Course Numbers, Symbols, and Abbreviations

Check the University Catalogs website at www.catalogs.umn.edu for the most current course information. The courses in this catalog are not offered every semester. To find out whether a course is offered during a particular semester, consult the online Class Schedule at onestop.umn.edu/registrar/registration/courses.html.

Course Designators
In conjunction with course numbers, departments and programs are identified by a 2-, 3-, or 4-letter designator prefix (e.g., CE for Civil Engineering, POL for Political Science, ECON for Economics). When no designator precedes the number of a course listed as a prerequisite, that prerequisite course is in the same department as the course being described.

Course Numbers
- 0xxx...Courses that do not carry credit toward any University degree.
- 1xxx...Courses primarily for undergraduate students in their first year of study.
- 2xxx...Courses primarily for undergraduate students in their second year of study.
- 3xxx...Courses primarily for undergraduate students in their third year of study.
- 4xxx...Courses primarily for undergraduate students in their fourth year of study; graduate students may enroll in such courses for degree credit. 4xxx courses can be counted for a Graduate School degree if the course is taught by a member of the graduate faculty or an individual appointed to Limited Teaching Status (LTS).
- 5xxx...Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

Course Symbols
The following symbols are used throughout the course prerequisites of most University catalogs to denote common and recurring items of information.

- *...Credit will not be granted if credit has been received for the course listed after this symbol.
- &...Concurrent registration is required (or allowed) in the course listed after this symbol.
- #...Approval of the instructor is required for registration.
- %...Approval of the department offering the course is required for registration.
- @...Approval of the college offering the course is required for registration.
- . ..In prerequisite listings, comma means “and.”
- 1-4 cr [max 6]...The course can be taken for 1 to 4 credits and may be repeated for up to 6 credits.

Abbreviations
The following abbreviations are used throughout the course prerequisites of most University catalogs to denote common and recurring items of information.

- Prereq....Course prerequisites.
- cr........Credit.
- div.......Division.
- DUS.......Director of undergraduate studies.
- equiv.......Equivalent.
- fr, soph, jr, sr...Freshman, sophomore, junior, senior.
- H.........Honors. Courses with an H following the course number satisfy honors requirements.
- V.........Honors and Writing Intensive. Courses with a V following the course number satisfy both honors and liberal education writing intensive requirements.
- W.........Writing Intensive. Courses with a W following the course number satisfy the writing intensive requirement for liberal education.
- A-F only....A-F grade basis only; course may not be audited or take pass/fail
- A-F or Aud....A-F grade basis, or course may be audited for no grade
- S-N only....S-N grade basis only (pass/fail), course may not be audited or taken A-F
- S-N or Aud....S-N grade basis (pass/fail), or course may be audited for no grade
- No Grade....No grade will be given for the course; typically used for laboratory components of courses
- OPT No Aud..Student selects the grading option; course may not be audited
- Stdnt Opt....Student selects the grading option; course may be audited

Course Listing Sample

Xology (Xolo)
Xology and Didactics
College of Liberal Education

Xolo 5101. Methods in Xology. (3-4 cr [max 8 cr]; A-F only. Prereq-3578 or #)

Historical, numerical, sociological, and Freudian methods of research in xology with applications to contemporary problems.

Credit will not be granted if credit has been received for the course listed after this symbol.
AHS 1101. Orientation to Health Careers. (1 cr.; Student Option No Audit; Every Fall & Spring) Interest/personality assessment, health-related academic majors/professions, professionalism/ethics in health care. Students integrate information about self and about careers to move toward major/career choice.

AHS 1102. Orientation to Health Careers. (1 cr.; Student Option No Audit; Every Fall & Spring) Web course. Fall/spring=1cr, summer=2cr. Interest/personality assessment, health-related academic majors/professions, professionalism/ethics. Integrating self-/career-related information.

AHS 1104. Experiences in Health. (2 cr.; Student Option: Every Fall, Spring & Summer) Non-physician roles in health care from traditional to alternative and complementary roles. Minimum 35 hour volunteer experience with instructor approval. prereq: AHS 1101 or AHS 1102 or AHS 1600


AHS 1601. The Future Physician II. (1 cr.; Student Option; Every Fall & Spring) A career in medicine. Life/work of physicians, what it takes to be successful. Issues/trends including Institute of Medicine core competencies, medical ethics, concept of health teams, multiculturalism, global issues, disparities in accessing medical care. prereq: Permission number; 1600 recommended

AHS 1602. The Future Physician III: Experiences in Health. (2 cr.; Student Option: Every Fall & Spring) Online course for students confident in decision to prepare for medical school. Exercises designed to learn about/prepare for career in medicine. Community-based volunteer experience (35 hours) in setting that employs physicians/serves patients. prereq: [1600 or 1601], instr consent

AHS 2300. Orientation to Clinical Research. (1 cr.; A-F only; Every Fall & Spring) Seminar. Field of clinical research. Ethical conduct/professionalism. Research methods pertinent to dentistry, medicine, public health, pharmacy, nursing. Field experience.

AHS 2400. Writing a Personal Statement. (1 cr.; S-N only; Every Fall & Spring) Develop competitive personal statement. Designed for students applying to health professional program in coming year.

AHS 3101. The New Health Professions Team. (2 cr.; Student Option; Every Spring) The future health of our world population requires a generation of creative, motivated, strategic, expansive thinkers prepared to collaborate across disciplines and sectors to preempt and address the causes of poor health in patients and populations. The knowledge and skills needed to be successful come from all disciplines, not just the health professions, and require us to learn about and work with each other. In addition to sharing discipline specific knowledge, the key is to translate concepts and language so interprofessional teams can identify, dissect, define, and solve health-related grand challenges together. This course will help students grow in their understanding and capacity to work in interdisciplinary teams in a multitude of settings, from serving patients to serving communities. As most of the knowledge, skills, and behaviors needed to work well with health care teams are the same for working successfully in general, this course also address many of the UMN Student Learning Outcomes (SLO) and Student Development Outcomes (SDO). prereq: This course is recommended for junior and senior undergraduate students pursuing a health career. Students are encouraged to take this course once they have completed many of their prerequisite courses for their major and health profession. Students are also encouraged to have had some experience working or volunteering so they have some context for the course information.

AHS 4300. Directed Study. (1-3 cr. [max 6 cr.]; Student Option: Every Fall, Spring & Summer) Students complete project under supervision of instructor from Health Careers Center. Students provide written update at end of each term. A written progress report is required at end of project. prereq: instr consent

AHS 5100. HIV Drug Discovery. (3 cr.; A-F only; Every Fall) Basic virology, medicinal chemistry, pharmacology of HIV chemotherapy. General process of drug discovery, including target selection/validation, in vitro assay development, computer-aided inhibitor design strategies/drug-like properties. Major classes of FDA-approved anti-HIV drugs. Intellectual properties, FDA regulatory issues, successful antiviral discovery story. prereq: One year of organic chemistry, [CHEM 2301 and 2302] or equivalent, [one semester of biochemistry]. [BIOC 3021 or equivalent]

ACCT 2050. Introduction to Financial Reporting. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Introduction to financial accounting for U.S. organizations. Reading financial statements. prereq: Soph


ACCT 3150. Role of the Accountant in Today's Finance Function. (1 cr.; Student Option: Every Fall & Spring) How to interact with financial, tax, audit, and IT personnel. How to be an accountant. Critical support role accountants play among market leading companies. Students define their vision for their accounting career. prereq: 2050

ACCT 3199. Internship in Public Accounting. (2 cr.; S-N or Audit; Every Fall & Spring) Full-time work for a public accounting firm plus a written report on the work experience. prereq: 5125, instr consent

ACCT 3299. Internship in Management Accounting. (2 cr.; S-N or Audit; Every Fall & Spring) Full-time work in general accounting, cost accounting, or internal auditing in an industrial or governmental organization plus a written report analyzing the work experience. prereq: Acct 3201, instr consent

ACCT 5101. Intermediate Accounting I. (4 cr.; A-F or Audit; Every Fall & Spring) Valuation, measurement, reporting issues related to selected assets/liabilities of firm. Theory underlying accounting issues. Applying accounting principles. prereq: Grade of at least B- in 2050, mgmt major or mgmt grad student, accounting certificate, select non mgmt students

ACCT 5102. Intermediate Accounting II. (4 cr.; A-F or Audit; Every Fall & Spring) Basic valuation problems encountered in financial reporting. Focuses on valuation of liabilities. Accounting for leases, pensions, and deferred taxes. Introduces consolidated financial statements. prereq: 5101[ mgmt or grad mgmt student]

ACCT 5125W. Auditing Principles and Procedures. (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer) Concepts of auditing internal control/financial statements in accordance with generally accepted auditing/professional standards established by Public Company Oversight Board (PCAOB) and American Institute of Certified Public Accountants (AICPA). Writing
Intensive course. prereq: [3101 or 5101 or 5100 or 6100], [acct major or grad mgmt student]

ACCT 5126. Internal Auditing. (2 cr. ; A-F or Audit; Every Fall & Spring) Financial/operational auditing. Standards. Managing the function. prereq: 2050

ACCT 5135. Fundamentals of Federal Income Tax. (4 cr. ; A-F or Audit; Every Fall, Spring & Summer) U.S. federal system of taxation. Concepts of gross income, deductions, credits. Analysis of structure of Internal Revenue Code, its provisions with respect to specific areas of law. Interrelationships between legislative, judicial, and administrative authority. Methods, tools, and techniques to conduct tax research. prereq: [2050 or MBA 6030], [mgmt or grad mgmt student]

ACCT 5160. Financial Statement Analysis. (2 cr.; A-F or Audit; Every Fall & Spring) Interpretation/analysis of financial statements. Introduces basic techniques of financial statement analysis and applies them in different settings (e.g., in investment/credit decisions). prereq: [5100/6100 or 3101/5101], [accounting or finance major]

ACCT 5180. Consolidations and Advanced Reporting. (2 cr.; A-F or Audit; Every Spring & Summer) Theory underlying preparation of consolidated financial statements, as well as mechanical computations needed to prepare statements. prereq: 5101, 5102 recommended, or MBA 6030. MBA students must register A/F grade base.

ACCT 5201. Intermediate Management Accounting. (2 cr.; A-F or Audit; Every Fall & Spring) Activity-based costing techniques in specific industries including service firms. Other topics could include costing for Just-in-Time manufacturing, tracking customer profitability, and costing quality. prereq: 3001, acct or finance major

ACCT 5236. Introduction to Taxation of Business. (2 cr.; A-F or Audit; Every Fall & Spring) Introduction to the income tax laws governing the taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students will also increase their knowledge and skills related to tax research by writing research memorandums. prereq: 5135, acct major

ACCT 5281. Special Topics in Financial Reporting. (2 cr.; A-F or Audit; Periodic Summer) Covers areas of financial reporting frequently encountered on CPA exam, including partnerships, governmental/nonprofit organizations, bankruptcy, reorganizations. prereq: 5101, 5102W recommended

ACCT 5310. International Accounting. (2 cr.; A-F or Audit; Every Fall & Spring) Causes/history of international differences in design of financial accounting/reporting systems, efforts to harmonize them into worldwide system. Role/impact of currency translation on financial statements. International Accounting Standards, conceptual framework. prereq: 5110; [5102 or concurrent registration is required (or allowed) in 5102] recommended

ACCT 5420. MAcc directed study. (1-4 cr.; Student Option; Every Fall, Spring & Summer) Internship or directed study in Master of Accountancy degree program. prereq: MAcc student


ACCT 6100. Financial Statement Analysis. (4 cr.; A-F only; Every Fall) Overview of asset/liability valuation, income measurement. How economic events are reported in the financial statements of a firm. Accounting theory/standard-setting process from perspective of users of financial statements. prereq: MBA 6030, MBA student


ACCT 6140. Managerial Economics. (3 cr.; A/F only; Every Fall & Spring) N/A prereq: MBA 6030, MBA 6035

ACCT 6201. Control and Incentives. (4 cr.; A-F only; Every Fall & Spring) Design of activity-based costing, performance measurement, and incentive systems to support strategy of firm. Use of accounting measurements in balanced scorecard, economic value-added, and decentralized decision making. Information issues in design of incentive systems. prereq: MBA 6235; micro economics recommended

ACCT 6320. Current Topics in Accounting. (1-4 cr.; A-F only; Periodic Fall & Spring) Topics vary. prereq: MBA 6130, MBA student

ACCT 6335. Advanced Managerial Accounting. (2 cr.; A-F or Audit; Every Spring) Topics of current interest. Detailed treatment of concepts learned in core. Application of concepts in complex settings. Harvard cases. prereq: MBA 6035 or MBA 6235


ACCT 6603. Advanced Auditing. (4 cr.; A-F only; Every Fall) Auditing of derivatives, business combinations, fair value instruments, and other accounting topics. Evaluating the discipline of forensic accounting.

ACCT 6604. Advanced Management Accounting. (2 cr.; A-F only; Every Fall) Advanced Management Accounting will expose students to the application of management accounting from a strategic perspective. Students will deepen their knowledge and understanding of management accounting’s role in areas such as sustainability, environmental accounting, time-based accounting, including time-based activity-based costing, activity-based management, value chain analysis, business process re-engineering, benchmarking, target costing, product life cycle management, quantifying qualitative improvements and ‘big data’. Via cases and discussion of current articles, students will explore the most current and challenging issues facing management accountants.

ACCT 6605. Negotiations for Financial Executives. (2 cr.; A-F only; Every Spring) In Negotiations for Financial Executives, students will develop an individual negotiating style and learn to adapt their negotiating style to various situations. Students will learn the methods and frameworks for negotiating effectiveness: preparation, setting high expectations, listening, and a commitment to ethics. During the class, students will have opportunities to apply the preparation model to plan a negotiation and actually apply their knowledge in a live case situation.

ACCT 8800. Empirical Research: Topics I. (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring) Current research topics that are cutting-edge and in instructor's area of expertise. Topics vary.

ACCT 8802. Empirical Research - Capital Markets I. (2 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Empirical capital markets research topics course. The course is designed to include current research topics in capital markets that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8803. Empirical Research: Capital Markets II. (2 cr.; Student Option; Every Fall & Spring) The course is designed to include current research topics in capital markets that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8804. Empirical Research Topics II. (2 cr.; Student Option; Every Fall & Spring) Current research topics that are cutting edge and in instructor's area of expertise. Topics in the area will vary.

ACCT 8811. Information Economics I. (4 cr.; Student Option; Periodic Fall & Spring) Asymmetric information, incentives, and contracts. Moral hazard, adverse selection, reputation, and signaling phenomena. Applications to accounting such as transfer pricing, budgeting, cost allocations, performance measurement, audit pricing. prereq: Business admin PhD student or instr consent

ACCT 8812. Information Economics II. (4 cr.; Student Option; Every Fall & Spring) Information in capital markets: asset pricing with asymmetric information; economics of disclosure and information acquisition. prereq: Business admin PhD student or instr consent

ACCT 8831. Analytical Research Topics I. (2 cr.; Student Option; Every Fall & Spring) The course is designed to include current analytical research topics that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8832. Analytical Research Topics II. (2 cr.; Student Option; Every Fall & Spring) The course is designed to include current analytical research topics that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8892. Readings in Accounting. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Readings appropriate to an individual student's program or objectives that are not available in regular courses. prereq: Business admin PhD student or instr consent

ACCT 8894. Research in Accounting. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Individual research on an approved topic appropriate to student's program and objectives. prereq: Business admin PhD student or instr consent


ADDS 5031. Applied Psychopharmacology. (2 cr.; A-F only; Every Fall & Spring) Categories of psychoactive drugs. Medicines to treat mental disorders. Substances such as alcohol, nicotine, cocaine, and marijuana. What occurs physiologically when someone takes a psychoactive drug.


ADDS 5051. Methods and Models II: Cognitive Behavioral Therapy. (2 cr.; A-F only; Every Fall, Spring & Summer) Components of cognitive model. Assessment, case formulation, automatic thoughts, core beliefs, cognitive restructuring, behavioral change elements, therapeutic relationship. Learn, practice, master key concepts.

ADDS 5061. Foundations of Group Work. (3 cr.; A-F only; Every Fall & Spring) Designing/facilitating therapy groups. Intra-/inter-personal dynamics, leadership skills, developmental aspects, ethical issues. Application to therapy of chemically addicted individuals. Lectures, discussion, experiential exercises, small groups, readings.

ADDS 5071. Foundations of Co-occurring Disorders. (2 cr.; A-F only; Every Fall, Spring & Summer) Understanding mentally ill/chemically abusive or dependent client. Intervention, advocacy, education, support for client/those part of his/her environment. Social, environmental, multicultural factors that contribute resources for these clients.

ADDS 5081. Multicultural Foundations of Behavioral Health. (3 cr.; A-F only; Every Fall & Spring) What is culture? How might culture, cultural practices, and history be significant in the use/abuse of substances? How is culture relevant to the attitudes/practices in the prevention/treatment of substance use/abuse? Multicultural counseling and cultural competence in addiction counseling. People as individuals. Clinician's own cultural worldview/other cultural worldviews.

ADDS 5091. Assessment and Treatment Planning I. (3 cr.; A-F only; Every Fall, Spring & Summer) Core addictions counseling. Clinical assessment, case management, documentation treatment planning, ethical issues. Students begin process of securing internship.

ADDS 5121. Professional Seminar 1. (1 cr.; S-N only; Every Fall, Spring & Summer) Prepares students for successful entry into field of substance use disorder counseling by focusing on facets that are critical to their professional development. Through discussions, experiential learning activities, guest lectures and site visits, students gain further understanding of the internship placement process and requirements, settings that fit their individual training and career goals, requirements for initial licensing and renewal, the testing process, models of professional development, the importance of professional advocacy and associations, self-care and requirements and benefits of clinical supervision. Professional ethics, including state rules, statutes, codes of conduct and regulations for practitioners and agencies are also addressed. Students will also develop their job search skills and apply them to secure a field placement for the internship seminar.

ADDS 5224. Integrating Spirituality in Counseling Practice. (2 cr.; A-F only; Every Fall, Spring & Summer) Knowledge/skills of counseling students/practitioners in professional competencies for addressing spiritual/religious issues. Lecture, discussion, experiential exercises/readings to advance cognitive, interpersonal/practical skills. Treatment of persons with co-occurring disorders.

ADDS 5950. Special Topics. (1-4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Special topics in addiction studies. prereq: dept consent

ADDS 5993. Directed Study. (1-3 cr.; max 9 cr.); Student Option; Every Fall, Spring & Summer) Directed study. prereq: dept consent

ADDS 5994. Directed Research. (1-3 cr.; max 9 cr.); A-F only; Every Fall, Spring & Summer) Directed research. prereq: dept consent

ADDS 5996. Internship in Behavioral Health. (1-8 cr.; S-N or Audit; Every Fall & Spring) Supervised field work experience. Practical application of substance abuse counseling. Assessment, treatment planning, case management, prereq: [5001 or 5011], [5021, 5003 or 5031], [5002 or 5041], [4001 or 5091], and ADDS 5121 (for students admitted Sp 15 and later) Department permission required.

Adult Psychiatry (ADPY)

ADPY 5515. Neuropsychology: University Hospitals. (3-9 cr.; O-N or Audit; Every Fall)
ADPY 7109. Adult Psychiatry: Duluth. (6 cr.; H-N or Audit; Every Fall & Spring) This externship in adult psychiatry provides a clinical exposure to the broad spectrum of psychiatric problems encountered in the general practice of psychiatry. The student has the opportunity to see and evaluate the various psychiatric syndromes from a hospital-based psychiatric unit. The program emphasizes an understanding of the psychodynamics, family interaction, sociological issues, and general life stresses precipitating the psychiatric picture. Subsequent treatment possibilities also are stressed, and the student has an opportunity for participating in treatment efforts at the hospital. In addition, the student may attend seminars and staff activities at St. Luke's Hospital & Regional Trauma Center. Miller-Dwan Hospital, the Medical Center, and St. Mary's Hospital in Duluth also are used. Efforts are made to fulfill the wishes of the student when possible. Prereq: SPECIAL INSTRUCTIONS: Students must contact the UMD Department of Family Medicine, 10 University Drive, Duluth, MN 55812 [218-726-7916] at least one month prior to quarterly cancel/add deadline.

ADPY 7121. Descriptive Psychiatry. (2 cr.; max 4 cr.; H-N or Audit; Periodic Fall) Diagnostic syndromes encountered in physical-disabilities/psychosocial work settings. Clinical presentations of common diagnoses. General diagnostic criteria. Intervention alternatives. Prereq: [OT or PT] student, instr consent

ADPY 7500. Psychiatry Externship. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) This course is a requirement for all third year medical students. Its goal is to prepare medical students to recognize, diagnose, and care for patients with psychiatric disorders encountered in most normal clinical situations. At the beginning of the course the student is given an outline of specific course objectives plus other orientation materials. The student is assigned to work with interdisciplinary teams that aid the student in meeting course objectives. The student is assigned patients and will follow both in-hospital and outpatients. They attend teaching rounds and a variety of teaching conferences. They are given a series of lectures/discussions at their individual teaching sites. Each student is required to write a brief paper concerning a patient-related problem.

ADPY 7501. Elective Rotation in Alcohol Problems Clinics. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) The Alcohol Problems Clinics provide an integrated approach for medically-ill heavy drinkers. Primary medical care is provided along with alcohol intervention by all members of an interdisciplinary team. This rotation is designed for the student who will provide primary or specialty medical care in any specialty, such as family practice, internal medicine, surgery, or psychiatry. Prereq: Med 7500 and AdPy 7500

ADPY 7502. Elective Rotation in Addiction Medicine. (6 cr.; H-N or Audit; Every Fall & Spring) Elective rotations are offered in a variety of substance abuse treatment settings. Our program is innovative and flexible, using interventions from many schools. Each treatment plan is fully individualized, and may include 12-step approaches, Rational Recovery, social learning theory, and psychiatric care. Designed for students of any specialty. Prereq: AdPy 7-500

ADPY 7503. Elective Experience in Research in Addiction Medicine. (3-6 cr.; H-N or Audit; Every Fall & Spring) A variety of clinical research projects offer the student excellent opportunities for developing research skills, as well as a deeper understanding of the addiction process. Ongoing projects include research on medical complications of alcoholism, treatment of alcohol and other drug dependence, brain imaging, neuropsychological testing and impairment, case management, and homelessness and alcohol/drugs. Other projects are available or possible and can be arranged. Prereq: Approval of course director

ADPY 7505. Assessment and Treatment of Torture Victims. (2 cr.; H-N or Audit; Every Fall, Spring & Summer) How to assess/treat survivors of political torture. As part of an interdisciplinary team, students have patient contact, participate in special projects. Two-week field experience. Prereq: 7500, MED 7500, med sr

ADPY 7512. Medical-Surgical Psychiatry: Consultation: Liaison. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer) The student is teamed with a resident and staff who supervise progressive participation in service activities. Case-directed teaching is complemented by seminars with assigned readings and service conferences.

ADPY 7514. Substance Abuse and Associated Psychiatric Disorders. (6 cr.; H-N or Audit; Periodic Fall & Spring) The student works with patients with substance use and/or abuse disorders. The student's involvement covers a spectrum of services including inpatient, intensive outpatient program, partial hospitalization, outpatient program, and outpatient follow-up. Supervision is conducted by Senior G-4 Resident and Staff. Prereq: Approval of course director

ADPY 7516. Fairview Recovery Services at Fairview-University Medical Center. (2-3 cr.; H-N or Audit; Every Fall, Spring & Summer) The student's time is spent primarily in group therapy and lecture settings in the adult chemical dependency unit. The student will meet with the medical director during the rotation.

ADPY 7518. Outpatient Geriatric Psychiatry. (2-6 cr.; H-N only; Every Fall, Spring & Summer) See patients 60+ years/families. Evaluate brain-behavior complications of medical/neurological illness. Learn gold standard assessment of dementias at VAMC GRECC clinic/Memory Clinic. See components of driving evaluation. Visit nursing home. Attend consensus conferences. Prereq: 7500.

ADPY 7530. Psychiatry Scholarly Work. (4 cr.; H-N only; Every Fall, Spring & Summer) The student arranges a program with a faculty supervisor. Choosing the supervisor and the content of the course is the student's responsibility and must be approved by the faculty supervisor and course director. The student arranges a program with a faculty supervisor. Choosing the supervisor and the content of the course is the student's responsibility and must be approved by the faculty supervisor and Dr. Mackenzie.

ADPY 7640. Essentials of Interdisciplinary Health Care. (1 cr.; H-N or Audit; Periodic Fall & Spring) Knowledge/skills to work successfully in interdisciplinary health care. Web-based course.

ADPY 7910. Adult Psychiatry Medical Residency. (6 cr.; max 120 cr.; No Grade Associated; Every Fall, Spring & Summer) Adult psychiatry medical residency.

ADPY 7911. Psychiatry PGY-1 at VA Medical Center. (8 cr.; max 24 cr.; H-N or Audit; Every Spring & Summer) Introduction to wide variety of psychiatric topics. Lectures by invited speakers and by clinical/psychiatric faculty. Prereq: PGY-1 psychiatry resident, dept consent

ADPY 7930. Adult Psychiatry Medical Fellowship. (6 cr.; max 120 cr.; No Grade Associated; Every Fall, Spring & Summer) Adult psychiatry medical fellowship.

ADPY 7952. Geriatric Psychiatry Fellowship VA Med Ctr. (8 cr.; max 24 cr.; H-N or Audit; Periodic Fall) Fifth year fellowship in geriatric psychiatry at VA Medical Center. Prereq: Psychiatric resident/fellow, dept consent

ADPY 7971. Consultation Liaison Psychiatric Fellowship. (8 cr.; H-N or Audit; Every Spring & Summer) Fifth year fellowship in consult-liaison psychiatry. Prereq: C-L fellow/psychiatric resident, dept consent

ADPY 7972. Psychiatric Child Fellowship Year I. (8 cr.; max 24 cr.; H-N or Audit; Every Fall, Spring & Summer) First year of two-year fellowship in child/adolescent psychiatry, PGY-4 level. Prereq: Psychiatric resident/fellow, dept consent

ADPY 7973. Chemical Dependency Fellowship. (8 cr.; max 24 cr.; H-N or Audit; Every Spring & Summer) Fifth year fellowship in addiction psychiatry medicine. Prereq: Psychiatric resident/fellow, dept consent

ADPY 7974. Eating Disorders Fellowship. (8 cr.; max 24 cr.; H-N or Audit; Every Spring & Summer) Fifth year fellowship in psychiatry eating disorders at Fairview-University Medical Center. Prereq: Psychiatric resident/fellow, dept consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

AEM 2301. Mechanics of Flight. (3 cr.; A-F or Audit; Every Spring) Standard atmospheric properties, basic aerodynamics, generation of lift/drag. Airfoils, finite wings. Elements of aircraft performance and atmospheric flight mechanics. Introduction to MatLab and simulations for aircraft design. prereq: PHYS 1301W, [concurrent registration is required (or allowed) in Math 2374 or equiv], CSE

AEM 3031. Deformable Body Mechanics. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Uniaxial loading/deformation. Stress/strain at point, Mohr's circle. Internal forces in beams. Material behavior, linear elasticity. Torsion of circular shafts. Bending of beams of symmetrical section. Column buckling. Statically indeterminate structures. prereq: [2012 or equiv], [MATH 2373 or equiv], CSE

AEM 3100. Software Applications in AEM. (3 cr.; S-N only; Every Fall & Spring) Topics covering software applications for problems of interest. prereq: [CSCI 1113 or equiv], [CSCI major]

AEM 3101. Mathematical Modeling and Simulation in Aerospace Engineering. (2 cr.; A-F only; Every Fall) Mathematical modeling of engineering systems/numerical methods for their solution. Use of MatLab. Focus on systems found in aerospace engineering/mechanics. prereq: [MATH 2373 or equiv], AEM major

AEM 3391. Independent Design Project. (3 cr.; A-F only; Every Spring) Independent design project construction/testing under guidance of faculty member. Group projects allowed. Students responsible for finding faculty adviser for project. Final project report (written or oral), prereq: department consent

AEM 4000H. Honors Research Seminar. (0 cr.; S-N only; Every Fall & Spring) Research seminars in aerospace engineering and mechanics, given by faculty members and visiting scholars. prereq: Honors student, permission of University Honors Program, AEM major

AEM 4021. Fluid Mechanics. (4 cr.; A-F or Audit; Every Fall) First course in fluid mechanics. Stress/strain rate descriptions, fluid statics. Use of differential and finite control volume analysis with continuity. Momentum/energy equations, Bernoulli/Euler equations, vorticity, potential flow, incompressible viscous flow using Navier-Stokes equations, dimensional analysis, pipe flow, boundary layers, separation, introduction to turbulence. prereq: [Math 2373 or equiv], [MATH 2373 or equiv], CSE


AEM 4203. Aerospace Propulsion. (4 cr.; A-F or Audit; Every Spring) Basic one-dimensional flows: isentropic, area change, heat addition. Overall performance characteristics of propellers, ramjets, turbojets, turboprops, rockets. Performance analysis of inlets, exhaust nozzles, compressors, burners, and turbines. Rocket flight performance, single/multi-stage chemical rockets, liquid/solid propellants. prereq: 4202, [CSE upper div or grad student]


AEM 4253. Computational Fluid Mechanics. (3 cr.; A-F only; Every Fall) Introductory concepts in finite difference and finite volume methods as applied to various ordinary/partial differential model equations in fluid mechanics. Fundamentals of spatial discretization and numerical integration. Numerical linear algebra. Introduction to engineering and scientific computing environment. Advanced topics may include finite element methods, spectral methods, grid generation, turbulence modeling. prereq: 4201, CSCI 1113, CSE upper division

AEM 4295. Problems in Fluid Mechanics. (1-3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Topics of current interest. Individual projects with consent of faculty sponsor. prereq: dept consent

AEM 4301. Orbital Mechanics. (3 cr.; A-F only; Every Spring) The two-body problem. Earth-satellite operations, rocket performance, reentry dynamics, space environments, interplanetary trajectories. Numerical simulations. Design project. prereq: [2012 or equiv], [MATH 2373 or equiv], [CSE upper div or grad student]

AEM 4303W. Flight Dynamics and Control. (WI; 3 cr.; A-F only; Every Spring) Forces/moments, trim, linearization, transfer functions, dynamic response characteristics
for aircraft. Aircraft stability/control derivatives, static longitudinal/lateral stability. Phugoid, short period, spiral, roll subsidence, dutch roll modes. Handling qualities. Design project. prereq: [2012, 2301, 3101, [WRT 1301 or equiv]. [CSE upper div or grad student]] or instr consent

AEM 4305. Spacecraft Attitude Dynamics and Control. (3 cr.; A-F or Audit; Every Spring)
Kinematics/dynamics for six-degree of freedom rigid body motions. Euler's angles/equations. Torque free motion, spin stabilization, dual-spin spacecraft, nutation damping, gyroscopic attitude control, gravity gradient stabilization. Linear systems analysis, Laplace transforms, transfer functions. Linear control theory. PID controllers. prereq: [4301, [3101 or ME 3281 or EE 3015], CSE upper div or] grad student

AEM 4321. Automatic Control Systems. (3 cr.; A-F only; Every Fall)
Modeling, characteristics, and performance of feedback control systems. Stability, root locus, and frequency response methods. Nyquist and Bode diagrams. Lead-lag and PID compensators. Digital implementation and hardware considerations. prereq: CSE upper div or grad student

AEM 4331. Aerospace Vehicle Design. (4 cr.; A-F only; Every Fall)
Multidisciplinary student teams perform conceptual designs of aerospace vehicles, components, missions, or systems that incorporate realistic constraints/applicable engineering standards. Papers on professional ethics/contemporary aerospace issues. Oral preliminary/critical design reviews. prereq: [2301, 4202, AEM sr] or instr consent

AEM 4333. Aerospace Design: Special Projects. (3 cr.; max 6 cr.; Student Option; Every Spring)
Student groups design, build, and test aerospace projects. Projects include designs from 4331 or projects such as microgravity experiments. Students keep design log/ notebook, prepare status reports, and give final oral presentation. prereq: 4331 or instr consent

AEM 4371. Helicopter Aerodynamics. (3 cr.; Student Option; Periodic Fall)
Review of basic aerodynamics, unique features of helicopters, momentum theory in axial flight/rotor flow states, momentum theory in non-axial flight, blade-element theory, vortex theory, helicopter equations of motion. Design project. prereq: 2301, 3101, 4202. [CSE upper div or grad student]

AEM 4391. Independent Design Project. (3 cr.; A-F only; Every Spring)
Independent design project construction and testing under the guidance of a faculty member. Projects may include designs from 4331 and group projects are allowed. Students are responsible for finding a faculty adviser for their project. Final project report (written or oral). prereq: 4331, dept consent

AEM 4495. Problems in Aerospace Systems. (3 cr.; A-F only; Every Fall, Spring & Summer)
Topics of interest or individual projects.

AEM 4501. Aerospace Structures. (3 cr.; A-F or Audit; Every Spring)
Advanced strength of materials analysis of elastic structures with aerospace applications; failure modes and criteria, buckling, matrix methods for analysis, plane truss design; energy and Castigliano methods for statically determinate and indeterminate structures; torsion and bending of asymmetrical thin-walled sections. Design project. prereq: CSE upper div or grad, 3031 or equiv

AEM 4502. Computational Structural Analysis. (3 cr.; Student Option; Fall Odd Year)
Application of finite element methods to problems in structural analysis. Emphasizes properly posing problems and interpreting calculation results. Use of commercial FEA packages. Introduction to theory of finite elements. prereq: [Grade of at least C in 4501, [CSE upper div or grad student]] or instr consent

AEM 4511. Mechanics of Composite Materials. (3 cr.; Student Option; Every Spring)
Analysis, design, and applications of laminated and chopped fiber reinforced composites. Micro-/macro-mechanical analysis of elastic constants, failure, and environmental degradation. Design project. prereq: 3031, [CSE upper div or grad student]

AEM 4581. Mechanics of Solids. (3 cr.; Student Option; Fall Even Year)
Continuum mechanics in one dimension: kinematics; mass, momentum/energy constitutive theory. Wave propagation, heat conduction. Strings. Euler-Bernoulli theory. 3-D deformations/stress. Topics from fracture mechanics, structural stability, vibrations, thin films, layered media, smart materials, phase transformations, 3-D elastic wave propagation. Elasticity, viscoelasticity, plasticity. prereq: 3031, [Math 2373 or equiv], [Math 2374 or equiv]. CSE upper div

AEM 4595. Problems in Mechanics and Materials. (1-3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer)
Topics of current interest. Individual projects with consent of faculty sponsor. prereq: dept consent

AEM 4601. Instrumentation Laboratory. (3 cr.; A-F or Audit; Every Spring)
Introduction to lab instrumentation. Computerized data acquisition. Statistical analysis of data. Time series data, spectral analysis. Transducers for measurement of solid, fluid, and dynamical quantities. Design of experiments. prereq: CSci 1113, EE 3005, EE 3006, [upper div CSE or grad student]

AEM 4602W. Aeromechanics Laboratory. (WI; 4 cr.; A-F or Audit; Every Fall)

AEM 4796. Professional Experience. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Work experience with substantive engineering component. Written report. prereq: CSE upper div, AEM major, dept consent

AEM 4894H. Senior Honors Thesis. (3 cr.; A-F only; Every Spring)
Writing thesis under direction of AEM faculty member. prereq: Honors student, permission of University Honors Program, AEM major

AEM 4896. International Professional Experience. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
International work experience with substantive engineering component. Written report. prereq: CSE upper div. AEM major, dept consent

AEM 5247. Hypersonic Aerodynamics. (3 cr.; A-F or Audit; Spring Odd Year)
Importance/properties of hypersonic flow. Hypersonic shock and expansion-wave relations. Local surface inclination methods. Approximate/exact methods for hypersonic inviscid flow fields. Viscous flow: boundary layers, aerodynamic heating, hypersonic viscous interactions, computational methods. Hypersonic propulsion and vehicle design. prereq: 4202 or equiv. CSE grad student

AEM 5253. Computational Fluid Mechanics. (3 cr.; A-F or Audit; Every Fall)
Introductory concepts in finite difference and finite volume methods as applied to various ordinary/partial differential model equations in fluid mechanics. Fundamentals of spatial discretization and numerical integration. Numerical linear algebra. Introduction to engineering and scientific computing environment. Advanced topics may include finite element methods, spectral methods, grid generation, turbulence modeling. prereq: 4201 or equiv, [CSci 1113 or equiv]. CSE grad student

AEM 5321. Modern Feedback Control. (3 cr.; Student Option; Every Fall)
State space theory for multiple-input-multiple-output aerospace systems. Singular value decomposition technique, applications to performance/robustness. Linear quadratic gaussian and eigenstructure assignment design methods. Topics in H[infinity symbol] control. Applications. prereq: 4201 or EE 4231 or ME 5281 or equiv

AEM 5333. Design-to-Flight: Small Uninhabited Aerial Vehicles. (3 cr.; A-F only; Periodic Spring)
Designing, assembling, modeling, simulating, testing/flying of uninhabited aerial vehicles. Rapid prototyping software tools for vehicle modeling. Guidance, navigation, flight control, real-time implementations, hardware-in-the-loop simulations, flight tests. prereq: [4201, concurrent registration is required (or allowed) in 4303W, 4601] or instr consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
AEM 5401. Intermediate Dynamics. (3 cr.; A-F or Audit; Every Fall) Three-dimensional Newtonian mechanics, kinematics of rigid bodies, dynamics of rigid bodies, graphical coordinates, holonomic constraints, Lagrange equations, applications. prereq: CSE upper div or grad, 2012, Math 2243

AEM 5451. Optimal Estimation. (3 cr.; Student Option; Fall Every Year) Basic probability theory, Batch/recursive least squares estimation. Filtering of linear/non-linear systems using Kalman and extended Kalman filters. Applications to sensor fusion, fault detection, and system identification. prereq: [[MATH 2243 or STAT 3021 or equiv], [4321 or EE 4231 or ME 5281 or equiv]] or instr consent

AEM 5495. Topics in Aerospace Systems. (1-4 cr.; A-F or Audit; Every Fall, Spring & Summer) Topics of current interest. Individual projects with faculty sponsor. prereq: dept consent

AEM 5501. Continuum Mechanics. (3 cr.; Student Option; Every Fall) Concepts common to all continuous media; elements of tensor analysis; motion, deformation, vorticity; material derivatives; mass, continuity equation; balance of linear, angular momentum; geometric characterization of stress; constitutive equations. prereq: CSE upper div or grad, 3031, Math 2243 or equiv or instr consent

AEM 5503. Theory of Elasticity. (3 cr.; A-F or Audit; Every Spring) Introduction to the theory of elasticity, with emphasis on linear elasticity. Linear and nonlinear strain measures, boundary-value problem for linear elasticity, plane problems in linear elasticity, three dimensional problems in linear elasticity. Topics from nonlinear elasticity, micromechanics, contact problems, fracture mechanics. prereq: 4501 or equiv, Math 2263 or equiv or instr consent

AEM 5581. Mechanics of Solids. (3 cr.; Student Option; Fall Every Year) Continuum mechanics in one dimension: kinematics; mass, momentum/energy, constitutive theory. Wave propagation, heat conduction. Strings. Euler-Bernoulli theory. 3-D deformational theories. Topics from fracture mechanics, structural stability, vibrations, thin films, layered media, smart materials, phase transformations, 3-D elastic wave propagation. Elasticity, viscoelasticity, plasticity. prereq: 3031 or equiv, [Math 2373 or equiv], [Math 2374 or equiv], [CSE grad student]

AEM 5561. Aerelasticity. (3 cr.; A-F or Audit; Every Fall) Static aerelastic phenomena, torsional divergence of a lifting surface, control surface reversal. Aeroelastic flutter, unsteady aerodynamics. Problems of gust response, buffeting. Design project. prereq: 4202, 4301, [grad student or CSE upper div]

AEM 8000. Seminar: Aerospace Engineering and Mechanics. (1 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring) To be determined prereq; DGS consent

AEM 8201. Fluid Mechanics I. (3 cr.; Student Option; Every Fall) Mathematical and physical principles governing the motion of fluids. Kinematic, dynamic, and thermodynamic properties of fluids; stress and deformation; equations of motion; analysis of rotational and irrotational inviscid incompressible flow; two-dimensional and three-dimensional potential flow. prereq: 4201 or equiv, Math 2263 or equiv

AEM 8202. Fluid Mechanics II. (3 cr.; Student Option; Every Spring) Analysis of incompressible viscous flow; creeping flows; boundary layer flow. prereq: 8201

AEM 8203. Fluid Mechanics III. (3 cr.; Student Option; Every Fall) Analysis of compressible flow and shock waves; method of characteristics for one-dimensional unsteady flow and for two-dimensional steady flow. prereq: 8202

AEM 8207. Hydrodynamic Stability. (3 cr. [max 4 cr.]; Student Option; Periodic Fall) Theory of hydrodynamic stability. Stability of shear flows, rotating flows, boundary layer, two fluid flows, fingering flows, Rayleigh-Taylor instability, Kelvin-Helmholtz instability, capillary instability, convective/absolute stability. Methods of linear stability, normal modes, energy theory of stability, nonlinear perturbation, bifurcation theory, transition to turbulence. prereq: 8201

AEM 8211. Theory of Turbulence I. (3 cr.; Student Option; Periodic Fall) Reynolds equations, methods of averaging, elements of stability theory and vortex dynamics; description of large vortical structures in mixing layers and boundary layers; horseshoe vortices; flow visualization. prereq: 8202

AEM 8212. Theory of Turbulence II. (3 cr.; Student Option; Periodic Fall) Prandtl's mixing length theory applied to classical boundary layer, pipe, jet, and wake flows; prediction methods used at Stanford Conference; law of wall; law of wake; K-epsilon method. prereq: 8211

AEM 8213. Turbulent Shear Flows. (3 cr.; A-F or Audit; Periodic Fall) Equations of motion for turbulent flow. Isotropic/homogeneous turbulence. Free shear flows. Wall turbulence, elements of vortex dynamics. prereq: 8201, 8202

AEM 8221. Rheological Fluid Mechanics. (3 cr.; Student Option; Periodic Fall) Methods of solution for flows of simple fluids with general constitutive equations. Topics from viscometric flow, extensional flow, perturbations of the rest state with steady and unsteady flow, secondary flow. prereq: 8201 or 5501 or instr consent

AEM 8231. Molecular Gas Dynamics. (3 cr.; Student Option; Periodic Fall) Kinetic theory of gases, Boltzmann equation, Maxwell-Boltzmann distribution, collisions, transport properties. Introduction to quantum mechanics. Statistical thermodynamics, classical/quantum statistics. Partition functions and thermodynamic properties. Irreversible thermodynamics. prereq: [4201 or equiv], [4203 or equiv], [ME 3324 or equiv]

AEM 8232. Physical Gas Dynamics and Molecular Simulation. (3 cr.; A-F or Audit; Periodic Fall) Molecular description of gas dynamics. Kinetic theory, transport theory, quantum mechanics for internal energy partitions, statistical thermodynamics. Finite rate chemical kinetics. Emphasis on link to continuum fluid dynamics. Overview of numerical simulation techniques for the Boltzmann equation with emphasis on direct simulation Monte Carlo. prereq: AEM 8231

AEM 8241. Perturbation Methods in Fluid Mechanics. (3 cr.; Student Option; Periodic Fall) Method of matched asymptotic expansions presented through simple examples and applied to viscous flows at high and low Reynolds numbers and other problems in fluid mechanics and applied mathematics. prereq: 8202 or instr consent

AEM 8251. Finite-Volume Methods in Computational Fluid Dynamics. (3 cr.; Student Option; Periodic Fall) Development of finite-volume computational methods for solution of compressible Navier-Stokes equations. Accuracy, consistency, and stability of numerical methods; high-resolution upwind shock-capturing schemes; treatment of boundary conditions; explicit and implicit formulations; considerations for high performance computers; recent developments and advanced topics. prereq: 4201 or 8201 or equiv, CSci 1107 or equiv


AEM 8261. Nonlinear Waves in Mechanics. (3 cr.; Student Option; Periodic Fall) Theory of kinematic, hyperbolic, and dispersive waves, with application to traffic flow, gas dynamics, and water waves. prereq: 5501 or instr consent

AEM 8271. Experimental Methods in Fluid Mechanics. (3 cr.; Student Option; Periodic Fall) Overview of computer organization, including external communications and A/D, D/A conversion. Measurement techniques, such as pressure measurements and hot-wire and laser Doppler anemometry. Signal processing and uncertainty; computer control of experiments. prereq: 4201, instr consent

AEM 8295. Selected Topics in Fluid Mechanics. (1-4 cr.; [max 8 cr.]; Student Option; Periodic Fall, Spring & Summer) Includes individual student projects completed under guidance of a faculty sponsor. prereq: dept consent
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AEM 8333. FTE: Master's. ( ; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

AEM 8400. Seminar: Aerospace Systems. ( ; 1 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring) Developing program of research in aerospace systems. Discussions of current research/topics of interest. prereq: Aerosp Eng grad student


AEM 8421. Robust Multivariable Control Design. ( ; 3 cr. ; Student Option; Periodic Spring) Application of robust control theory to aerospace systems. Role of model uncertainty/modeling errors in design process. Control analysis and synthesis, including H[sub 2] and H[infinity symbol] optimal control design and structural singular value [Greek letter mu] techniques. prereq: 5321 or equiv

AEM 8423. Convex Optimization Methods in Control. ( ; 3 cr. ; A-F or Audit; Periodic Fall) Practical aspects of convex optimization methods applied to solve design/analysis problems in control theory. prereq: 5321 or EE 5231 or equiv

AEM 8426. Optimization and System Sciences. ( ; 3 cr. ; A-F or Audit; Periodic Fall) Review of probability concepts and random variables, nonlinear stochastic differential equations and their numerical solutions, Monte-Carlo simulations, Gauss-Markov process, stochastic dynamic programming, and optimal control of practical uncertain dynamic systems. prereq: 5231 or 5431, CSE grad student


AEM 8444. FTE: Doctoral. ( ; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

AEM 8451. System Identification: Theory and Applications. ( ; 3 cr. ; A-F or Audit; Periodic Spring) Modeling methods for dynamic systems using measurement data, or in combination with first principles, based on theory of systems/signals. Primary emphasis on linear systems for control system design/simulation applications. Examples from aerospace applications. prereq: 4321 or equiv

AEM 8495. Advanced Topics in Aerospace Systems. ( ; 1-4 cr. [max 9 cr.]; A-F or Audit; Every Fall, Every Fall, Spring & Summer) Individual student projects completed under guidance of a faculty sponsor. prereq: dept consent

AEM 8500. Research Seminar in Mechanics of Materials. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Seminars given by students, faculty, and visitors on topics drawn from current research. prereq: instr consent

AEM 8511. Advanced Topics in Continuum Mechanics. ( ; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall) Constitutive equations; invariance and thermodynamic restrictions. Nonlinear elasticity theory; exact solutions, minimization, stability. Non-Newtonian fluids; viscometric flows, viscometric functions, normal stress. Other topics may include reactive and/or nonreactive mixtures, nonlinear plasticity, and deformable electromagnetic continua. prereq: 5501 or instr consent

AEM 8521. Advanced Topics in Elasticity. ( ; 3 cr. ; A-F or Audit; Periodic Fall) Contact stresses, finite deformations, and other topics. prereq: 5503

AEM 8523. Elasticodynamics. ( ; 3 cr. ; A-F or Audit; Periodic Fall) Waves and vibrations in rods, beams, and plates; dispersion; volume and surface waves; reflection; energy theorems; vibrations of bounded media and relation to technical theories; elements of nonlinear waves, inelastic waves, and stability of motion of elastic systems. prereq: 4581 or 5501 or instr consent


AEM 8531. Fracture Mechanics. ( ; 3 cr. ; A-F or Audit; Periodic Fall & Spring) Theories of mechanical breakdown. Kinetic rate theories and instability considerations; formation of equilbrium cracks and circular crack propagation under pulses; statistical aspects of strength and fracture of micromolecular systems; time and temperature dependency in fracture problems and instability of compressed material systems. prereq: 5503 or instr consent

AEM 8533. Theory of Plasticity. ( ; 3 cr. ; Student Option; Periodic Fall) Theory of permanent deformation of ductile metals; bi-linear material models, Drucker’s three bar truss, and other examples; 3-D continuum formulation, yield surfaces, hardening rules, and material stability; slip line theory, Prandtl punch solution; single crystal plasticity. prereq: 5203 or instr consent

AEM 8541. Mechanics of Crystalline Solids. ( ; 3 cr. ; Student Option; Periodic Fall) Atomic theory of crystals and origins of stress in crystals. Relation between atomic and continuum description; phase transformations and analysis of microstructure; effects of shear stress, pressure, temperature, electromagnetic fields, and composition on transformation temperatures and microstructure; interfacial energy in solids. prereq: 5501 or instr consent

AEM 8551. Multiscale Methods for Bridging Length and Time Scales. ( ; 3 cr. ; A-F or Audit; Periodic Spring) Classical/emerging techniques for bridging length/time scales. Nonlinear thermoelectricity, viscous fluids, and micromagnetics from macro/atomic viewpoints. Statistical mechanics, kinetic theory of gases, weak convergence methods, quasicontinuum, effective Hamiltonians, MD, new methods for bridging time scales. prereq: Basic knowledge of [continuum mechanics, atomic forces], familiarity with partial differential equations, grad student in [engineering or mathematics or physics]

AEM 8595. Selected Topics in Mechanics and Materials. ( ; 1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Includes individual student projects completed under guidance of a faculty sponsor. prereq: dept consent

AEM 8666. Doctoral Pre-Thesis Credits. ( ; 1-6 cr. ; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) To be determined prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

AEM 8777. Thesis Credits: Master's. ( ; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

AEM 8880. Plan B Project. ( ; 1-3 cr. ; Student Option; Every Fall, Spring & Summer) Satisfies project requirement for Plan B Master's degree. May appear on M.S. program but does not count toward 20-credit minimum in the major field. Topic arranged by student and advisor; written report required. prereq: Grad aerospace engineering or mechanics major, dept consent

AEM 8888. Thesis Credit: Doctoral. ( ; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Aerospace Studies (AIR)

AIR 1000. Leadership Laboratory. (1 cr.; [max 10 cr.]; S-N or Audit; Every Fall & Spring)
Air Force customs and courtesies, drill and ceremonies, military commands, the environment of the Air Force officer, and learning about areas of opportunity available to commissioned officers. Interviews, guidance, and information to increase the understanding, motivation, and performance of other cadets.

AIR 1104. Introduction to the Air Force Today I. (3 cr.; A-F or Audit; Every Fall) Mission and organization of the Air Force, officerhip and professionalism, military customs and courtesies, Air Force officer opportunities, group leadership problems, and introduction to communication skills.

AIR 1105. Introduction to the Air Force Today II. (1 cr.; A-F or Audit; Every Spring) Structure and missions of Air Force organizations. Communicative skills. How cadets are selected for the Professional Officer Course, categorization into specific career areas (pilot and navigator) occurs in the AFROTC junior year, and selection for specific career fields is made in a cadet's senior year.

AIR 1201. Def. (1 cr.; A-F only;)

AIR 1202. Def. Derm. (1 cr.; A-F only;)

AIR 1204. History of Airpower and Communication Skills. (1 cr.; A-F or Audit; Every Fall & Spring) Air Force heritage and leaders, Quality Air Force, and introduction to ethics and values, introduction to leadership, group leadership problems, and continuing application of communication skills.


AIR 3301. Air Force Leadership, Quality, and Communication. (3 cr.; A-F or Audit; Every Fall) Air Force leadership, management, writing, conflicts. Opportunity to present Air Force briefing.

AIR 3302. Air Force Officerhip, Quality, and Communication. (3 cr.; A-F or Audit; Every Spring) Focus on completing Quality Air Force training, learning the Officer Professional Development system, exploring leadership styles, ethics, core values, character development, and standards of conduct. Improve written and oral communication skills. Case studies. prereq: 3301 recommended

AFRO 1001. Introduction to African American Studies. (3 cr.; Student Option; Every Spring) The study of peoples of African descent including the evolution of African American culture, comparative race relations, feminism and social policy change.


AFRO 1021. Introduction to Africa. (GP; 4 cr.; Student Option; Every Fall & Spring) Diverse themes and disciplines in African Studies from prehistory to post-colonial period. Introduction to methodologies of inquiry.


AFRO 1201. Racial Formation and Transformation in the United States. (DSJ, SOCS; 3 cr.; Student Option; Every Fall) How aggrieved racialized groups struggle over identity, culture, place, and meaning. Histories of racialization. Strategies toward rectification of historical injustices from dispossession, slavery, exploitation, and exclusion.

AFRO 1902. Freshman Seminar. (DSJ; 3 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule.

AFRO 3001. West African History: Early Times to 1800. (GP; 3 cr.; Student Option; Every Fall) West Africa from early times to establishment/histories of states. Relations with North African, Mediterranean, Asian, and American worlds. Non-centralized political authority.

AFRO 3002. West African History: 1800 to Present. (GP; 3 cr.; Student Option; Every Fall, Spring & Summer) West African history from late 18th century to present. Past/profound changes including new 19th century state formation, European colonialism, post-colonial issues.


AFRO 3103. World History and Africa. (3 cr.; A-F or Audit; Fall Even Year) Contributions of African American thinkers to making of African history/strategies to rework theoretical/analytical foundations of world history. Writings/intellectual networks of major thinkers whose historical/ethnographic works on Africa spanning nineteenth to twentieth century.

AFRO 3108. Black Music: A History of Jazz. (3 cr.; Student Option; Every Spring) The development of jazz in America and in the world, with special emphasis given to the roots or jazz in the African American experience.


AFRO 3125W. Black Visions of Liberation: Ella, Martin, Malcolm, and the Radical Transformation of U.S. Democracy. (CIV, WI; 3 cr.; A-F only; Every Spring) Course on the critical thought of Black intellectual-activists and others enmeshed in the struggles for the radical transformation of U.S. democracy. Introduces the following three leaders and activists—Ella Baker, Martin Luther King, Jr., and Malcolm X—whose work in the building of the Black freedom movement spanned the period from the 1930s to the late 1960s. Course proposition is that their life and times in the struggle for liberation offer important insights into the transformation of the U.S. political economy from the welfare/warfare state to the neoliberal state. These intellectual-activists, as well as others who translate their radical traditions through Black-Brown and Afro-Asian solidarity projects (e.g. Grace Lee Boggs of Detroit) have responded to racial formation in the U.S. and presented not just
AFRO 3141. Africa. (; 3 cr.; Student Option; Every Fall) Regional differentiation of human groups and environments; cultural contact and problems of underdeveloped countries south of the Sahara.

AFRO 3204. History of South Africa to 1910. (; 3 cr.; Student Option; Every Fall) Introductory survey of the history of South Africa from early humans to the arrival of the first Dutch settlers at the Cape of Good Hope in 1652 to the formation of the Union of South Africa in 1910.

AFRO 3205. History of South Africa from 1910. (; 3 cr.; Student Option; Periodic Fall) The history of South Africa from the Union to the present. Focus on such issues as African and Afrikaner nationalism, structures of apartheid, forced population removals, divestment and sanctions, and the post-apartheid era.

AFRO 3251W. Sociological Perspectives on Race, Class, and Gender. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Analytical overview of three major forms of inequalities in the United States today: race, class, gender. Focus on these inequalities as relatively autonomous from one another and as deeply connected/intertwined with one another. Intersectionality key to critical understanding of these social forces. Social change possibilities.

AFRO 3301. The Music of Black Americans. (AH,DSJ; 3 cr.; Student Option; Every Fall, Spring & Summer) Musical contributions of African American artists/innovators from 1619 to present. Spirituals, blues, ragtime, gospel, art music, jazz.

AFRO 3402. Pleasure, Intimacy and Violence. (3 cr.; Student Option; Spring Odd Year) Gender/sexual violence to poststructural, anti-racist theories and debates about social construction of sexuality. How intimacy and violence are co-constituted within normative frameworks of U.S. governmentality. Writings by black feminist criminologists who have linked incarceration, welfare reform, and other forms of state regulation to deeply systemic forms of violence against people of color.


AFRO 3432. Modern Africa in a Changing World. (GP,HIS; 3-4 cr.; Student Option; Every Fall, Spring & Summer) Socioeconomic, political, and cultural development in precolonial Africa, from ancient Egypt through era of trans-Atlantic slave trade.


AFRO 3436. Contemporary African Conflicts: From Somalia to South Africa. (3 cr.; Student Option; Periodic Fall) Historical contexts in which specific contemporary political conflicts developed. Slave trade, colonial conquest, indirect rule, forced labor, discretionary justice. Patterns of human rights violations/socio-political conflict. Cases studies might include Somalia, Democratic Republic of Congo, Rwanda.

AFRO 3543. Psychology and the Black American Experience. (3 cr.; Student Option; Every Fall & Spring) Historical and contemporary perspectives of the relationship between the area of psychology and African Americans in research and practice.

AFRO 3592W. Introduction to Black Women Writers in the United States. (DSJ,LI,T; 3 cr.; Student Option; Every Fall & Spring) The literature of African American women writers explored in novels, short stories, essays, poetry, autobiographies, and drama from the 18th to the late-20th century.


AFRO 3597W. Introduction to African American Literature and Culture I. (LITR,WI; 4 cr.; Student Option; Every Fall) African American oral tradition, slave narrative, autobiography, poetry, essay, fiction, oratory, and drama, from colonial era through Harlem Renaissance.

AFRO 3598W. Introduction to African American Literature and Culture II. (LITR,WI; 4 cr.; Student Option; Every Spring) African American oral tradition, autobiography, poetry, essay, fiction, oratory, drama. From after Harlem Renaissance to end of 20th century.

AFRO 3601W. African Literature. (GP,WI,LITR; 3 cr.; Student Option; Every Fall, Spring & Summer) Oral/written literature of 19th/20th centuries. Emphasizes literature written in English/French. All readings in English.

AFRO 3625W. Women Writers of Africa and the African Diaspora. (GP,WI,LITR; 3 cr.; Student Option; Spring Even Year) Works of black women writers from Europe, Africa, South America, and the Caribbean. Novels, drama, films, and essays.

AFRO 3627. Seminar: Harlem Renaissance. (3 cr.; Student Option; Every Fall) Review Harlem Renaissance from variety of perspectives. Literary, historical, cultural, political, international. Explore complex patterns of permeation/interdependency between worlds inside/outside of what W.E.B. Du Bois called “Veil of Color.”

AFRO 3654. African Cinema. (AH,GP; 4 cr.; Student Option; Periodic Spring & Summer) Films by African filmmakers from West, Central, and Southern Africa. Aesthetic, theoretical, and sociocultural issues will be explored through class screenings and critical readings.


AFRO 3864. African American History: 1619 to 1865. (3-4 cr.; Student Option; Periodic Spring) Importance of dynamics of class, gender, region, and political ideology. Changing nature of race/racism.

AFRO 3865. African-American History: 1865 to the Present. (3 cr.; Student Option; Every Fall, Spring & Summer) History of African American men and women from the beginning of the 20th century to the present. Discussion of internal migrations, industrialization and unionization, The Great Depression, world wars, and large scale movements for social and political change.


AFRO 3868W. Race, War, and Race Wars in American History. (WI; 3 cr.; A-F or Audit; Fall Odd Year) Role that race has played in American war history. Impact that wars have had on race and race relations in the United States and the world. Literature and film.

AFRO 3910. Topics in African American and African Studies. (; 1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

AFRO 3920. Topics in African Studies. (3 cr. [max 8 cr.]; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

AFRO 3993. Directed Study. (1-3 cr. [max 5 cr.]; Student Option; Every Fall, Spring & Summer)
Guided individual research and study. Prereq: instr consent, dept consent, college consent.

AFRO 4105. Ways of Knowing in Africa and the African Diaspora. (3 cr.; A-F only; Every Fall)
Impact of European knowledge systems on African world. How peoples on African continent and across African diaspora have produced/defined knowledge. Continuity/ change in the way African peoples have thought about and left their epistemological imprints upon the world.

AFRO 4112. The Beat Goes on: Advanced Studies in the Poetry of Rap. (3 cr.; A-F only; Every Spring)

AFRO 4231. Color of Public Policy: African Americans, African Indians, Asian Americans & Chicanos in the U.S.. (3 cr.; Student Option; Periodic Fall)
Examination of structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.

AFRO 4406. Black Feminist Thought. (3 cr.; Student Option; Periodic Spring)
Critically examine spatiality of African descendant women in Americas/larger black diaspora. Writings from black feminist/queer geographies, history, contemporary cultural criticism. Recent black feminist theorizing.

AFRO 4557. History of the Field: Development of African American, African, and African Diasporic Studies. (3 cr.; A-F only; Every Spring)
How Black studies evolved to become Africana studies in the 1960s and an academic field at major universities. How Africana Studies became a discipline that encompassed Africa and Africans in the Diaspora (African American Studies). Challenges of an interdisciplinary field.

AFRO 4910. Topics in African American and African Studies. (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

AFRO 4991W. Thesis Research and Writing. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Preparing a research paper that satisfies major project requirement. Defining a research problem. Collecting/analyzing data. Writing the research paper. prereq: dept consent

AFRO 5101. Seminar: Introduction to Africa and the African Diaspora. (3 cr.; Student Option; Periodic Fall & Spring)
Comparative frameworks, related theories, and pivotal texts in study of Africa and African Diaspora.

AFRO 5103. World History and Africa. (3 cr.; A-F or Audit; Fall Even Year)
Contributions of African American thinkers to making of African history/theories to rework/post-theoretical/theoretical foundations of world history. Writings/intellectual networks of major thinkers whose historical/anthropological works on Africa spanning nineteenth to twentieth century. prereq: Grad student or instr consent

AFRO 5120. Social and Intellectual Movements in the African Diaspora. (3 cr.; A-F or Audit; Every Fall)

AFRO 5181W. Blacks in American Theatre. (WI; 3 cr.; Student Option; Periodic Spring)
Historical survey of significant events in the development of American Black theatrical tradition; plays, essays, playwrights, and theatres from early colonial references to Black Arts Movement.

AFRO 5182W. Contemporary Black Theatre: 1960-Present. (WI; 3 cr.; Student Option; Spring Even Year)
Essays, plays, playwrights, theatres that have contributed to contemporary Black theatre from beginning of Black Arts Movement to present.

AFRO 5191. Seminar: The African American Experience in South Africa. (3 cr.; Student Option; Periodic Fall & Spring)
Ideenology, political, religious, and cultural ties that have informed African American and black South African relations from late 18th century to present.

AFRO 5406. Black Feminist Thought. (3 cr.; Student Option; Periodic Spring)
Critically examine spatiality of African descendant women in Americas/larger black diaspora. Writings from black feminist/queer geographies, history, contemporary cultural criticism. Recent black feminist theorizing.

AFRO 5551. Methods: Use of Oral Traditions as Resources for History. (3 cr.; Student Option;)
Use of spoken information through time as a source for writing history. Use of canons of history to analyze and critique oral traditions and integrate them into written history.

AFRO 5593. The African American Novel. (3 cr.; Student Option; Every Spring)

AFRO 5625. Women Writers of Africa and the African Diaspora. (3 cr.; Student Option; Spring Even Year)
Works of black women writers from Europe, Africa, South America, and the Caribbean. Novels, drama, films, and essays.

AFRO 5627. Seminar: Harlem Renaissance. (3 cr.; Student Option; Every Fall)
Review Harlem Renaissance from variety of perspectives. Literary, historical, cultural, political, international. Complex patterns of permeation/interdependency between worlds inside/outside of what W.E.B. Du Bois called "the Veil of Color." prereq: Grad student or instr consent

AFRO 5866. The Civil Rights and Black Power Movement, 1954-1984. (3 cr.; A-F or Audit; Every Fall)

AFRO 5876. Proseminar: Approaches to African Development. (3 cr.; Student Option; Periodic Fall & Spring)
Study, critical analysis, and comparison of primary documents relevant to African development.

AFRO 5910. Topics in African American and African Studies. (2-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Topics vary by instructor.

AFRO 5932. The Production of Knowledge, Negotiating the Past, and the Writing of African Histories. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Recent scholarship on social history of Africa. Focusses on new literature on daily lives of ordinary people in their workplaces, communities, households. prereq: Grad student or instr consent

AFRO 5993. Directed Study. (1-3 cr.; Student Option; Every Fall, Spring & Summer)
Guided individual reading/study for qualified seniors and graduate students. prereq: instr consent

AFRO 6202. Seminar: Intellectual History of Race. (3 cr.; Student Option; Every Fall & Spring)
Shifting and contested meanings of "race" from the "Age of Conquest" to the present. Starting from the proposition that race is not a fixed or stable category of social thought or being, the seminar seeks to ascertain how and why Western ideas about race have changed.

AFRO 6554. Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora. (3 cr.; Student Option; Every Fall & Spring)
Interdisciplinary analysis of U.S. domestic and foreign policies as they affect Africans and peoples of African descent in the diaspora.
Intersections of gender, race, nation, and class. prereq: instr consent

AFRO 8590. Figures in Contemporary Black Fiction. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Each term focuses on works of an individual writer, such as Toni Morrison, Pauline Marshall, and Jamaica Kincaid. Critical studies.

AFRO 8802. Seminar: Orientalism. (3 cr.; Student Option; Periodic Fall & Spring) Recent arguments related to Orientalism as a trend in modern literary and cultural criticism.

AFRO 8910. Topics in Studies of Africa and the African Diaspora. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

Ag Industries & Marketing (AFEE)

AIM 4011. Student Project/Field Investigation. (3 cr.; Student Option; Every Fall & Spring) Application of marketing knowledge that involves building a complete marketing plan for an agricultural product or device. Team projects are used.

Agri, Food, and Environ Educ (AFEE)

AFEE 1001. Introduction to Agricultural Education, Communication & Marketing. (1 cr.; Student Option; Every Fall & Spring) An overview of the discipline of agricultural education: orientation to careers, current opportunities; areas and expectations of specialization; issues in the field.

AFEE 1002. Principles of Career Planning for Agricultural Professionals. (1 cr.; Student Option; Every Spring) Self assessment and analysis of interests, skills, and abilities. Analyses of occupations, employment potential, employee expectations for work. Use informational interviews to examine career options and employment portfolio for career planning.

AFEE 2051. Current Technical Competencies. (3 cr.; Student Option; Every Fall) Preparations in agricultural education and other agricultural professionals to use technology. Develop basic skills and knowledge to plan, implement, operate, and maintain agricultural structural and mechanical systems. Experiential learning principles and applied problem solving.

AFEE 2096. Professional Practicum in Agricultural Education: Early Experience. (1-3 cr.; A-F or Audit; Every Spring) Observation of agricultural education programs in related areas or settings.

AFEE 2221W. Foundations of Leadership Practice. (WI; 3 cr.; A-F or Audit; Every Fall) How to be an effective leader in profit/non-profit agricultural settings. Roles, responsibilities, knowledge, attitudes, and skills to hire staff, set goals, coach, mentor/manage teams, and improve communication.


AFEE 3096. Experiential Learning: Production and Business. (1-3 cr. [max 9 cr.]; Student Option; Every Fall) Experiential learning in agricultural production and business. Planned, organized, monitored, and evaluated based on a per-experience diagnosis of learning prerequisite to higher level courses in technical agriculture and agricultural business. prereq: AFEd major, instr consent

AFEE 3112. Building Construction Technology. (3 cr.; A-F or Audit; Every Fall) Instructional/lab exercises in light frame building construction. Site layout, foundations, framing, plumbing, insulating, sheathing, roofing. Emphasizes safety and use of modern tools, materials, and prefabricated components.


AFEE 3430. Communicating Food, Agriculture & Environmental Science to the Public. (3 cr.; A-F or Audit; Every Spring) Planning/strategy for communication campaigns related to food/agriculture. Student-centered, relies on interaction/participation. prereq: Sophomore standing or 30 cr

AFEE 3480. Special Topics in Agricultural Education. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Lectures by visiting scholar or regular faculty member. Topics specified in Class Schedule.

AFEE 4221. Rural Leadership Development. (WI; 3 cr.; Student Option; Spring Odd Year) Understanding the role, function, and features of leadership in rural communities; importance of personal involvement, personal leadership qualities, and vision for individuals and rural community organizations.

AFEE 5110. Foundations of Agricultural Education. (3 cr.; A-F only; Every Fall) This course explores historical and philosophical foundations and current structures of school-based agricultural education programs. Students will understand, value, and apply strategies to implement and manage the integrated program model of agricultural education.

AFEE 5111W. Agricultural Education: Methods of Teaching. (WI; 4 cr.; Student Option; Every Fall) Use of teaching resources; principles of teaching and learning; problem-solving techniques, lesson plan construction for large group, small group and individual investigations; student management; and assessment.

AFEE 5112. Agricultural Education Program Organization and Curriculum for Youth. (3 cr.; Student Option; Every Spring) Development of community school program in agriculture, agribusiness, and environmental science. Program to meet graduation outcomes and determine student needs.

AFEE 5114. Agricultural Education Teaching Seminar. (1 cr.; Student Option; Every Spring) Reflective learning on teacher preparation experience; identify issues and problems facing the discipline; needs for continual preparation and program adjustment.


AFEE 5118. Strategies for Managing and Advising the FFA Organization. (2 cr.; A-F or Audit; Every Spring) Principles and techniques to advise an FFA chapter. Historical and philosophical basis of FFA, organization and structure. Integration with classroom instruction, public relations, recruitment, and administration of FFA chapters.

AFEE 5220. Special Topics in Agriculture Education and Extension. (1-3 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Content varies by offering.

AFEE 5231. Agricultural Education Curriculum K-12. (2 cr.; A-F or Audit) Philosophy, organization, and administration of instruction in agricultural education programs at the elementary, middle, and high school levels.

AFEE 5233. Advanced Procedures in Teaching Agricultural Education. (2 cr.; A-F or Audit) New developments in methodology; assessment of innovations and procedures; consideration of various levels of instruction.

AFEE 5235. Advanced Supervised Agricultural Experience Programs. (2 cr.; Student Option) The organization and administration of agricultural experience programs for middle and secondary level students: career exploration, improvement projects, experiments, placement in production/business/community settings, entrepreneurship. Current state and national programs and resource material.

AFEE 5280. Current Issues for the Beginning Agricultural Education Teacher. (1-3 cr.; Student Option; Every Spring) Reflection, analysis on current problems and issues confronting beginning teachers.
of agricultural education. Issues in teaching methods, classroom and program management, discipline, curriculum, FFA and SAE development, school-to-work relationships.

AFEE 5290. Seminar: Current Issues in Agricultural Education and Extension. ( ; 1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) Exploration of current issues in agricultural education and extension, strategies of response, implications of response actions, and related leadership roles.

AFEE 5361. World Development Problems. ( ; 3 cr.; Student Option; Every Fall) Development in Third World countries. Examples of First World development problems. Population, health and disease, education, agriculture, industry, finance, politics, and human rights. prereq: Grad students only

AFEE 5697. Teaching Internship: School and Classroom Setting. ( ; 2 cr.; Student Option; Every Fall) Part-time supervised teaching experience in a school. Seminars on managing student's learning in context of work and human resource education programs in contemporary schools and on becoming a reflective educator. prereq: WHRE 5696 for initial licensure program

AFEE 5698. Teaching Internship. ( ; 2-8 cr. ; max 16 cr.; Student Option; Every Spring) Teaching experience in a school system that provides programs to grades 5-12. prereq: Admission to initial licensure program

AFEE 5993. Directed Study in Agricultural Education and Extension. ( ; 1-4 cr. ; max 8 cr.; Student Option; Every Fall, Spring & Summer) Topics may be chosen to permit study of areas within education or to supplement areas of inquiry not provided in the regular course structure.

AFEE 5995. Integrating Paper--Master of Education: Agricultural and Extension Education. ( ; 1-4 cr.; A-F or Audit; Every Fall, Spring & Summer) Students prepare a paper dealing with issues in agricultural education applied to professional responsibilities.

AFEE 8090. Seminar: Agricultural Education and Extension. ( ; 1-3 cr. ; max 6 cr.; Student Option; Periodic Fall & Spring) Topics on various aspects of agricultural education. Prepare, present, and critique a report. prereq: AgEd grad student

AFEE 8094. Research in Agricultural Education and Extension. ( ; 1-6 cr.; A-F or Audit; Every Fall, Spring & Summer) Select problems, prepare bibliographies, analyze and interpret data, and prepare manuscripts on studies. prereq: AgEd student doing Plan B research, dept consent

AGRO 1093. Directed Studies. ( ; 1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Allows study of agronomy in greater depth or in areas not currently offered in formal courses. Tutorial instruction under staff guidance. prereq: 4 cr in agronomy, instr consent

AGRO 1101. Biology of Plant Food Systems. (BIOL; 4 cr.; Student Option; Every Spring) Designed for students who are not majors in a life science program, but who wish to acquire a better understanding of biological concepts especially as they relate to their lives. We examine current issues related to food, food production and the environment which provide the context to investigate fundamental concepts of biology including productivity, energy, genetic change in populations, and environmental responses to human activity. We use a problem-based learning approach to explore three contemporary issues of great importance: risks and benefits of GMOs, farming and food, and the dead zone in the Gulf of Mexico. Lab, greenhouse, field, and classroom discussions.

AGRO 1103. Crops, Environment, and Society. (ENV; 4 cr.; Student Option; Every Fall) Plants that supply food, fiber, beverages, and medicine to humans. Plant identification, plant physiology, plant breeding/biotechnology, plant ecology, crop culture/management.

AGRO 1660W. First-Year Colloquium/Experience in Agroecosystems Analysis. (WI; 2 cr.; A-F or Audit; Every Fall) Agroecosystems and their impacts on the environment, landscapes, and rural communities. Students develop a course plan within their major, explore career options, and increase their familiarity with the department, its history, and its faculty/staff. Field trips, discussions, readings, reflective writings. prereq: 1st yr in major hosted by Department of Agronomy and Plant Genetics

AGRO 1901. Topics: Freshman Seminar. (ENV; 1-3 cr.; A-F or Audit; Every Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule. prereq: Fr

AGRO 2501. Plant Identification for Urban and Rural Landscapes. ( ; 2 cr.; Student Option; Periodic Fall) Plant/weed species important in turf, horticulture, forestry, and crop production systems. Emphasizes identification of native grasses/forbs, field crops, and weed species in Minnesota and Upper Midwest. Plant life cycles, habitats, and relationships to humans. prereq: Biol 1009 or equiv

AGRO 3203W. Environment, Global Food Production, and the Citizen. (GP, WI; 3 cr.; Student Option; Every Spring) Ecological/ethical concerns of food production systems in global agriculture: past, present, and future. Underlying ethical positions about how agroecosystems should be configured. Decision cases, discussions, videos, other media.

AGRO 3305. Agroecosystems of the world. (GP; 3 cr.; Student Option; Every Fall) Explore four different areas of world (Minnesota, Morocco, Nepal, Costa Rica) by networking with locals on ground in each region through online interactions. Food, agriculture, environment. Biophysical/socio-cultural aspects of agroecosystems through unique multi-disciplinary lens.


AGRO 4015. Topics in Agronomy. ( ; 1 cr.; Student Option; Periodic Fall, Spring & Summer) This course focuses on current topical issues in livestock, cropping systems, and crop improvement.

AGRO 4093. Directed Studies for Advanced Students. ( ; 1-4 cr. ; max 12 cr.; Student Option; Every Fall, Spring & Summer) Allows study of agronomy in greater depth or in areas not currently offered in formal courses. Tutorial instruction under staff guidance. prereq: 15 cr in agronomy, instr consent

AGRO 4096. Professional Experience Program: Internship. (1-3 cr. ; max 6 cr.; Student Option; Every Fall, Spring & Summer) Supervised professional experience in agribusiness firms or government agencies. Evaluative reports/consultations with faculty advisers and employers. prereq: CFANS undergrad, instr consent, completed internship contract from CFANS

AGRO 4097. Undergraduate Research Thesis. ( ; 1-6 cr. ; max 12 cr.; A-F only; Every Fall, Spring & Summer) Research/thesis conducted under supervision of CFANS faculty member. Written thesis describing research results. prereq: Jr or sr

AGRO 4103. World Food Problems. (GP; 3 cr.; Student Option; Every Fall) Multidisciplinary look at problems and possible solutions affecting food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views on population, technology, and ethical and cultural values of people in various parts of the world.

AGRO 4401. Plant Genetics and Breeding. ( ; 4 cr.; Student Option; Every Spring) Principles of plant genetics and environmental variation. Applications of genetics to crop evolution and breeding of self-pollinated, cross-pollinated, and asexually propagated crops. Investigation of hybridization, variation, and selection. prereq: Biol 1009 or equiv or grad, instr consent

AGRO 4505. Biology, Ecology, and Management of Invasive Plants. ( ; 3 cr.; Student Option; Periodic Fall & Spring) Ecology/biology of invasive plant species (weeds). Principles of invasive plant
AGRO 4606. Senior Capstone. (2 cr.; A-F or Audit; Every Fall) Complexities of agricultural issues. Exercises/discussions integrating previous educational situations. Linked to underg internships/experiential learning opportunities such as thesis or directed studies or service learning. Written/oral assignments.

AGRO 4888. Issues in Sustainable Agriculture. (3 cr.; Student Option; Every Fall, Spring & Summer) Agroecology, sustainable practices, production economics, environmental quality, holistic resource management, healthy food/water, rural communities. More sustainable-agriculture advocates, including farmers, faculty, and representatives of non-profit sustainable-agriculture organizations. prereq: 1101 or equivalent, [CHEM1015/17 or equivalent], [jr or sr or grad student or instr consent]

AGRO 5201. Plant Breeding Principles. (3 cr.; Student Option; Every Fall) This course is intended for advanced undergraduate students and graduate students that are either: 1) not plant breeding majors who will benefit from a basic understanding of how genetics is applied to plant improvement; or 2) plant breeding majors lacking prior coursework in plant breeding. The objective of this course is to develop an understanding of the underlying principles, ideas, and concepts important to applying genetic principles to plant breeding, evaluating breeding methods, and enhancing genetic progress and efficiency.

AGRO 5321. Research Methods in Crop Improvement and Production. (1 cr.; S-N or Audit; Every Fall & Summer) Demonstrations and discussions of techniques in crop improvement and/or production research. Presentations integrate biotechnology with traditional breeding methods; production sessions emphasize ecologically sound cropping systems. prereq: applied plant sciences grad

AGRO 5322. Ecology of Agricultural Systems. (3 cr.; A-F or Audit; Every Fall) Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied. prereq: [3xxx or above] course in [Agro or AnSc or Ent or Hort or PiPa or Soil] or instr consent

AGRO 5431. Applied Plant Genomics and Bioinformatics. (3 cr.; Student Option; Every Fall) Analysis, interpretation, visualization of large plant genomic datasets. Basic computer programming, applying large-scale genomics to answer basic/applied biological questions, understanding limitations of each application, presenting concise visual findings from large-scale datasets. prereq: Grad student or [undergrad with genetics course]

AGRO 5980. Publishing in Plant Science Journals. (2 cr.; S-N only; Every Fall) Organization/writing skills for reporting research results in a peer-reviewed journal manuscript. Publication process; choosing your journal; characteristics of good scientific writing; ethics, plagiarism, and authorship; stating your objectives; writing the different components of a manuscript; citing literature; use of tables and figures; proofreading. Written manuscript ready for submission to a plant science journal. prereq: instr consent

AGRO 5999. Special Topics: Workshop in Agronomy. (1-6 cr.; Student Option; Every Fall, Spring & Summer) Workshops on various topics in agronomy and plant genetics. Presenters/faculty may include guest lecturers/experts. Topics specified in class schedule.

AGRO 8005. Supervised Classroom or Extension Teaching Experience. (2 cr.; S-N or Audit; Every Fall & Spring) Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticultural Science; Plant Pathology; or Soil, Water, and Climate. Participation in discussions about effective teaching to strengthen skills and develop personal teaching philosophy. prereq: Grad SENG major, instr consent

AGRO 8202. Breeding for Quantitative Traits in Plants. (3 cr.; Student Option; Spring Odd Year) Principles and concepts of population and quantitative genetics/application in designing and implementing a plant breeding program/theory, experimental approaches, and evidence that form the basis for these concepts and breeding strategies. prereq: [5201, STAT 5021] or instr consent

AGRO 8241. Chromosomal and Molecular Genetics of Plant Improvement. (3 cr.; Student Option; Spring Even Year) Mixture of classic/current info in molecular plant genetics, biotech, and genomics. Students devise experiments in breeding, genetics, genomics, physiology, cellular/molecular biology, and other areas. prereq: Introductory Genetics course

AGRO 8270. Graduate Seminar. (1 cr.; A-F or Audit; Every Fall & Spring) Reports/discussions of problems and investigational work. prereq: Grad major in [applied pint sci or ag or ent or hort or plnt brdg or plnt path or soil] or instr consent

AGRO 8280. Current Topics in Applied Plant Sciences. (1 cr.; S-N or Audit; Every Spring) Topics presented by faculty or visiting scientists.

AGRO 8505. Advanced Perspectives in Weed Science. (2 cr.; A-F or Audit; Periodic Fall) Topics concerning the biochemistry and sustainability of chemical and biological weed control methods. Lecture and student-directed discussion. prereq: Grad major in agro or applied plant sciences or ent or hort or plant brdg or plant path or soil or instr consent

AGRO 8900. Advanced Discussions. (1-3 cr.; max 12 cr. ; S-N or Audit; Every Fall & Spring) Special workshops or courses in applied plant sciences. prereq: instr consent

Akkadian (AKKA)

AKKA 5011. Elementary Akkadian I. (3 cr.; Student Option; Periodic Fall) Introduction to cuneiform script. Basics of Old Babylonian morphology and syntax. Written drills, readings from Hammurabi laws, foundation inscriptions, annals, religious and epic literature. prereq: Adv undergrads with instr consent or grades

AKKA 5012. Elementary Akkadian II. (3 cr.; Student Option; Periodic Fall) Continuation of 5011. Readings include The Gilgamesh Epic, The Descent of Ishtar, Mari Letters, Annals of Sennacherib and Essarhaddon, Sargon II. prereq: 5011
AMIN 1001. American Indian Peoples in the United States. (DSJ; 3 cr.; Student Option; Every Fall & Spring)
Introduction to how voices/visions of indigenous peoples have contributed to history of cultural expression in North America. Historic contexts/varieties of this expression by region, tribal cultures. Emphasizes contributions in literature, philosophy, politics, fine arts.

AMIN 1002. Indigenous Peoples in Global Perspective. (GP; 3 cr.; A-F or Audit; Every Fall & Spring)
Colonial experiences of selected indigenous peoples in Americas, Eurasia, Pacific Rim.

AMIN 1003. American Indians in Minnesota. (DSJ,HIS; 3 cr.; A-F or Audit; Every Fall & Spring)
History, culture, and lived experience of American Indian people in Minnesota. Self-representation and histories of Anishinaabe (Ojibwe) and Dakota peoples through film, music, oral traditions, and written texts. Work by non-Indian scholars focuses on cultural, philosophical, and linguistic perspectives of Anishinaabe and Dakota peoples.

AMIN 1201. Racial Formation and Transformation in the United States. (DSJ,SOCS; 3 cr.; Student Option; Every Fall)
How aggrieved racialized groups struggle over identity, culture, place, and meaning. Histories of racialization. Strategies toward rectification of historical injustices from dispossession, slavery, exploitation, and exclusion.

AMIN 1902. Freshman Seminar. (DSJ; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Topic specified in Course Schedule. prereq: Fr

AMIN 1905. Freshman Seminar. (WI; 3 cr. [max 6 cr.]; A-F or Audit; Every Fall)
Topics specified in Class Schedule. prereq: Freshman

AMIN 3001. Public History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Interpretations of collective past as produced in public venues, including museum exhibitions, films, theme parks, and websites. Intellectual and political issues in history produced for public audiences. Career opportunities. prereq: instr consent

AMIN 3107. Structure of Anishinaabemowin, the Ojibwe Language. (3 cr.; A-F or Audit; Periodic Fall)
Analysis of grammatical structures of Anishinaabemowin. prereq: 3103

AMIN 3108. History of Anishinaabemowin, the Ojibwe Language. (3 cr.; A-F or Audit; Periodic Fall)
Historical development of Anishinaabemowin. prereq: 3107

AMIN 3109. Anishinaabe Literature. (3 cr.; A-F or Audit; Periodic Fall)
Readings in Anishinaabe oral literature. prereq: 3103

AMIN 3141. American Indian Language Planning. (3 cr.; A-F or Audit; Periodic Fall)
Planning for maintenance/revitalization of North American indigenous languages.
Condition/status of languages. Documentation, cultivation, literacy, education. prereq: 3103 or 3123

AMIN 3143. Language in American Indian Culture and Society. (3 cr.; A-F or Audit; )
Survey of North American indigenous languages in social/cultural contexts, from before European contact to present.

AMIN 3201W. American Indian Literature. (DSJ, WL, LITR; 3 cr.; A-F only; Every Fall & Spring)
Comparative studies of oral traditions, modern literature from various tribal cultures.

AMIN 3205. Introduction to Aztec, Maya, and Inka Art, from Ancient Times to the Colonial Period. (AH; 3 cr.; Student Option; Fall Even Year)
Art/architecture of native peoples of Americas from twelfth century B.C. until arrival of Europeans in sixteenth century. Ways that people living in diverse areas of South America/Mesoamerica used art/architecture. Tools to investigate Pre-Columbian art at more advanced levels.

AMIN 3301. American Indian Philosophies. (AH,DSJ; 4 cr.; Student Option; Every Fall, Spring & Summer)
World views and philosophical traditions of American Indian peoples. Topics include native medicines/healing practices, ceremonies/ritual governance, ecology, humor, tribal histories, status of contemporary native people.

AMIN 3303. American Indians and Photography. (AH,DSJ; 3 cr.; Student Option; Fall Odd Year)
Historical/comparative overview of photos in which American Indian people are central subjects. Primary features of images in American Indian photos. Relationships among those involved in making/viewing photos. Ways in which photos are interpreted. Relation of photos to social contexts in which they are produced and to agencies of those who stand behind their making.

AMIN 3304. Indigenous Filmmakers. (AH; 3 cr.; Student Option; Every Spring)
Filmmaking an indigenous practice. Analysis of dialogues among American Indian writers, directors, producers within contexts of tribally specific cultures/histories, as well as within context of US culture/film history.

AMIN 3312. American Indian Environmental Issues and Ecological Perspectives. (ENV; 3 cr.; Student Option; Every Spring)
Analysis of film/video made by American Indian writers, directors, producers within contexts of tribally specific cultures/histories, as well as within context of US culture/film history.

AMIN 3314. Natural Resource Management and Environmental Policy in Indian Country. (ENV; 3 cr.; Student Option; Every Fall)

AMIN 3402. American Indians and the Cinema. (AH,DSJ; 3 cr.; A-F or Audit; Every Spring & Summer)
Representations of American Indians in film, historically/contemporary. What such representations about Native experience and cultural viability. What they reflect about particular relationships of power.

AMIN 3409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (DSJ,HIS; 3 cr.; Student Option; Fall Even Year)
Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.

AMIN 3501. American Indian Tribal Governments and Politics. (DSJ,HIS; 3 cr.; A-F or Audit; Fall Even Year)

AMIN 3602. Archaeology and Native Americans. (DSJ; 3 cr.; Student Option; Fall Even Year)
Historical, political, legal, and ethical dimensions of the relationship of American archaeology to American Indian people. Case studies of how representational narratives about Native people are created through archaeology; responses by Native communities; and the frameworks for collaborative and equitable archaeological practice. Professional ethics in archaeology/heritage studies in American contexts.

AMIN 3604. Indigenous Immersion Methods for the Home, Classroom, and Community. (3 cr.; A-F only; Every Spring)
Prepares students as advanced language students to participate in and facilitate immersion environments within both formal and informal settings including the home, second language classrooms, immersion classrooms, language tables, immersion camps, and other community settings. prereq: OJIB 3104, DAKO 3124 or four semesters of another target language

AMIN 3701. Ojibwe Culture and History. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring)
Ojibwe culture, history, and traditions, including philosophy, religion, and lifestyle. Students develop an appreciation for the values and belief systems of traditional Indian people.

AMIN 3711. Dakota Culture and History. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring)
Dakota culture, language, history, literature. Contemporary issues, the arts.
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

AMIN 3871. American Indian History: Pre-contact to 1830. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring) American Indian history from the era of ancient Native America to the removal era. Social, cultural, political, and economic diversity of Native American peoples and Native American experiences with European colonization.

AMIN 3872. American Indian History: 1830 to the Present. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring) Focus on the impact of federal Indian policy on American Indian cultures and societies, and on American Indian culture change.

AMIN 3876. American Indian Education. (3 cr.; Student Option; Periodic Spring) Educational processes in American Indian cultures. History of school programs established for tribes by missionaries/U.S./Canadian governments. Importance of boarding schools in shaping the lives, families, communities, educational expectations of Indian people in late-19th/early-20th centuries.

AMIN 4231. Color of Public Policy: African Americans, American Indians, Asian Americans, & Chicanos in the U.S. (3 cr.; Student Option; Periodic Fall) Structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.

AMIN 4501. Law, Sovereignty, and Treaty Rights. (3 cr.; Student Option; Periodic Fall, Spring & Summer) History of American Indian law and the post-contact effects of colonial and U.S. law on American Indians through the 20th century. Prereq: 1001

AMIN 4511. American Indian Political Economy. (3 cr.; Student Option; Periodic Fall, Spring & Summer) Sources, nature, consequences of social/economic development/change in Indian communities. Precontact Indian communities. Effect of European contact. Social movements into 20th century, including phenomenon of urban Indian communities. Prereq: 1001

AMIN 4525W. Federal Indian Policy. (WI; 3 cr.; Student Option; Periodic Fall, Spring & Summer) Formulation, implementation, evolution, comparision of Indian policy from pre-colonial times to self-governance new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature related to policies.

AMIN 4820W. Senior Seminar. (WI; 3 cr.; A-F only; Every Fall) Seminar for preparation/completion of American Indian Studies Senior Project requirement.

AMIN 4990. Topics in American Indian Studies. (1-4 cr.; max 8 cr.; Student Option; Every Fall, Spring & Summer) Topics specified in Class Schedule.

AMIN 4991. Independent Study. (1-12 cr.; Student Option; Every Fall, Spring & Summer) Prereq-instr consent, dept consent, college consent.

AMIN 4994. Directed Research. (1-12 cr. [max 18 cr.]; Student Option; Every Fall, Spring & Summer) Individually arranged research with faculty to meet student needs and interests. Prereq-instr consent, dept consent, college consent.

AMIN 4996. Field Study. (1-12 cr. [max 18 cr.]; Student Option; Every Fall & Spring) Opportunities for experiential learning in a variety of American Indian community settings. Consult department faculty at least one term before enrolling. Prereq-instr consent, dept consent, college consent.

AMIN 5107. The Structure of Anishinaabemowin, the Ojibwe Language. (3 cr.; A-F or Audit; Periodic Fall) Analysis of grammatical structures of Anishinaabemowin. Prereq: 3104

AMIN 5108. History of Anishinaabemowin, the Ojibwe Language. (3 cr.; A-F or Audit; Periodic Fall) Historical development of Anishinaabemowin. Prereq: 3107 or instr consent

AMIN 5109. Anishinaabe Literature. (3 cr.; A-F or Audit; Periodic Fall) Readings in Anishinaabe oral literature. Prereq: 3107 or 5107 or instr consent

AMIN 5141. American Indian Language Planning. (3 cr.; A-F or Audit; Periodic Fall) Planning for maintenance/revitalization of North American indigenous languages. Condition/status of languages. Documentation, cultivation, literacy, education. Prereq: 3103 or 3123 or instr consent

AMIN 5303. American Indians and Photography. (AH,DSJ; 3 cr.; Student Option; Fall Odd Year) Historical/comparative overview of photos in which American Indian people are central subjects. Primary features of images in American Indian photos. Relationships among those involved in making/viewing photos. Ways in which photos are interpreted. Relation of photos to social contexts in which they are produced and to agencies of those who stand behind their making.


AMIN 5409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (DSJ,HIS; 3 cr.; Student Option; Fall Even Year) Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.


AMIN 5890. Problems in American Indian History. (3 cr.; Student Option; Periodic Fall & Spring) Intensive consideration of topics in American Indian history. Possible topics include social history, Indian history of particular regions, political systems, education, and American Indian policy. Prereq: instr consent

AMIN 5920. Topics in American Indian Studies. (3 cr.; max 12 cr.; A-F or Audit; Every Fall & Spring) Various topics in American Indian studies, depending upon instructor/semester.

AMIN 5991. Graduate Level Directed Studies. (1-16 cr. [max 9 cr.]; A-F or Audit; Every Spring) Contact department for further information. Prereq: dept consent

American Sign Language (ASL)

ASL 1701. American Sign Language I. (5 cr.; Student Option; Every Fall, Spring & Summer) First of a 4-course sequence. American Sign Language (ASL), cultural values/rules of behavior of Deaf community in the United States. Receptive/expressive readiness activities, sign vocabulary, grammatical structure, receptive/expressive fingerspelling, aspects of Deaf culture. Lab sessions.

ASL 1702. American Sign Language II. (5 cr.; Student Option; Every Fall, Spring & Summer) Second of four-course sequence. American Sign Language (ASL), cultural values/rules of behavior of U.S. deaf community. Receptive/expressive readiness activities, sign vocabulary, grammatical structure, receptive/expressive fingerspelling, aspects of Deaf culture. Lab. Prereq: 1701 with grade of at least [S or C-] or dept consent

ASL 3703. American Sign Language III. (5 cr.; Student Option; Every Fall, Spring & Summer) Third of four-course sequence. American Sign Language (ASL), cultural values/rules of behavior of U.S. deaf community. Receptive/expressive readiness activities, sign vocabulary, grammatical structure, receptive/expressive fingerspelling, aspects of Deaf culture. Lab. Prereq: 1702 with grade of at least [S or C-] or dept consent

ASL 3704. American Sign Language IV. (5 cr.; Student Option; Every Fall, Spring & Summer) Fourth of a four-course sequence. American Sign Language (ASL), cultural values/rules of behavior of U.S. deaf community.
Receptive/expressive readiness activities, sign vocabulary, grammatical structure, receptive/expressive fingerspelling, aspects of deaf culture. Lab. prereq: 3703 with grade of at least [S or C-] or dept consent

ASL 3705. Cultural and Sociolinguistic Views within the Deaf Community. (3 cr.; Student Option; Every Fall & Spring) This course investigates the Deaf community using an ethnocentric view of culture. Students will explore cultural readings and various sources in class discussion using multi-disciplinary approaches: sociological, educational, and linguistic views. Can be taken concurrently with ASL 1701-3704. Class instruction conducted entirely in ASL with an English interpreter.

ASL 3800. ASL Independent Study: Extended Study. (1-3 cr. [max 6 cr.]; S-N only; Every Fall & Spring) Tutoring/supporting ASL instruction. Social/academic situations. Trained in tutoring by SMART Learning Commons. prereq: Completion of or concurrent registration is required (or allowed) in 3704

American Studies (AMST)

AMST 1011. Religions and American Identity in the United States from World War II to the Present. (CIV; 3 cr.; Student Option; Every Fall) Political/cultural watersheds of last 60 years. Changing ideas about religion. Debates within/between religious traditions/communities. How gender, race, class, and sexuality have shaped relationships between religion and politics. Tensions between secularism and religiosity and liberalization and fundamentalism. Ways in which religion has acted as both a progressive and a conservative political force.

AMST 1012. Migrants, Refugees, Citizens, and Exiles: The U.S. on an Immigrant Planet. (CIV; 3 cr.; Student Option; Every Spring) Immigration to the United States at various historical periods and across geographical/political terrains. How immigration, as a national/racial project, is shaped by legal categories and discursive practices based on race, class, gender, and sexuality. Diverse ways marginalized groups produce national/transnational political practices.

AMST 1401. Comparative Genders and Sexualities. (DSJ; 3 cr.; Student Option; Every Spring) Gender/sexual practices/identities within international framework. How such practices/identities reflect/refract national ideals and express national/international division.

AMST 1511. Americans Abroad: Rethinking Travel, Culture, & Empire. (GP,HIS; 3 cr.; Student Option; Every Spring) In this course, we will look at Americans (including ourselves) who travel abroad and what their experiences, both in the present and historically, tell us about how we imagine others and our/their place in the world. What do these experiences tell us about who we are as a people, a culture, and a nation? This course will examine how these experiences have transformed (and continue to transform) Americans and the countries and cultures with which they interact. Indeed, this course challenges students to consider the overall effects that these processes have had on America's relationship with the rest of the world.

AMST 1905. Freshman Seminar. (3 cr.; Student Option; Every Fall) Topics specified in Class Schedule.

AMST 2001. Chasing the American Dream: Economic Opportunity & Inequality in the U.S. (DSJ,HIS; 3 cr.; Student Option; Every Fall) This course begins by focusing on the historical origins and meanings of the American dream. How did this dream of unlimited opportunity come about? What has it meant in different historical moments and to different social groups? And, why does it continue to be such a powerful and compelling idea in the United States and around the world?


AMST 3003. Public History. (3 cr. [max 4 cr.]; A-F or Audit; Periodic Fall & Spring) Interpretations of collective past as produced in public venues, including museum exhibitions, films, theme parks, websites. Intellectual and political issues in history produced for public audiences. Career opportunities.

AMST 3113W. Global Minnesota: Diversity in the 21st Century. (DSJ,WI; 3 cr.; Student Option; Every Fall, Spring & Summer) Diverse cultural (racial, ethnic, class) groups in America. Institutions/processes that shape their relations and create domination, resistance, hybridity, nationalism, racism, alliance. Specific content may vary.

AMST 3114. America in International Perspective. (DSJ; 3 cr.; Student Option; Every Fall & Spring) The nature of international cultural exchange. The impact of U.S. cultures and society on other countries of the world as well as the impact of other cultures and societies on the United States.

AMST 3117. Latinos in America's Global Cities. (DSJ,SOCS; 3 cr.; Student Option; Spring Every Year) Relationship between Latina/o immigration and development of America's global cities. Theoretical foundation for understanding global cities. Similarities/differences among socio-political trajectories and cultural practices of Latina/o communities.

AMST 3252W. American Popular Culture and Politics: 1900 to 1940. (CIV,WI,HIS; 4 cr.; Student Option; Every Fall & Summer) Historical analysis of how popular arts represent issues of gender, race, consumerism, and citizenship. How popular artists define boundaries of citizenship and public life: exclusions/inclusions in polity and national identity. How popular arts reinforce/alter political ideologies.


AMST 3713. Lands and Homelands in the American Indian Great Lakes. (DSJ,HIS; 3 cr.; Student Option; Every Fall) Tribes that have strong historic ties to Minnesota region, such as the Ojibwe, Dakota, and Ho-Chunk Nations. Integrity/ viability of American Indian societies. Conflict of cultures that occurred with Native American and Euroamerican contact in Minnesota and the Great Lakes.

AMST 3752. Chicanas and Chicanos in Contemporary Society. (DSJ; 3 cr.; Student Option; Every Spring) Introduction to sociological analysis of theoretical/methodological approaches to Chican/o/a and Latina/o communities. Socioeconomic conditions, education, cultural change, the family, gender relations, political experiences. Theories, issues, methods of sociological research. Debates regarding qualitative/quantitative research methods.

AMST 3920. Topics in American Studies. (1-5 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

AMST 3993. Directed Studies. (1-9 cr.; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: instr consent

**AMST 4101. Gender, Sexuality, and Politics in America.** (DSJ,HIS; 3 cr.; Student Option; Every Fall) WAYS public and private life intersect through the issues of gender, sexuality, family, politics, and public life; ways in which racial, ethnic, and class divisions have been manifest in the political ideologies affecting private life.

**AMST 4301. Workers and Consumers in the Global Economy.** (DSJ; 3 cr.; Student Option; Every Spring) Impact of global economy on workplaces/workers in the United States, Mexico, and Caribbean countries. Influence on consumption. Consequences for American culture/character. Effects on U.S./Mexican factory work, service sector, temporary working arrangements, offshore production jobs in Dominican Republic, and professional/managerial positions.

**AMST 4961. Proseminar I.** (; 3 cr.; Student Option; Every Fall) Classic/contemporary works/problems. Development of American Studies. Idealizing of American past. Challenges of multiculturalism. Contemporary themes. prereq: AmSt jr or AmSt sr or instr consent

**AMST 4962W. Second Proseminar in American Studies.** (WI; 3 cr.; Student Option; Every Spring) Problem related to representative theme, figure, or period. Students research/write senior theses. prereq: AmSt sr or instr consent

**AMST 8201. Historical Foundations of American Studies.** (; 3 cr.; Student Option; Every Fall) Exposition of American studies as a field of inquiry, including its history, major theoretical framework, and interdisciplinary methodologies. prereq: grad AmSt major

**AMST 8202. Theoretical Foundations and Current Practice in American Studies.** (; 3 cr.; Student Option; Every Spring) Analysis of central theoretical work in the field and survey of key methodologies. prereq: grad AmSt major or instr consent or dept consent

**AMST 8231. Cultural Fallout: The Cold War and Its Legacy, Readings.** (; 3 cr.; Student Option; Every Fall & Spring) Culture of Cold War, its legacy. How it affected/reflected domestic politics, public policies, civic life, gender expectations, sexuality, class relations, racial justice, and civil rights. Impact of domestic anti-communism and of American cultural politics abroad.

**AMST 8232. Cultural Fallout: The Cold War and Its Legacy, Research.** (; 3 cr.; Student Option; Every Fall & Spring) Student produce a research paper on history/culture of Cold War era as it developed in United States after World War II. Research projects build upon readings from 8231. prereq: 8231

**AMST 8239. Gender, Race, Class, Ethnicity, and Sexuality in the United States: Readings.** (; 3 cr.; Student Option; Every Fall) Social, cultural, and artistic modes of self-expression. Intellectual analysis of people in the United States identified as female or male or as members of groups defined by race, ethnicity, class, or sexual orientation.

**AMST 8240. Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development.** (; 3 cr. [max 9 cr.]; Student Option; Every Spring) Social, cultural, and artistic modes of self-expression and intellectual analysis of people in the United States identified as female or male and/or as members of group defined by race, ethnicity, class, or sexual orientation. prereq: instr consent

**AMST 8249. Popular Culture and Politics in the 20th Century: Readings.** (; 3 cr.; Student Option; Periodic Fall) Popular arts in their political/social context. Issues of race, gender, class, and nationalism.

**AMST 8250. Popular Culture and Politics in the 20th Century: Research Strategies.** (; 3 cr.; Student Option; Periodic Fall) Popular arts in their political/social context. Focuses on issues of race, gender, class, and nationalism. prereq: 8239 or instr consent

**AMST 8259. Literature, History, and Culture: Research Strategies.** (; 3 cr.; Student Option; Periodic Fall & Spring) Interdisciplinary study of connections between literary expression and history, particularly as they articulate themes in American culture. prereq: instr consent

**AMST 8260. Literature, History, and Culture: Topical Development.** (; 3 cr.; Student Option; Periodic Fall & Spring) Interdisciplinary study of connections between literary expression and history, particularly as they articulate themes in American culture. prereq: instr consent

**AMST 8288. Working in the Global Economy: Readings.** (; 3 cr.; Student Option; Periodic Fall) Debates about global economy’s consequences for American culture/character. Effects of global capitalism on factory work, service sector, pink-collar, and factory work in multinational corporations and professional/managerial positions inside/outside U.S. borders. How work is lived through race, class, gender, and nation.

**AMST 8289. Ethnographic Research Methods: Research Strategies in American Studies.** (; 3 cr.; Student Option; Periodic Spring) Students conduct an empirical research project, write a final paper. Assumptions/practices of positivism, reflexive science, and feminist methodology. Issues surrounding politics/ethics of feminist research. Dilemmas in practice of fieldwork, oral histories, reading, and writing. prereq: 8288 or instr consent

**AMST 8333. FTE: Master’s.** (; 1 cr.; No Grade Associated; Every Fall; Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

**AMST 8401. Practicum in American Studies.** (; 3 cr.; S-N or Audit; Periodic Fall & Spring) Training in teaching undergraduate courses in American studies. prereq: instr consent

**AMST 8444. FTE: Doctoral.** (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

**AMST 8666. Doctoral Pre-Thesis Credits.** (; 1-6 cr.; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) x prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**AMST 8777. Thesis Credits: Master’s.** (; 1-18 cr.; [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**AMST 8801. Dissertation Seminar.** (; 3 cr.; S-N or Audit; Every Fall & Spring) Conceptualizing the research problem for the dissertation and structuring the process of writing a chapter of it. prereq: AmSt doctoral student beginning dissertation work

**AMST 8888. Thesis Credit: Doctoral.** (; 1-24 cr.; [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

**AMST 8920. Topics in American Studies.** (; 3-4 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

**AMST 8970. Independent Study in American Studies.** (; 1-9 cr.; Student Option; Every Fall, Spring & Summer) Independent study of interdisciplinary aspects of American civilization under guidance of faculty members of various departments. prereq: instr consent, dept consent

**Anatomy (ANAT)**

**ANAT 3001. Human Anatomy.** (; 3 cr.; Student Option; Every Fall) Anatomical relationships. Function based upon form. Clinical applications. Gross (macroscopic) anatomy, histology (microscopic anatomy). Neuroanatomy (nervous system), embryology (developmental anatomy). prereq: [BIOL 1002W or BIOL 1009 or BIOL 2002 or equiv]. at least soph

**ANAT 3171. Principles of Human Anatomy Laboratory for Mortuary Science Students.** (; 2 cr.; Student Option; Every Spring) Human anatomy laboratory for mortuary science students who have had a previous human anatomy lecture course. prereq: Mortuary science student

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
ANAT 3601. Principles of Human Anatomy. (3 cr.; Student Option; Every Spring) Anatomical relationships. Function based upon form. Clinical applications. Gross (macroscopic) anatomy, histology (microscopic anatomy), Neuroanatomy (nervous system), embryology (developmental anatomy). prereq: [BIOI 1002 or BIOI 1009 or BIOI 2002 or equiv]. [concurent registration is required (or allowed) in 3602 or concurrent registration is required (or allowed) in 3612], at least soph or junior.

ANAT 3602. Principles of Human Anatomy Laboratory. (2 cr.; Student Option; Every Spring) Complements 3601 or 3611. prereq: 3001 or 3301 or INMD 3001 or 3301 or concurrent registration is required (or allowed) in 3601 or concurrent registration is required (or allowed) in 3611

ANAT 3608H. Principles of Human Anatomy Laboratory for Honors Students. (3 cr.; A-F only; Every Spring) Lab work required for 3602 or 3612. Additional dissection of human cadavers/related projects. Supplement 3001 or 3601 or 3611. prereq: concurrent registration is required (or allowed) in 3601 or concurrent registration is required (or allowed) in 3611] or 3001], sophomore, junior or senior, honors

ANAT 3611. Principles of Human Anatomy. (3 cr.; Student Option; Every Spring) Anatomical relationships. Function based upon form. Clinical applications. Gross (macroscopic) anatomy, histology (microscopic anatomy). Neuroanatomy (nervous system), embryology (developmental anatomy). prereq: [BIOI 1002 or BIOI 1009 or BIOI 2002 or equiv], at least soph; [concurrent registration is required (or allowed) in 3602 or concurrent registration is required (or allowed) in 3612] recommended

ANAT 3612. Principles of Human Anatomy Laboratory. (2 cr.; Student Option; Every Spring) Complements 3601 or 3611. prereq: 3001 or 3301 or INMD 3001 or 3301 or concurrent registration is required (or allowed) in 3601 or concurrent registration is required (or allowed) in 3611

ANAT 4900. Directed Studies in Anatomy. (1-6 cr.; max 18 cr.); S-N only; Every Spring) x prereq: instr consent

ANAT 5095. Advanced Problems in Anatomy. (1-6 cr.; max 12 cr.); A-F only; Every Fall, Spring & Summer) Exceptional projects that do not easily fit within confines of other ANAT offerings. Examples include but not limited to individual teaching or research projects. prereq: one or more ANAT classes, instr consent

ANAT 5150. Human Gross Anatomy. (5 cr.; A-F only; Every Fall) Human cadaveric dissection based on traditional preparation, lab dissection, review sections, radiographic analysis, clinical correlations. Taught by regions. Extremities, torso, head/neck. Assessment by mid-semester/final written/practical examinations.

ANAT 5525. Anatomy and Physiology of the Pelvis and Urinary System. (1-2 cr.; A-F only; Every Spring) Two-day intensive course. Pelvis, perineum, and urinary system with cadaveric dissection. Structure/function of pelvic and urinary organs, including common dysfunction and pathophysiology. Laboratory dissections, including kidneys, ureters, urinary bladder, pelvic viscera and perineum (male or female), pelvic floor, vascular and nervous structures. Grand rounds section. prereq: One undergrad anatomy course, one undergrad physiology course, instr consent

ANAT 5999. Head and Neck Anatomy. (3 cr.; A-F or Audit; Every Summer) N/A prereq: instr consent

ANAT 6050. Dental Gross Anatomy. (5 cr.; A-F or Audit; Every Fall) Lab dissection-based course. Peer teaching, team-based learning. Extremities/torso. Head/neck. prereq: Dental student or instr consent

ANAT 6150. Human Gross Anatomy. (7 cr.; A-F only; Every Fall) Extremities/back, torso, head/neck. Lectures provide pre-lab presentation (dissection reviewed), review (at end of a unit), and clinical correlations. prereq: Grad student or instr consent

ANAT 6160. Human Embryology. (1 cr.; A-F only; Every Fall) Online course. Embryonic development/defects through most systems. Online lectures/forums. Two classroom review sessions, two assessments. prereq: Grad student, instr consent

ANAT 7600. Advanced Topics in Anatomy. (1-15 cr.; P-N only; Every Fall, Spring & Summer) Complete/detailed review of normal anatomy. prereq: instr consent

ANAT 7601. Advanced Clinical Gross Anatomy I. (2-8 cr.; P-N only; Every Fall & Summer) Reviews gross anatomy of entire human body. Students perform regional dissections under guidance of anatomy faculty. Emphasizes clinical applications of gross anatomical structure/function. Teaching techniques in clinical anatomy. prereq: 6150 or instr consent

ANAT 7602. Advanced Clinical Gross Anatomy II. (2-9 cr.; max 18 cr.); H-N only; Every Fall & Summer) Techniques of didactic teaching to large groups and interactive teaching to small groups. Practical teaching experience may include both large group relab lectures and laboratory instruction in gross anatomy to medical students. prereq: 7601 or instr consent

ANAT 7800. Integrated Preparation for Internship. (4 cr.; H-N only; Every Spring) Surgical anatomy through common surgical procedures. Simulated operating room environment. Operating room procedures, resource management, teamwork. prereq: INMD 6801, instr consent

ANAT 7999. Head and Neck Anatomy. (3 cr.; Student Option; Every Fall & Summer) Head/neck anatomy. prereq: [Medical or dental] resident

Anesthesiology (ANES)

ANES 5587. Adv Clinical Physiology I for Nurse Anesthetists. (3 cr.; A-F or Audit; Every Fall) Cellular mechanisms underlying systems physiology. Cellular physiology, physiology of excitable tissues, renal physiology, cardiovascular physiology, hemostasis.

ANES 5588. Advanced Clinical Physiology II for Nurse Anesthetists. (3 cr.; A-F or Audit; Every Spring) Respiratory physiology, acid-base physiology, gastrointestinal physiology, metabolism, endocrinology, reproductive physiology, physiology of pregnancy/labor, prereq: Advanced Clinical Physiology I for Nurse Anesthetists

ANES 5686. Chemistry and Physics for Nurse Anesthetists. (3 cr.; A-F or Audit; Every Summer) Chemical equilibrium, organic chemistry, physics of fluids/gases, anesthetic applications. prereq: General chemistry or instr consent

ANES 7015. Directed Study, Anesthesia Topics/Project Course Development. (1-15 cr.; H-N or Audit; Every Fall & Spring)

ANES 7181. Externship in Clinical Anesthesiology. (3-cr.; H-N or Audit; Every Fall, Spring & Summer) The student will receive supervised training in the operating suite at Fairview-University Medical Center (University Campus), assisting in the management of all types of surgical patients under the direction of the faculty and residents of the Department of Anesthesiology. The rotation is divided into one-week segments; each student may select sub-specialty areas on the basis of interest. Daily student/staff seminars cover fluid and blood replacement, cardiopulmonary resuscitation, preoperative preparation, respiratory problems, special anesthetic techniques, and other topics. The student will spend the majority of his/her time in the operating room because only under such controlled conditions can there be leisurely teaching of essential life-support skills. There is no night or weekend call.

ANES 7182. Independent Study, Anesthesiology. (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer) On- or off-campus learning experiences individually arranged between the student and a faculty member for credit in areas not covered by regular courses. May include clinical/basic science research, library research or special projects.

ANES 7183. Externship in Clinical Anesthesiology: Advanced Experience at
Abbott NW. (; 3 cr.; H-N or Audit; Every Fall, Spring & Summer)
Cardiopulmonary pathophysiology. Interpretation of lab data. Anesthetic pharmacology. Emphasizes airway management. prereq: 7181; 3 wk externship in clinical anesthesiology

ANES 7184. Rural Externship in Clinical Anesthesiology. (; 0-3 cr.; H-N only; Every Fall, Spring & Summer)
Students will be a rural anesthesiologist in all aspects of patient care and administrative duties. Care of patients in OR. Clinic visits. ICU consult. Riding with paramedics. Meeting with CEO of hospital for strategic planning.

ANES 7186. Clinical Practice in Anesthesia. (; 15 cr.; H-N or Audit; Every Fall & Spring)

ANES 7286. Directed Study Anesthesia Project: Clinical. (; 1-15 cr.; H-N or Audit; Every Spring)

ANES 7910. Anesthesiology Medical Residency. (; 6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Anesthesiology medical residency.

ANES 7930. Anesthesiology Medical Fellowship. (; 6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Anesthesiology medical fellowship.

ANES 8269. Research in Anesthesia. (; 1 cr.; Student Option; Every Fall & Spring)

Animal Science (ANSC)

ANSC 1001. Orientation to Animal Science. (1 cr.; A-F or Audit; Every Fall)
Current issues, career planning, professional development. Interviews with faculty and other resource persons.

ANSC 1111. Animals and Society. (CIV; 3 cr.; Student Option; Every Fall)

ANSC 1101. Introductory Animal Science. (4 cr.; Student Option; Every Spring)
Fundamental concepts of animal breeding, physiology, nutrition, and management as they apply to the production of beef, dairy, horses, poultry, sheep, swine, and other livestock.

ANSC 1201. Backyard Chickens - Science and Practice. (; 3 cr.; Student Option; Every Spring)
Backyard Chickens - Science and Practice is an online course designed to meet the needs of students interested in understanding chickens in general, and for those who engage or are planning to engage in small scale farming of chickens. This course, expanded over 6 modules: (1) Basic biology and behavior (2) Selection (3) Housing (4) Nutrition (5) Management and (6) Diseases as it relates to chickens, will help the students understand the basic science of rearing chickens. Each of the six modules encompasses pertinent short video or PowerPoint lectures that provide fundamental and applied information on backyard chicken rearing.

ANSC 1205. Animal Handling - Livestock. (1 cr.; A-F only; Every Fall & Spring)
Students will learn how to handle and restrain animals safely. Cattle, sheep, and pigs in the Animal Science Department? St. Paul animal units are the animals primarily worked with. Students will perform common animal husbandry techniques on these animals. Proper techniques that promote animal welfare will be emphasized. This course is meant for Animal Science freshmen students that have minimal experience working with livestock.

ANSC 1403. Companion Animal Nutrition and Care. (; 3 cr.; Student Option; Every Spring)
This course is designed for individuals having no prior training with animals or nutrition but have interest in caring for and understanding the contemporary importance of companion animals. Emphasis will be on nutrition of healthy animals and the various factors that play a role in feeding an animal adequately. These factors include animal behavior, environmental conditions, food type, and availability. The course will emphasize basic principles of nutrition. The target audience of this course is all undergraduate students interested in nutrition and care of companion animals. The course will focus on companion animals, but not exclusively dogs and cats.

ANSC 1511. Food Animal Products for Consumers. (; 3 cr.; Student Option; Every Fall)
Introduction to the compositional variation, processing, selection, storage, cookery, palatability, nutritional value, and safety of red meat, poultry, fish, and dairy products.

ANSC 1701. Historical Influence of the Horse on Society. (HIS; 3 cr.; Student Option; Every Fall)
Concepts of historical inquiry using the powerful/changing relationship between Man and horse. Students function as historians: framing questions, searching for appropriate sources, developing explanation model with reasoned arguments, and finally, write/defend interpretation.

ANSC 1901. Livestock and Carcass Evaluation. (; 3 cr.; Student Option; Every Spring)
Evaluation of dairy animals on the basis of physical appearance, including classes of heifers and cows from the six major dairy breeds. Held in conjunction with the Minnesota State Fair. Training in oral reasons. prereq: instr consent

ANSC 2012. Livestock and Carcass Evaluation. (; 3 cr.; Student Option; Every Spring)
Evaluation of cattle, swine, and sheep. Breeding stock evaluated on live appraisal, performance records, and breeding values. Market animals evaluated, graded, and priced on physical appearance followed by evaluation and grading of their carcasses.

ANSC 2053. Beginning Livestock Judging. (; 2 cr.; Student Option; Fall Odd Year)
Visual evaluation of beef cattle, swine, and sheep for type, muscling, degree of finish, structure, and soundness. Short oral presentations. Preparation for collegiate livestock judging competition. prereq: [Soph or jr or sr], instr consent; 2012 recommended

ANSC 2055. Horse Management. (; 2 cr.; Student Option; Every Fall)
Best management practices. Daily care (in small groups, weekends included) of horses. Volunteer day at local equine nonprofit. Applied equine management research project. Two group presentations. prereq: 2055 or concurrent registration is required (or allowed) in 2055

ANSC 2401. Animal Nutrition. (; 3 cr.; Student Option; Every Fall)
Classification/function of nutrients. Use of nutrients for body maintenance, growth, egg production, gestation, and lactation. Comparative study of digestive systems of farm animal species.

ANSC 3007. Equine Nutrition. (; 3 cr.; Student Option; Every Spring)

ANSC 3011. Statistics for Animal Science. (; 4 cr.; Student Option; Every Fall & Spring)
Basic statistical concepts. Develop statistical reasoning/critical thinking skills. Descriptive statistics, probability, sampling and sampling distributions, hypothesis testing, experimental design, linear correlation, linear regression and multiple regression. How to make sound arguments/decisions based on statistics when reviewing news articles or scientific publications with statistical content. Explore/draw conclusions from data using a basic statistical software package.
ANSC 3091V. Research Proposals: From Ideas to Strategic Plans. (WI; 3 cr.; A-F only; Every Fall & Spring)
You have a great research idea, now what? How do you turn your idea into a proposal? It has been said, paraphrasing Edison, that innovation is one percent inspiration, 99 percent perspiration. In this course, we will start with an inspiring idea and sweat our way to develop a research proposal. The students will go through a step-by-step process that starts with choosing and defining a research idea, then proceeding to do literature reviews and to the development of a hypothesis, aims, objectives, and a research strategy. The aim of this course is to provide students with tools to understand the structure of scientific reports and proposals, literature searches, and basic data interpretation. The students will learn about different research approaches and how to achieve consistency in their research projects. We will guide students in how to begin and develop a written research proposal that will satisfy the requirements of their advisors, institution, and funding organizations. prereq: If you have less than 60 credits and are interested in this course, please contact the instructor.

ANSC 3092. Undergraduate Research in Animal Science. (1-3 cr.; max 6 cr.; A-F only; Every Fall & Spring)
Students conduct research project under supervision of faculty member.

ANSC 3141. Advanced Dairy Judging. (1 cr.; Student Option; Every Spring)
Training in presentation of oral reasons in dairy cattle judging. Selected students from this course participate in fall intercollegiate dairy judging contest. prereq: 2011 or instr consent

ANSC 3142. Advanced Livestock Judging. (2 cr.; Student Option; Fall Even Year)
Visual evaluation of beef cattle, swine, and sheep for muscle, finish, structure, and soundness. Use of production (growth and reproduction) records in evaluation. Oral presentations. Preparation for national collegiate livestock judging contest. prereq: instructor consent

ANSC 3203W. Environment, Global Food Production, and the Citizen. (GP;WI; 3 cr.; Student Option; Every Spring)
Ecological/ethical concerns of food production systems in global agriculture: past, present, and future. Underlying ethical positions about how agroecosystems should be configured. Interactive learning using decision cases, discussions, videos, other media.

ANSC 3221. Animal Breeding. (4 cr.; Student Option; Every Fall)
Application of qualitative and quantitative genetics to animal breeding. Concepts of livestock improvement through selection and mating programs.

ANSC 3301. Human and Animal Physiology. (3 cr.; Student Option; Every Fall & Spring)
Functions of major systems in mammals. Nervous system, muscles, cardiovascular system, respiration, renal system.

Endocrinology/metabolism. Blood, immunology, reproduction, prereq: Must have taken a Biology and Chemistry course.

ANSC 3302. Human and Animal Physiology Laboratory. (1 cr.; Student Option; Every Fall & Spring)
Companion course to 3301. Physiological principles are demonstrated using active learning approaches. Nervous system, muscles, cardiovascular, respiration, renal, endocrinology/metabolism, blood, immunology, reproduction, prereq: 3301 or concurrent registration is required (or allowed) in 3301

ANSC 3305. Reproductive Biology in Health and Disease. (4 cr.; Student Option; Every Fall)
Reproductive organ functions, fertilization, estrous cycle and endocrine control, reproductive efficiency, problems/principles of artificial insemination. Anatomy, physiology, biochemistry of mammary gland. Mammary growth, initiation/maintenance of lactation, milk synthesis, factors influencing lactation curve. prereq: Biol 1009 or equiv.

ANSC 3307. Artificial Insemination Techniques. (1 cr.; S-N or Audit; Every Spring)
Hands-on training/techniques of artificial insemination at an off-campus laboratory setting. Techniques of AI and semen handling. Criteria for selection of bulls. prereq: instr consent

ANSC 3403. Companion Animal Hot Button Issues. (3 cr.; Student Option; Every Fall)
Various issues that affect companion animals in our society. Students debate pros/cons of each issue and formalize their own opinions based on information presented by debate teams.

ANSC 3509. Animal Biotechnology. (3 cr.; Student Option; Every Spring)
Scientific, social, and ethical issues related to current topics in animal biotechnology. Introduction to molecular genetics. Use of animals as biological reagents/topics, tools in reproductive biotechnology, methods for genetic modification of animals. prereq: GCD 3022 or instr consent

ANSC 3511. Animal Growth and Development. (3 cr.; Student Option; Every Spring)
Principles of animal growth. Interaction of nutrition, hormones, exercise, heredity, and disease in regulating growth. prereq: College-biology course

ANSC 3609. Business Planning for Animal Enterprises. (2 cr.; Student Option; Every Fall)

ANSC 3801. Livestock Merchandising. (3 cr.; Student Option; Every Spring)
Promotion/merchandising of purebred livestock. Hands-on training in advertising, livestock photography, showing/fitting, sale organization. Field trips to seed stock operations/auctions. Presentations by industry and breed association leaders. Students conduct annual sale. prereq: Jr or sr or instr consent

ANSC 4096. Professional Experience Program: Internship. (1-3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Supervised professional experience in animal industries and farm enterprise systems. Various aspects of the industry and related fields. Evaluative course. Consultations with faculty advisers and employers. prereq: CFANS undergrad, instr consent, agreement form

ANSC 4097. Special Workshop in Animal Science. (3 cr.; Student Option; Every Fall, Spring & Summer)
Independent study in an area of animal science, under supervision of faculty member. prereq: instr consent

ANSC 4099. Special Workshop in Animal Science. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Workshops on a variety of topics in animal science. Consult Class Schedule or department for offerings. Topics may use guest lecturers/experts.

ANSC 4305. Companion & Wild Species Reproduction. (2 cr.; A-F only; Every Spring)
Reproductive physiology specific to domesticated companion canine and feline species as well as avian species. Management of breeding and reproductive diseases in companion species as well as conservation management in wild species. prereq: ANSC 3305

ANSC 4401. Swine Nutrition. (3 cr.; Student Option; Every Fall)
A comprehensive review of major considerations in providing optimum, cost-
effective nutrition to swine in all stages of production. prereq: 2401, 3511 recommended

**ANSC 4403. Ruminant Nutrition.** (3 cr.; Student Option; Every Spring) Nutrient requirements of ruminants, physiology of digestion in ruminants, nutrient content of feedstuffs, primarily forages; energy utilization, protein and nonprotein nitrogen utilization; nutritional disorders; formulation of adequate rations. prereq: 2401

**ANSC 4404. Applied Dairy Nutrition.** (2 cr.; Student Option; Periodic Fall) Application of nutrition principles to dairy cow nutrition. Nutrient requirements of dairy cows, feed ingredient selection/usage, formulation/evaluation of dairy cow rations using computer programs. Case study analysis of feeding programs used on dairy farms. prereq: AnSc 4403 recommended

**ANSC 4601. Pork Production Systems Management.** (4 cr.; Student Option; Fall Odd Year) Interrelationships of business, marketing, and biological performance of pigs in various types of production systems. prereq: 2401; 3221 recommended


**ANSC 4603. Beef Production Systems Management.** (4 cr.; Student Option; Every Fall) How to resolve problems and manage cow-calf, stocker, or feedlot operations. Segments of beef industry, challenges. Nutrition, reproduction, genetics, and health in beef cattle production. Students evaluate a beef cattle enterprise and contribute in marketing, selection, reproduction, nutrition, or health management. prereq: concurrent registration is required (or allowed) in 4613

**ANSC 4604. Dairy Production Systems Management.** (4 cr.; Student Option; Every Spring) Practical applications of principles of animal breeding, nutrition, physiology, reproduction, housing, and economics in a problem solving context. Decision-cases, farm visits, field diagnostic techniques labs. prereq: Pre-req: AnSc 1101, AnSc 2401 Concurrent registration is not allowed in 4614

**ANSC 4613. Advanced Beef Production Systems Management.** (2 cr.; Student Option; Every Fall) Half semester course. Student enterprise-analysis teams evaluate a beef cattle enterprise and solve problems in marketing, selection, reproduction, nutrition, or health management. prereq: 4603


**ANSC 5099. Special Workshop in Animal Science.** (1-6 cr. [max 12 cr.]; A-F or Audit; Every Spring) Topics vary. See Class Schedule or department. Topics may use guest lectures/experts. prereq: instr consent


**ANSC 5305. Companion & Wild Species Reproduction.** (2 cr.; A-F only; Every Spring) Principles of reproductive physiology specific to domesticated companion canine and feline species as well as avian species. These principles discussed in the context of the management of breeding and reproductive diseases in companion species as well as conservation management in wild species. prereq: instr consent

**ANSC 5526. Nutritional Physiology.** (3 cr.; A-F only; Every Spring) Whole body macronutrient metabolism as it relates to etiology of metabolic diseases. Signaling between tissues to control homeostasis. How dysregulation of crosstalk can lead to metabolic diseases. How diet, exercise, or starvation impact metabolism. Regulation of food intake and energy expenditure. Designing/analyzing/interpreting research data.

**ANSC 5700. Cell Physiology.** (4 cr.; A-F only; Every Fall) Control mechanisms in maintaining homeostasis with respect to critical cell functions. Regulation of pH, volume, nutrient transport, intracellular electrolyte composition, membrane potential. Aspects of intercellular communication. prereq: [Two semesters of physics/chemistry, calculus, one semester of systems-level physiology] or instr consent

**ANSC 8111. Genetic Improvement of Animals.** (3 cr.; Student Option; Periodic Fall) Application of population genetics to livestock breeding; selection index theory and practice; basis of relationships and covariances among relatives; and selection based on multiple sources of information. prereq: instr consent

**ANSC 8121. Linear Model Methods.** (3 cr.; Student Option; Periodic Fall) Techniques and statistical tools for analysis of data. Matrix manipulation, least-squares procedures, correction for environmental factors, estimation of components of variance, and standard errors of estimates. prereq: Stat 5021

**ANSC 8134. Ethical Conduct of Animal Research.** (3 cr.; A-F or Audit; Every Fall) Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements, bases for what is deemed proper conduct. Societal impact on scientific investigations utilizing animal subjects. prereq: Grad student or prof school student or instr consent

**ANSC 8141. Mixed Model Methods for Genetic Analysis.** (2 cr.; max 4 cr.; A-F or Audit; Spring Even Year) Theoretical foundation of genetic prediction, selection index theory, best linear unbiased prediction, multivariate mixed models, estimation of variance components using maximum/maximum likelihood methods, genomic prediction/variance component estimation. prereq: 5200 or CMB 5200 or equiv

**ANSC 8194. Research in Animal Genetics.** (1-3 cr.; Student Option; Every Fall, Spring & Summer) Research in quantitative genetics, cyto genetics, molecular genetics, and other areas related to animal breeding. prereq: instr consent

**ANSC 8211. Animal Growth and Development.** (3 cr.; Student Option; Every Spring) Whole body growth of animals, bone, and adipose tissue; structure, function,
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
ANTH 3001. Introduction to Archaeology. (SOCS; 4 cr.; Student Option; Fall Even, Spring Odd Year)
The fundamentals of fieldwork, laboratory analysis, and interpretation in archaeology. How field and laboratory research are designed and implemented, and how results are interpreted.

ANTH 3002. Sex, Evolution, and Behavior: Examining Human Evolutionary Biology. (3 cr.; Student Option; Every Fall, Spring & Summer)
Methods/theories used to understand humans in an evolutionary framework. What can be known only, or primarily, form an evolutionary perspective. How evolutionary biology of humans might lead to better evolutionary theory. How physiology, development, behavior, and ecology coordinate to evolve in humans.

ANTH 3003. Cultural Anthropology. (GP; 3 cr.; Student Option; Every Fall, Spring & Summer)

ANTH 3004. Great Controversies in Anthropology. (GP,SOCS; 3 cr.; A-F or Audit; Every Spring)
Notable controversies in anthropology: Is human "reason" the same in all cultures? What makes up evidence/truth when we study people? Whose "voices" should be heard? Should anthropologists support contemporary attempts at ethnic and cultural rights? Can we make qualitative judgments about cultures? What civic/political responsibilities does the anthropologist have at home and with the people whom she or he studies? In-class debates.

ANTH 3005W. Language, Culture, and Power. (DJS,WI,SOCS; 4 cr.; Student Option; Every Spring)
Studying language as a social practice, students transcribe and analyze conversations they record themselves, and consider issues of identity and social power in daily talk.

ANTH 3006. Humans and Aliens: Learning Anthropology through Science Fiction. (GP; 3 cr.; Student Option; Every Spring)
Pairs anthropological texts with science fiction stories to illustrate how our future is more dependent on how humanity works anthropologically than what next technological invention has to offer.

ANTH 3008. Introduction to Flintknapping. (; 3 cr.; A-F or Audit; )
Hands-on experience in replication of prehistoric stone tools, as basis for archaeological analysis and as art form in itself.

ANTH 3009. Prehistoric Pathways to World Civilizations. (HIS; 3 cr.; Student Option; Every Spring)
How did complex urban societies first develop? This course addresses this question in ten regions of the world including Maya Mesoamerica, Inca South America, Sumerian Near East, Shang Civilization in East Asia, and early Greece and Rome.

ANTH 3015W. Biology, Evolution, and cultural Development of Language. (SOCS, WI; 3 cr.; Student Option; Every Spring)

ANTH 3020. Topics in the Anthropology of Africa. (3-6 cr.; Student Option; )
Perspectives on Africa using ethnographic methods and theories. Topics such as kinship and gender; ecological adaptations; economic systems; belief systems; political organization; art and aesthetics; Islamization; colonization; liberation movements and nationalism; culture change.

ANTH 3021W. Anthropology of the Middle East. (GP, WI, SOCS; 3 cr.; A-F or Audit; Fall Even Year)
Archaeological methods of analyzing/interpreting Middle Eastern cultures/societies.

ANTH 3022W. Anthropology of Dreaming and Myth. (WI; 3 cr.; A-F or Audit; Spring Odd Year)

ANTH 3023. Culture and Society of India. (GP, SOCS; 3 cr.; Student Option; Spring Even Year)
Contemporary society and culture in South Asia from an anthropological perspective with reference to nationalism, post-colonial identities, media and public culture, gender, kinship, and politics; religion, ethnicity, and the Indian diaspora.

ANTH 3027W. Archaeology of Prehistoric Europe. (HIS, WI; 3 cr.; Student Option; Every Fall)
How archaeologists analyze/interpret artifacts to develop knowledge about formation of European society, from earliest evidence of human occupation to Roman period.

ANTH 3028. Introduction to Historical Archaeology. (; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Emphasizes research approaches. Documentary research, oral history, probate inventories/acculturation, integration of documents/archaeological data, analysis of community patterning, social analysis of architecture, foodways, artifact identification, thin ceramic dating, industrial archaeology, estimation of social status with cemetery data, sampling, report writing.

ANTH 3034. Roots Music in American Culture and Society. (; 3 cr.; Student Option; Every Spring)
Southern American vernacular music that came to public attention in the 1920s and 1930s. Issues of race, class, and historical context.

ANTH 3035. Anthropologies of Death. (GP, SOCS; 3 cr.; A-F or Audit; Every Spring)
Archaeological perspectives on death. Diverse understandings of afterlife, cultural variations in death ritual, secularization of death in modern era, management of death in medicine, cultural shifts/conflicts in what constitutes good or natural death.

ANTH 3036. The Body in Society. (; 3 cr.; Student Option; Spring Odd Year)
Body-related practices throughout the world. Readings, documentaries, mass media.

ANTH 3041. Ecological Anthropology. (; 3 cr.; Student Option; Periodic Fall)

ANTH 3043. Art, Aesthetics and Anthropology. (; 3 cr.; Student Option; Summer Odd Year)
The relationship of art to culture from multiple perspectives including art as a cultural system; the cultural context of art production; the role of the artist in different cultures; methodological considerations in the interpretation of art across cultural boundaries.

ANTH 3046W. Romance and Culture. (GP, WI; 3 cr.; A-F only; Every Spring)
Romance, aspects of this kind of love relationships from different perspectives in social/biological sciences. Draws on cross-cultural materials.

ANTH 3049W. Anthropology of Social Class. (WI; 3 cr.; A-F only; Fall Odd Year)
Anthropological concepts of class. Theories of class difference. Investigate comparative ethnographic about experience of class difference. Classic texts, mass media/full-length ethnographic accounts will be used.

ANTH 3205. Art of Central and South America Before Columbus. (AH; 3 cr.; Student Option; Fall Even Year)
Art/architecture of native peoples of Americas from twelfth century B.C. until arrival of Europeans in sixteenth century. Ways that people living in diverse areas of South America/Mesoamerica used art/architecture. Tools to investigate Pre-Columbian art at more advanced levels.

ANTH 3221. Field School. (; 6 cr.; Student Option; Every Summer)
Field excavation, survey, and research. Intensive training in excavation techniques, recordation, analysis, and interpretation of archaeological materials or prehistoric remains. prereq: instr consent

ANTH 3242W. Hero, Savage, or Equal? Representations of NonWestern Peoples in the Movies. (WI; 3 cr.; A-F only; Fall Even Year)
ANTH 3306W. Medical Anthropology. (GP; WI; 3 cr.; A-F or Audit; Every Fall) Relations among human affliction, health, healing, social institutions, and cultural representations cross-culturally. Human health/affliction. Medical knowledge/power. Healing. Body, international health, colonialism, and emerging diseases. Reproduction. Aging in a range of geographical settings. prereq: 1003 or 1005 or entry level soc sci course recommended

ANTH 3401. The Human Fossil Record. (; 3 cr.; A-F only; Fall Even Year) Fossil evidence paleoanthropologists use to reconstruct human evolutionary history. Taxonomy, phylogeny, behavior, ecology, tool use, land use, biogeography. Hands-on examination of fossil casts, readings from primary/secondary professional sources. prereq: 1001 or instr consent

ANTH 3402. Zooarchaeology Laboratory. (; 3 cr.; A-F only; Every Fall) How archaeologists reconstruct past societies, diets, and environments. Bones and bone fragments to skeletal element (e.g., femur, humerus, tibia), side, age, and taxon (e.g., horse, bison, antelope, hyena). Adaptations and functional morphology of animals? anatomy. Tool marks, tooth marks, burning, and types of bone breakage. Past societies’ hunting, sharing, cooking practices as well as environmental reconstruction using vertebrates.


ANTH 3501. Managing Museum Collections. (3 cr.; A-F or Audit; Fall Even Year) The care and maintenance of collection objects and their associated information are a crucial part of both the sciences and the humanities. This course is designed to provide foundations and practical experience with many of the issues faced by those responsible for museum collections: conservation, legal issues, organization and classification, digitization, accessibility, and policies and procedures. The course includes lectures by museum professionals, field trips to local facilities, and hands-on activities. Credit will not be granted if credit has been received for ANTH 5501.

ANTH 3601. Archaeology and Native Americans. (DSJ; 3 cr.; Student Option; Fall Even Year) Historical, political, legal, and ethical dimensions of the relationship of American archaeology to American Indian people. Case studies of how representational narratives about Native people are created through archaeology; responses by Native communities; and the frameworks for collaborative and equitable archaeological practice. Professional ethics in archaeology/heritage studies in American contexts.

ANTH 3913. Senior Project Planning. (1 cr.; A-F only; Every Fall, Spring & Summer) Evaluation of work to date. Planning future course work and prospectus for senior research project. Defining senior project. Finding an adviser, developing preliminary bibliography. prereq: [ Jr or Sr ] anh major, instr consent

ANTH 3980. Topics in Anthropology. (; 3 cr. [max 6 cr.]; Student Option; Periodic Fall, Spring & Summer) Topics specified in Class Schedule.

ANTH 4001. Advanced Method and Theory in Archaeology. (; 3 cr. [max 9 cr.]; Student Option; Every Spring) Intended for Archaeology majors. Content varies by instructor.

ANTH 4003W. Contemporary Perspectives in Cultural Anthropology. (WI; 3 cr.; A-F or Audit; Periodic Fall & Spring) This course considers issues of race, class, gender, ?culture," and globalization across multiple genres of writing (ethnography, history, fiction, poetry, memoir). We do this by reading the work of writers who, with an ethnographic sensibility, focus on a particular person whose life is lived in obscurity, at the margins. We ask how such an approach that aims to evoke a world through a life might allow the reader to understand how people move across space and time and through their social worlds, in ways that other kinds of ethnographic or historical writing might not. prereq: [1003 or 1005], or instr consent

ANTH 4007. Laboratory Techniques in Archaeology. (; 1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Plant remains, material culture, faunal remains, human osteology. Emphasizes lab experience. prereq: instr consent

ANTH 4009W. Warfare and Human Evolution. (WI; 3 cr.; A-F or Audit; Fall Even Year) Is warfare universal? Are there truly peaceful societies? Why war occurs more often at some times/places. How/when/why warfare evolved. Warfare and intergroup aggression in other animals. Role of warfare and its primitive antecedents in evolution of our species.

ANTH 4013. Senior Project. (; 3 cr.; Student Option; Every Fall, Spring & Summer) Independent research project fulfilling the senior option; directed by a faculty member. prereq: sr major, instr consent

ANTH 4013H. Senior Honors Thesis Project. (; 3 cr.; A-F only; Every Fall & Spring) Independent research project fulfilling the senior option and the honors thesis requirement; directed by a faculty member. prereq: Sr major, honors student, instr consent

ANTH 4019. Symbolic Anthropology. (; 3 cr.; Student Option; Periodic Fall) Pragmatic/structural aspects of social symbolism cross-culturally. Focuses on power, exchange, social boundaries, gender, and rituals of transition/reversal. prereq: 1003 or 1005 or grad student or instr consent

ANTH 4025. Studies in Ethnographic Classics. (; 3 cr.; A-F or Audit; Periodic Fall) Five types of explanations employed in ethnographic research: diffusionism and theory of survivals; functionalist response; British structuralists; French structuralism; interpretive turn. Problems in ethnographic practice, analysis, and writing. Focuses on several classic monographic examples and associated theoretical writing. prereq: 1003 or 1005

ANTH 4031W. Anthropology and Social Justice. (WLCW; 4 cr.; Student Option; Spring Odd Year) Practical application of theories/methods from social/cultural anthropology. Issues of policy, planning, implementation, and ethics as they relate to applied anthropology. prereq: 1003 or 1005 or 4003 or grad student or instr consent

ANTH 4035. Ethnographic Research Methods. (; 3 cr.; Student Option; Every Spring) History of and current issues in ethnographic research. Research projects, including participant observation, interviewing, research design, note taking, life history, and other ethnographic methods. prereq: 1003 or 1005 or grad student

ANTH 4047. Anthropology of American Culture. (SOC; 3 cr.; Student Option; Every Spring) Anthropological approaches to contemporary American society/culture. Tensions between market and family. Unity, diversity. Individualism, community.

ANTH 4049. Religion and Culture. (; 3 cr.; Student Option; Periodic Fall) Religious beliefs and world views cross-culturally. Religious dimensions of human life through theories of origins, functions, and forms (e.g. myth, ritual, symbolism) of religion in society. prereq: 1003 or 1005 or instr consent

ANTH 4053. Economy, Culture, and Critique. (GP; SOC; 3 cr.; Student Option; Every Fall) Systems of production/distribution, especially in nonindustrial societies. Comparison, history, critique of major theories. Cross-cultural anthropological approach to material life that subsumes market/nonmarket processes.

ANTH 4069. Environmental Archaeology. (; 3 cr.; Student Option; Periodic Fall) Use of remains from archaeological sites and off-site records of ancient landscapes, vegetation, and climate to reconstruct how humans interacted with their environments. Interdisciplinary approaches toward reconstructing past human environments; long-term local and global environmental change.

ANTH 4071. Race, Culture, and Vision. (; 3 cr.; A-F or Audit; Periodic Fall, Spring & Summer) Evaluation of main trends in study of racism. Psychological, sociological, symbolic, and
ANTH 4777. Directed Readings. (3 cr.; Student Option; Every Fall, Spring & Summer) Allows students to pursue special interests in anthropology through reading materials under the guidance of a faculty member. prereq: instr consent

ANTH 4994W. Directed Research. (WI; 1-6 cr.; Student Option; Every Fall, Spring & Summer) Qualified students may conduct a well-defined research project under the guidance of a faculty member. prereq: instr consent

ANTH 5009. Human Behavioral Biology. (3 cr.; A-F or Audit; Every Spring) In-depth introduction to, and critical review of, human behavioral biology, examining the approaches in anthropology and related fields. Classic texts/recent empirical studies of humans and other species. Theoretical underpinnings of this new discipline/how well theoretical predictions have been supported by subsequent research.


ANTH 5021W. Anthropology of the Middle East. (GP, WI, SOS; 3 cr.; Student Option; Fall Even Year) Anthropological field methods of analyzing/interpreting Middle Eastern cultures/societies.

ANTH 5027W. Archaeology of Prehistoric Europe. (HIS, WI; 3 cr.; Student Option; Every Fall) How archaeologists/historians analyze/artifact to develop knowledge about formation of European society, from earliest evidence of human occupation to Roman Period. Interpreting archaeological evidence from specific sites to understand broad trends in human past.

ANTH 5031W. Ethnographies of Science. (WI; 3 cr.; A-F only; Spring Even Year) Ethnographic, historical, and sociological accounts of scientific practice. How facts are constructed/negotiated. Social, cultural, and political influences on scientific method, data analysis using computers. prereq: SOCS 2008 or 5269 or instr consent

ANTH 5041. Ecological Anthropology. (3 cr.; Student Option; Periodic Fall) Concepts, theories, and methods of ecological anthropology (cultural ecology) show how humans interact with the biophysical environment. Compare biological and cultural interactions with the environment; examine adaptive strategies cross-culturally. prereq: grad or instr consent

ANTH 5112. Reconstructing Hominin Behavior. (3 cr.; A-F or Audit; Spring Even Year) Major hypotheses regarding evolution of human behavior. Combine evidence from realm of biological anthropology as we consider link between bone biology/behavior. Archaeological record. Hypotheses about biocultural evolution regarding tool-use, hunting, scavenging, food sharing, grandmothers, cooking, long distance running. prereq: Previous coursework in Biological Anthropology or Archaeology

ANTH 5113. Primate Evolution. (3 cr.; A-F only; Fall Odd Year) Evolutionary history of primates. Particular focus on origin/diversification of apes/Old World monkeys. prereq: Anthropology major, junior or senior

ANTH 5121. Business Anthropology. (2 cr.; Student Option; Every Spring) Anthropological/ethnographic understandings/research techniques. prereq: MBA student


ANTH 5221. Anthropology of Material Culture. (4 cr.; A-F or Audit; Every Fall) How anthropologists use fossil bones to answer questions of past human diet, behavior, and environments. Basics of skeletal-element/species identification of humans and large mammals. Project where students analyze a small assemblage of bones. Emphasizes scientific method, data analysis using computers. prereq: 1001

ANTH 5269. Analysis of Stone Tool Technology. (4 cr.; A-F or Audit; Fall Even Year) The course offers practical lab experience in analyzing archaeological collections of stone tools to learn about human behavior in the past. Students gain experience needed to get a job in the cultural resource management industry.

ANTH 5401. The Human Fossil Record. (3 cr.; A-F only; Fall Even Year) Fossil evidence paleoanthropologists use to reconstruct human evolutionary history. Taxonomy, phylogeny, behavior, ecology, tool use, land use, and biogeography. Examination of fossil casts, readings from primary/secondary professional sources. prereq: 1001 or instr consent

ANTH 5402. Zooarchaeology Laboratory. (3 cr.; A-F only; Every Fall) How archaeologists reconstruct the past through the study of animal bones associated
with artifacts at archaeological sites. Skeletal element (e.g., humerus, femur, tibia), and taxon (e.g., horse, antelope, sheep, bison, hyena) when confronted with bone. Comparative collection of bones from known taxa.

**ANTH 5403. Quantitative Methods in Biological Anthropology.** (4 cr.; Student Option; Fall Even, Spring Odd Year)
Quantitative methods used by biological anthropologists. Applying these methods to real anthropometric data. Lectures, complementary sessions in computer lab. prereq: Basic univariate statistics course or instr consent

**ANTH 5405. Human Skeletal Analysis.** (4 cr.; Student Option; Every Spring)

**ANTH 5442. Archaeology of the British Isles.** (; 3 cr.; A-F only; Every Fall)

**ANTH 5444. Archaeological Ceramics.** (; 4 cr.; A-F only; Every Spring)
Ceramics as material, technology, and cultural/social trace. Methods of assessing technology/use. Research, design, and interpretation of ceramic analyses. Students work with collections and propose/answer a research question about a ceramic assemblage. Readings, discussion, prereq: 3001 or instr consent

**ANTH 5446. Archaeology of Representation as Communication.** (; 3 cr.; A-F only; Every Spring)
Seminar. Uses of paintings, sculptures, drawings, and photographs as means of communication, from earliest representations of 30,000 years ago to present day.

**ANTH 5448. Applied Heritage Management.** (; 3 cr.; A-F only; Every Spring)
Contexts of cultural heritage applicable to federal/state protection. Approaches to planning/management. Issues of heritage/stakeholder conflict.

**ANTH 5501. Art of the Andes.** (3 cr.; A-F or Audit; Fall Even Year)
Introducion to art of the Andes, from earliest evidence to present day. Approaches to Andean art. Seminar. Uses of paintings, sculptures, drawings, and photographs as means of communication, from earliest representations of 30,000 years ago to present day. Readings, discussion, prerequisites: 3001 or instructor consent.

**ANTH 5502. Art of the Inka and their Ancestors.** (3 cr.; Student Option; Every Spring)
Art/architecture of Peru, from Andes, from first appearance in archaeological record until Spanish invasion in 16th century. Problems, theoretical/methodological approaches. Analysis of scholarly writing, focusing on evidence.

**ANTH 5503. Topics in Anthropology.** (; 3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

**ANTH 5590. Topics in Anthropology.** (; 3 cr. [max 9 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

**ANTH 8001. Ethnography, Theory, History.** (3 cr.; A-F or Audit; Every Fall)
Introduction to foundational concepts, methods, and ethnographic work. Emphasizes theories that have shaped 20th-century thinking in cultural anthropology. Connection of these theories to fieldwork and contemporary issues.

**ANTH 8002. Ethnography: Contemporary Theory and Practice.** (3 cr.; A-F or Audit; Every Spring)

**ANTH 8004. Foundations of Anthropological Archaeology.** (3 cr.; Student Option; Every Fall)
Theoretical foundations of anthropological archaeological research in historical and contemporary perspective. prereq: 8001, 8002

**ANTH 8005. Linguistic Anthropology.** (3 cr.; Student Option; Fall Even Year)
Introduction to literature of anthropological linguistics.

**ANTH 8111. Evolutionary Morphology.** (3 cr.; Student Option; Periodic Fall)

**ANTH 8112. Reconstructing Hominin Behavior.** (3 cr.; A-F or Audit; Spring Even Year)
Consider major hypotheses regarding evolution of human behavior. Evidence/arguments used to support or reject hypotheses. Consider link between bone biology/behavior. Archaeological record for more holistic understanding of evidence.

**ANTH 8113. Primate Evolution.** (3 cr.; A-F only; Fall Odd Year)
Evolutionary history of primates, with particular focus on origin/diversification of apes/Old World monkeys. prereq: Anthropology doctoral student

**ANTH 8114. Biological Anthropology Graduate Program Seminar: Behavioral Ecology of Primates.** (3 cr.; A-F or Audit; Fall Odd Year)
Course focuses on the behavioral ecology of primates, including humans, with a focus on how the evolution of social behaviors relates to ecology. The course serves as one of three Biological Anthropology Graduate Program Seminars, which provide training in the foundations of biological anthropology. For Biological Anthropology graduate students, the take-home exam for this course will stand as one of the three required Preliminary Papers. Students outside of Biological Anthropology are welcome to enroll, pending permission of the instructor. prereq: Anthropology graduate student or instr consent

**ANTH 8120. Problems in Culture Change and Applied Anthropology.** (3-6 cr.; Student Option; Periodic Fall & Spring)
Comparative studies of change in cultural systems. Impact of global processes on local cultures. Roles of anthropology and anthropologists in policy, planning, implementation, and evaluation.

**ANTH 8201. Humans and Nonhumans: Hybrids and Collectives.** (3 cr.; Student Option; Periodic Spring)
Social life as consisting of relationships not only among human beings, but also between humans and nonhumans: animals, plants, environments, technologies, etc. Focuses on figure of hybrid, its role in formations of collective life.

**ANTH 8203. Research Methods in Social and Cultural Anthropology.** (3 cr.; Student Option; Every Fall)
Current and classic issues in research methodology, including positivist, interpretivist, feminist, and postmodernist frameworks. Methodology, in the broadest sense of the concept, is evaluated. Students conduct three research exercises and set up an ethnographic research project. prereq: Grad anth major or instr consent

**ANTH 8205. Economic Anthropology.** (3 cr.; Student Option; Periodic Fall & Spring)
Theoretical foundations of economic anthropology examined through critical readings of traditional, classical, and contemporary authors. Ethnographic puzzles of material life and issues of ecological degradation, development, market expansion, gender, and transglobal processes.

**ANTH 8207. Political and Social Anthropology.** (3 cr.; Student Option; Periodic Fall & Spring)
Western concepts of politics, power, authority, society, state, and law. Cross-cultural approaches to these concepts in historical perspective. Major theoretical frameworks and current problems and positions in social and political anthropology. Ethnographic classics and new directions.

ANTH 8213. Ecological Anthropology. (3 cr.; Student Option; Periodic Fall & Spring) Seminar in ecological theory, and key problems in ecological anthropology and human ecology. Examines approaches in light of human practices, interactions between culture and the environment, global environmental change, and our understanding of human dimensions of ecosystem-based management.

ANTH 8215. Anthropology of Gender. (3 cr.; Student Option; Periodic Fall & Spring) Comparative, cross-cultural approach to gender. Focuses on various theories (e.g., feminist, postmodernist, psychoanalytic) of power, gender, authority, and femininity and masculinity. Gender ambiguity and issues of sexuality. prereq: Grad anth major or instr consent

ANTH 8219. Grant Writing. (2 cr.; Student Option; Periodic Fall & Spring) Students draft a research proposal in their area of interest. Seminar involves reading and evaluating proposals, learning about funding and process of submitting proposals, nuts of bolts of composing a proposal, and ethics of research in anthropology. prereq: Grad anth majors preparing to submit research grant proposals next academic yr

ANTH 8220. Field School. (6 cr.; Student Option; Every Summer) Advanced field excavation, survey, and research. Intensive training in excavation techniques, recordation, analysis, and interpretation of archaeological materials or prehistoric remains.

ANTH 8230. Anthropological Research Design. (3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall & Spring) Training seminar on research development, coordination, grant management, field/laboratory research management, fundraising. prereq: Anth grad student or instr consent

ANTH 8244. Interpreting Ancient Bone. (4 cr.; A-F or Audit; Periodic Fall & Spring) How anthropologists use fossil bones to answer questions of past human diet, behavior, and environments. Skeletal element and species identification (of humans, large mammals). Students analyze small assemblage of bones for class project. Scientific method, data analysis using computers. prereq: instr consent

ANTH 8333. FTE: Masters. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

ANTH 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

ANTH 8510. Topics in Archaeology. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Seminar examines particular aspects of archaeological methods and/or theory. Topics vary according to student and faculty interests.

ANTH 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral: no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ANTH 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ANTH 8810. Topics in Sociocultural Anthropology. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Seminar examines particular aspects of method and/or theory. Topics vary according to student and faculty interests.

ANTH 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

ANTH 8991. Independent Study. (1-18 cr.; Student Option; Every Fall, Spring & Summer) Under special circumstances and with instructor approval, qualified students may register for a listed course on a tutorial basis. prereq: instr consent

ANTH 8992. Directed Reading. (1-18 cr. [max 54 cr.]; Student Option; Every Fall, Spring & Summer) TBD prereq: instr consent

ANTH 8993. Directed Study. (1-18 cr.; Student Option; Every Fall, Spring & Summer) Directed Study prereq: instr consent

ANTH 8994. Directed Research. (1-18 cr.; Student Option; Every Fall, Spring & Summer) N/A prereq: instr consent

**Apparel Design (ADES)**

ADES 1221. Apparel Assembly Fundamentals. (3 cr.; A-F or Audit; Every Fall) Methods/applications of apparel assembly, from macro to macro perspective. prereq: Pre-apparel design major or instr consent

ADES 2196. Work Experience in Apparel Design. (1-14 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer) Supervised work experience in business, industry, or government, related to student's area of study. Integrative paper or project. prereq: Plan submitted/approved by [adviser, internship supervisor], written approval of supervisor, instr consent

ADES 2211. Fashion Illustration and Portfolio Development. (4 cr.; A-F or Audit; Every Spring) Illustration skills specific to garments/textiles. Traditional media/CAD applications. Critique/analysis of visual communication of apparel design concepts. prereq: Apparel Design Major or Pre-Major

ADES 2213. Textile Analysis. (4 cr.; A-F or Audit; Every Fall) Physical, chemical, and biological characteristics of fibers, yarns, textile structures, and finishes. Their effect on performance/appearance of textile products, including apparel, interior, and industrial textiles. prereq: DHA major or pre-major or instr consent

ADES 2214. Softlines Analysis. (3 cr.; A-F or Audit; Every Spring) Physical characteristics of softline products related to function for target market. Class experiences based on methods of analysis, including visual inspection, quality, construction, costing, and fit/sizing. prereq: DHA major or minor or instr consent

ADES 2221. Apparel Design Studio I. (4 cr.; A-F or Audit; Every Spring) Theories/methods in designing apparel for various user groups. Relation of two-dimensional pattern shape to three-dimensional body. Introduction to flat-pattern draping. prereq: [DHA 1201 or RM 1201]. [1221 or DHA 1221], apparel design premajor

ADES 2222. Apparel Design Studio II. (4 cr.; A-F or Audit; Every Fall & Spring) Design process in developing apparel for specific user group. Advanced principles/methods of developing patterns for body, including flat pattern, draping, fitting. Computer-aided design tools for illustration, pattern making, prereq: [2221 or DHA 2221] with a grade of at least C-. Apparel Design major, pass portfolio review

ADES 3196. Field Study: National or International. (1-10 cr.; A-F or Audit; Every Fall, Spring & Summer) Faculty-directed field study in a national or international setting. prereq: instr consent

ADES 3217. Fashion: Trends and Communication. (3 cr.; A-F or Audit; Every Fall) Relation of fashion trends to visual analysis of apparel. Application to design/retail.

ADES 3223. Apparel Design Studio III. (4 cr.; A-F or Audit; Every Spring) Study tailored/non-tailored apparel structures. Experiment with various materials/structures using traditional/innovative methods. Principles of manipulating materials/structures applied to series of garments. prereq: [2222 or DHA 2222] with grade of at least C-. Apparel Design major, pass portfolio review

ADES 3224. Apparel Design Studio IV. (4 cr.; A-F or Audit; Every Spring) Principles/theory of functional apparel design. Conduct/apply research in designing apparel for situations requiring thermal or impact
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.


**ABUS 4012. Strategic Decision Making and Problem Solving.** (3 cr.; A-F or Audit; Every Fall) Frameworks/processes for decision-making. Analyzing causes, effects of problems, and solutions in organizations. Creativity, team building. Case studies, final real-world project, online presentation. prerequisite: 45 cr

**ABUS 4013W. Legal, Ethical, and Risk Issues for Managers.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Key legal, ethical, and risk frameworks in business activity and civic life. Students will identify areas of exposure within their specific industry and learn about best practices to minimize legal liability and manage risk. The writing-related instruction is designed to develop effective management-level communication skills regarding legal, ethical, and other risks and to develop a thoughtful analytical approach to addressing real-world risks. prerequisite: CMgt 4011 recommended for CMgt students. 45 semester credits

**ABUS 4022W. Management in Organizations.** (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Demands on today's managers, with a focus on small to medium-sized organizations. Techniques/ideas beyond traditional studies. Applying management theory at all levels. Managing in a global workplace. Organizational planning and decision making. Organizing resources. Leading/motivating people. Controlling/evaluating organizational activities. This writing intensive designed course will spend significant time focusing on the writing process. Writing is crucial to this discipline because clear, accurate, and professional communication is essential to organization management. The ability to write effectively in terms of specified audiences ensures, in the professional world, successful communication between team members as well as the success of the projects, companies, and employees they represent. prerequisite: 45 semester credits recommended

**ABUS 4023W. Communicating for Results.** (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Aspects of communication essential for being persuasive/influential. Organizing/presenting ideas effectively, strategies for audience analysis, choosing communication methods, making appropriate use of informal influence methods, handling dissent. Processes for intercultural communication. prerequisite: 45 cr completed

**ABUS 4041. Dynamics of Leadership.** (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Successful leadership via flexible approach. Knowledge, skills, and abilities that leaders develop from eight leadership strategies: academic, bureaucratic, eclectic, economic, fellowship, military, political, social. Ways to lead diverse populations in a global environment. prerequisite: 45 cr completed

**ABUS 4043. Project Management in Practice.** (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Introduction to project management. Tools/techniques to support project leader in scheduling, coordinating, allocating resources. Develop/conduct field project. Requires use of MS Project (bundled w/textbook), Word, PowerPoint. prerequisite: 45 cr completed


**ABUS 4104. Management and Human Resource Practices.** (3 cr.; A-F or Audit; Every Fall & Spring) Providing day-to-day leadership. Organizing work, motivating employees. Delegating, coordinating, and achieving results. Front line human resource practices, including selection, induction, and training of new employees, employee appraisal. Handling grievances/discipline. prerequisite: 45 cr completed

**ABUS 4151. Innovation for Leaders and Organizations.** (3 cr.; A-F or Audit; Every Spring) Innovation as cornerstone of knowledge economy. History of innovation process, importance to individuals/organizations. Strategies to foster innovation. Responsibilities in innovation skill-building/leadership. prerequisite: 45 cr

**ABUS 4217. Real Estate Development: Process and Tools.** (3 cr.; A-F or Audit; Every Fall) Real estate development creates and alters our built environment. Working with architects, engineers, contractors, financing teams, government, and a host of consultants, real estate developers transform ideas into buildings, and with this, the spaces in which we live, work, and play. So, how do developers identify good and bad opportunities, and then, once committed, manage a wide group of stakeholders, often with disparate interests, to get the project completed and operating as planned? It is a challenge every step of the way, with a myriad of risks and obstacles to overcome, but with significant potential rewards. This course traces the development process from beginning to end, introducing foundational knowledge in project feasibility analysis and financial modeling, and integrating real world examples via case studies and interviews with Twin Cities-based practitioners. prerequisite: 45 credits. Familiarity with finance and accounting concepts helpful.

**ABUS 4321. Evaluating Performance Excellence in Organizations.** (3 cr.; S-N or Audit; Every Fall, Spring & Summer) Systematic processes for leadership, quality improvement, performance excellence. Analyze strengths/improvements using Baldrige National Quality Award and MNQA criteria. Students join MNQA board of evaluators and complete team evaluation of group seeking MNQA. prerequisite: Submit MNQA evaluator application

**ABUS 4509. New Product Development.** (3 cr.; A-F or Audit; Every Spring) How new consumer, industrial, and service products are planned/developed. Idea generation, concept/buyer testing, pricing, sales/profit strategies, product positioning, promotion, packaging/distribution. Marketing case histories. Student projects. prerequisite: [4103 or 4701 or Mktg 3001], at least 45 cr or instr consent

**ABUS 4515. Strategy and Management for a Sustainable Future.** (3 cr.; A-F or Audit; Every Spring) Sustainability in business. Relationship of sustainable environments to organizations. Economic/strategic enterprise value. Relationship of sustainable business practices to marketplace trends/realities. prerequisite: 45 cr completed

**ABUS 4571W. Introduction to Grant Writing for Health Care and Nonprofit Organizations.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Nonprofits and health care entities will continue to be challenged by limited resources and increased needs in communities they serve. This reality also results in an increased need for these groups to find additional financial support. This course will provide an understanding of ways to find, research, and write proposals for grants offered by government and private entities. As a writing intensive course, it will spend significant time focusing on the writing process. Writing is crucial to the field because the only way for a nonprofit to be awarded a grant is by submitting a written proposal. The strength of the proposal has a significant impact on the money that an organization will receive. Students will become familiar with various sections of the proposal by drafting, editing, and seeking feedback, and by revising a needs assessment, goal statement, budget justification, and statement of organizational purpose. By learning how to write well in the field, students will increase their chances of being employed by a nonprofit and securing funding for their organization.

**ABUS 4701. Introduction to Marketing.** (3 cr.; A-F or Audit; Every Fall & Spring)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

University of Minnesota Twin Cities Catalog

Fall, 2016

Applied Economics (APEC)

APEC 1001. Orientation to Applied Economics. (1 cr.; A-F or Audit; Every Fall) Introduction to curriculum offerings, liberal education requirements, employment opportunities, faculty in the Department of Applied Economics. Emphasizes historical development of the discipline, areas of specialization, coursework expectations, career planning.


APEC 1251. Principles of Accounting. (3 cr.; A-F only; Every Fall) Financial accounting. Theory, concepts, principles, procedures. Preparation/understanding of the four financial statements.

APEC 1905. Topics: Freshman Seminar. (1-3 cr.; A-F or Audit; Every Fall) Topics vary.

APEC 3001. Applied Microeconomics: Consumers, Producers, and Markets. (4 cr.; Student Option; Every Fall & Spring) Consumer/producer decisions. Theory of supply/demand. Markets, pricing, investment, effect regulation, market failures. prereq: [(1101 or Econ 1101 or 1101H or Econ 1101H), [MATH 1142 or MATH 1271]] or instr consent; intended for undergrads in [Ag/Food Bus Mgmt, Appl Econ]

APEC 3002. Applied Microeconomics: Managerial Economics. (4 cr.; Student Option; Every Fall & Spring) Microeconomic theory, its application to managerial problems. Introduction to regression analysis, demand analysis, function estimation, forecasting, cost function estimation, resource allocation decisions, linear programming, market structure, pricing policy, risk analysis, investment analysis. prereq - ApEc 3001 or Econ 3101 AND SCO 2550 or Stat 3011

APEC 3003. Introduction to Applied Econometrics. (4 cr.; A-F only; Every Spring) Econometrics is the core empirical methodology used in economics. It allows economists (and others) to learn about the world through data in non-experimental situations. This course teaches student how to use common types of econometric analysis to answer research questions in an experiential learning environment. prereq: APEC 1101 or equiv., STAT 3011 or equiv.

APEC 3006. Applied Macroeconomics: Government and the Economy. (3 cr.; Student Option; Every Fall & Spring) Public sector and market economics. Public goods, externalities, and other allocation issues. Government and stabilization of national economy. Overview of new classical/Keynesian models. Principles of taxation. Individual income tax. Sales, business, and property taxes. prereq: [(1102 or Econ 1102), [3001 or Econ 3101]] or instr consent

APEC 3007. Applied Macroeconomics: Policy, Trade, and Development. (GP; 3 cr.; Student Option; Every Fall & Spring) Indicators of economic development, growth in trade, and welfare of developing countries. Globalization. Drivers of growth, productivity, technical change, and research. Comparative advantage. Distribution consequences of trade. Trade policy instruments/institutions. prereq: [1101 or ECON 1101], [1101H or ECON 1101H], [1102 or ECON 1102], [1102H or ECON 1102H]; 3001, 3006 recommended


APEC 3071. Microeconomics of International Development. (3 cr.; Student Option; Every Fall) Characteristics and performance of peasant agriculture; potential role of agriculture in economic development, and design of economic policies to achieve agricultural and economic development; role of women in agricultural development. prereq: 1101, 1102, Econ 1101, 1102, or instr consent
APEC 3202. An Introduction to the Food System: Analysis, Management and Design. (3 cr.; Student Option; Every Fall)
Introduction to use of systems thinking for exploration of problems in contemporary food system from multidisciplinary perspective. System concepts. Historical evolution of food system. Analysis, management, design.

APEC 3411. Commodity Marketing. (3 cr.; Student Option; Every Fall)
Economic concepts related to marketing agricultural commodities. Conditions of competitive markets, historical perspectives on market institutions/policy, structural characteristics of markets, policies/ regulations affecting agricultural marketing of livestock, crop, and dairy products. prerequisite: 1101 or Econ 1101

APEC 3451. Food and Agricultural Sales. (3 cr.; Student Option; Every Spring)
Professional selling of agricultural and food products. Students build/refine sales abilities, identify/qualify prospects, deliver sales presentations, close the sale. Principles of market research. prerequisite: 1101 or Econ 1101

APEC 3480. Topics in Applied Economics. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Lectures and discussion on applied economics subjects. Topics specified in Class Schedule.

APEC 3501. Agribusiness Finance. (3 cr.; Student Option; Every Fall)
Analysis of financing and investment strategies for agribusiness firms and their effects on liquidity, solvency, and profitability. Analysis of financial institutions, markets, and instruments. Management problems, issues facing financial intermediaries serving agriculture. prerequisite: [1251 or Acct 2050], 60 cr or instr consent

APEC 3551. Entrepreneurship Fundamentals for Value-Added Rural Businesses. (3 cr.; A-F only; Every Fall)
Process of starting a new business or organization. Creating a new value proposition in which people are willing to pay for this new product or service according to its perceived value. Students identify market niches and develop plans to exploit them. Student-run businesses may be created as well as self-standing independent businesses.

APEC 3611W. Environmental and Natural Resource Economics. (ENV.WI; 3 cr.; Student Option; Every Spring)

APEC 3811. Principles of Farm Management. (3 cr.; Student Option; Every Fall)
Strategic and operations aspects of farm management; financial analysis, budgeting, strategic management; marketing plan and control; enterprise and whole farm planning and control; investment analysis, quality, risk, and personnel management. prerequisite: 1101 or Econ 1101

APEC 3821. Retail Center Management. (3 cr.; Student Option; Every Spring)
Management of garden centers, grocery stores, and other retail units selling perishable agricultural products. prerequisite: [1101 or Econ 1101], [1251 or Acct 2050]

APEC 3840. Cooperative Organization. (3 cr.; Student Option; Every Spring)
Introduction to cooperative form of business. Extensive applications to agricultural/food cooperatives used. Active-student learning process with group activities/written exercises.

APEC 3991. Independent Study in Applied Economics. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Independent study and supervised reading and research on subjects and problems not covered in regularly offered courses. prerequisite: instr consent

APEC 4103. World Food Problems. (GP; 3 cr.; Student Option; Every Fall)
Multidisciplinary look at problems and possible solutions affecting food production, storage, and utilization in developing countries. Presentations and discussions introduce conflicting views on population, technology, and ethical and cultural values of people in various parts of the world.

APEC 4311. Tourism Development: Principles, Processes, Policies. (3 cr.; Student Option; Every Spring)
Evolution of tourism industry; economic, environmental, and sociocultural impacts of tourism development; influence of government policies and organizations; models and tools needed for successful development; consequences of development activities and ways to involve stakeholders in decisions. prerequisite: 1101, 1102 or Econ 1101, 1102

APEC 4451W. Food Marketing Economics. (CIV,WI; 3 cr.; Student Option; Every Fall)
Economics of food marketing in the United States. Food consumption trends, consumer behavior, marketing strategies, consumer survey methodology, food distribution/retailing system. Policy issues related to food marketing. Individual/group projects. prerequisite: [1101 or Econ 1101], [1101H or Econ 1101H], MGMT 3001, 60 cr or instr consent

APEC 4461. Horticultural Marketing. (3 cr.; A-F only; Every Fall)
Major areas in horticultural marketing. Difference between horticultural products and commercial commodities. Core marketing components that should be used by every small horticultural business. Approaches to consumer research.

APEC 4481. Futures and Options Markets. (3 cr.; Student Option; Every Spring)
Economics of futures/options trading in theory/application. Basis/price relationship in storable/nonstorables commodities. Hedging/commercial use of futures/options contracts. Speculation. Pricing efficiency. Market performances/regulation. prerequisite: [3001 or Econ 3101], [AnSc 3011 or SCO 2550 or Stat 3011], or instr consent

APEC 4501. Financial Modeling. (3 cr.; A-F or Audit; Every Spring)
Designing/implementing solutions to financial problems with Microsoft Excel? spreadsheet software. Development of computer-based tools. Interpreting/implementing concepts/theories in economics/finance. prerequisite: [APEC 3501 or FINA 3001], [APEC 1251 or ACCT 2050]

APEC 4821W. Business Economics and Strategy. (WI; 3 cr.; Student Option; Every Spring)
Strategic management for production, processing, wholesaling, retailing, and service. Strategy formulation, implementation, and control. Business plans. Case study analysis. prerequisite: 3002, [3501 or FINA 3001], MGMT 3001

APEC 5031. Methods of Economic Data Analysis. (3 cr.; Student Option; Every Fall)
Statistical and econometric techniques for applied economists. Theory and application of multivariate regression model using data sets from published economic studies. Emphasis on use of statistical techniques to understand market behavior. prerequisite: Math 1271, Stat 5021, knowledge of matrix algebra

APEC 5032. Economic Data Analysis for Managerial and Policy Decisions. (3 cr.; Student Option; Every Fall)
Statistical and econometric methods for the analysis of large data sets to support managerial and policy decisions. Methods for organizing, accessing, and ensuring the quality of data. Estimation techniques include panel data methods, limited dependent variable models, and time series analysis. Clarity of reporting and design of procedures for maintaining and updating data estimates. prerequisite: 5031 or instr consent

APEC 5151. Applied Microeconomics: Firm and Household. (3 cr.; Student Option; Every Fall)
Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis Regression analysis, mathematical programming, and present value analysis. prerequisite: 3001 or Math 1271 or Math 2243 or equiv or grad student or instr consent

APEC 5152. Applied Macroeconomics: Income and Employment. (3 cr.; Student Option; Every Spring)
Static and dynamic open economy models and simple business cycle models that examine economic growth, business cycles, and fiscal and monetary policy. Input-output analysis and large scale econometric models. Sources/properties of economy and sector-wide data. Empirical applications. prerequisite: 3001 or Math 1271 or Math 2243 or equiv or grad student or instr consent

APEC 5321. Regional Economic Analysis. (3 cr.; Student Option; Every Spring)
Development patterns. Role of resources, transportation, and institutional constraints.
Migration, investments in growth and change. Economic information in investment and location decisions. Economic development policies and tools. Economic impact analysis. prereq: 3006 or ECON 3102 or instr consent

APEC 5451. Food Marketing Economics. I, II, III (3 cr. ; A-F or Audit; Every Fall)

APEC 5481. Futures and Options Markets. I, II, III (3 cr. ; Student Option; Every Spring)
Economic concepts related to futures/options trading. Hedging, speculation.

APEC 5511. Labor Economics. I, II, III (3 cr. ; Student Option; Periodic Fall)
Theoretical foundations of labor markets. Intertemporal/household labor supply. Demand for labor, efficiency wages. Human capital theory, unemployment, migration decisions. Analysis of econometric research applied to labor policy issues such as minimum wage, tax policy, social insurance, education. prereq: [[3001 or Econ 3101 or PA 5021], [PA 5032 or equiv]] or instr consent

APEC 5561. Economics of Natural Resource and Environmental Policy. I, II, III (3 cr. ; Student Option; Every Spring)
Economic analyses, including project evaluation of current natural resource/environmental issues. Intertemporal use of natural resources, natural resource scarcity/adequacy, environmental quality, and mechanisms for pollution control and their implications for public policy. prereq: [[3001 or ECON 3101], [3611 or ECON 3611 or ESPM 3261]] or instr consent

APEC 5711. U.S. Agricultural and Environmental Policy. I, II, III (3 cr. ; Student Option; Periodic Spring)
U.S. agricultural policy in an open world economy; role of private markets and government in regulating supply and demand; income vs. price support, supply controls, environmental constraints, and export protectionism; functioning of markets; roles of public interest groups and future of American agricultural policy. prereq: 3001 or Econ 3101

APEC 5721. Economics of Science and Technology Policy. I, II, III (3 cr. ; Student Option; Every Fall)
Economics of innovation, technical change, and research and development. Productivity measurement. Knowledge stocks, research lags and spillovers. Econometric/welfare surplus methods for evaluating economic consequences of research and development. Economics of intellectual property rights. prereq: 3001 or ECON 3101 or instr consent

APEC 5731. Economic Growth and International Development. I, II, III (3 cr. ; Student Option; Periodic Spring)
Economics of research and development. Technical change, productivity growth. Impact of technology on institutions. Science and technology policy. prereq: 3002 or [Econ 3101, Stat 3022]; Econ 4211 recommended

APEC 5751. Global Trade and Policy. I, II, III (3 cr. ; Student Option; Every Fall)
Trade policies of import/export nations, gains from trade, trade negotiations/agreements. Free trade and common market areas. Exchange rate impacts. Primary commodities and market instability. Current trade issues. prereq: 3001 or Econ 3101 or PA 5021

APEC 5811. Cooperative Organization. I, II, III (3 cr. ; Student Option; Every Spring)
Introduction to cooperative form of business. Extensive applications to agricultural/food cooperatives. Active-student learning process with group activities/written exercises.

APEC 5831. Food and Agribusiness Marketplace. (2 cr. ; A-F only; Every Spring)
This is a graduate student survey course of the industrial organization and current policy issues in the food and agribusiness marketplace. It represents a collaboration between the College of Food, Agricultural, and Natural Resource Sciences and the Carlson School of Management. The course uses short readings and speakers. A comprehensive look at all of the sectors in the food and agribusiness value chain is described. Topics include food policies (Farm Bills, food stamps, food labeling, and similar topics); environmental policies (water, invasive species, agriculture production and similar topics); and industrial organization issues (marketing and production contracts, overview of firm strategic orientation, distribution and similar topics). Readings, guest speakers, and presentations are used. prereq: graduate student

APEC 5891. Independent Study: Advanced Topics in Farm and Agribusiness Management. I, II, III (1-4 cr. ; Student Option; Every Fall)
Special topics or individual work suited to the needs of particular groups of students. prereq: instr consent

APEC 5911. Special Topics and Independent Study in Applied Economics. I, II, III (1-4 cr. ; max 12 cr. ; Student Option; Every Fall, Spring & Summer)
Special classes, independent study, and supervised reading/research on subjects/problems not covered in regularly offered courses. prereq: instr consent

APEC 8001. Applied Microeconomic Analysis of Consumer Choice and Consumer Demand. I, II, III (2 cr. ; A-F or Audit; Every Fall)
Consumer behavior/demand. Introduction to welfare analysis. General equilibrium analysis in pure exchange economy. Part of four-course sequence (APEC 8001-8004). prereq: [[5151 or ECON 3101 or ECON 5151 or intermediate microeconomic theory], [MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8002. Applied Microeconomic Analysis of Production and Choice Under Uncertainty. I, II, III (2 cr. ; A-F or Audit; Every Fall)
Production, competitive markets, and choice under uncertainty. Technology and production, cost minimization and profit maximization, production duality, efficiency and technical change, general equilibrium of production. Part of four-course sequence (APEC 8001-8004), prereq: [[5151 or ECON 3101 or ECON 8101], [MATH 2243, MATH 2263] or equiv] or instr consent

APEC 8003. Applied Microeconomic Analysis of Game Theory and Information. I, II, III (2 cr. ; A-F or Audit; Every Spring)
Strategic competition, game theory, and information. Non-cooperative games, static games of complete and imperfect information, dynamic games of complete/incomplete information, application of incomplete information. Part of four-course sequence (APEC 8001-8004). prereq: [[8002 or ECON 8002 or ECON 8102], [MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8004. Applied Microeconomic Analysis of Social Choice and Welfare. I, II, III (2 cr. ; A-F or Audit; Every Spring)
Welfare economics/measurement, externalities and social choice. Welfare theorems in general equilibrium, externalities and public goods, social choice, social welfare, and welfare change measurement. Part of four-course sequence (APEC 8001-8004). prereq: [[8003 or ECON 8003 or ECON 8103], [MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8202. Mathematical Optimization in Applied Economics. I, II, III (3 cr. ; Student Option; Every Fall)
Economic foundations and applications of mathematical and dynamic programming and optimal control. Mathematical optimization concepts; structures and economic interpretations of various models of the firm, consumer, household, sector, and economy. Model building and solution techniques. prereq: [5151, Econ 5151] or equiv or instr consent

APEC 8203. Applied Welfare Economics and Public Policy. I, II, III (3 cr. ; Student Option; Every Spring)
Basic concepts underlying measurement of welfare change, problems of market failure and externalities, social welfare functions, and distribution within and across generations. Application of concepts, based on case studies of the environment, returns to research, technical change, and agricultural policy. prereq: calculus, intermediate econ theory

APEC 8206. Dynamic Optimization: Applications in Economics and Management. I, II, III (3 cr. ; Student Option; Every Spring)
Formulation and solution of dynamic optimization problems using optimal control theory and dynamic programming. Analytical and numerical solution methods to solve deterministic and stochastic problems for various economic applications. prereq: 5151 or equiv or instr consent

APEC 8211. Econometric Analysis I. I, II, III (4 cr. ; Student Option; Every Fall)
Classical multiple linear regression, stochastic regressors, heteroscedasticity, autocorrelated disturbances, panel data, discrete dependent variables. prereq: [[Stat 4102 or Stat 5102], Ph.D. student] or instr consent
APEC 8212. Econometric Analysis II. (4 cr.; Student Option; Every Spring) Second semester of econometrics for Ph.D. students. Specification tests, instrumental variables, heteroscedasticity, panel data, simultaneous equations, bootstrap methods, limited dependent variable models, semiparametric estimation, econometrics of program evaluation, general method of moments, time series, hazard models. prereq: 8211 or equiv or inst consent

APEC 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

APEC 8341. Applied Public Finance. (3 cr.; A-F only; Periodic Spring) Current economic research on government tax and expenditure policy. Apply tools of applied economics to public finance issues. Tax policy, taxation and household decisions (including labor supply and saving), taxation and the firm (including the cost of capital), and fundamental tax reforms. Alternative demand models for public goods, public choice theory, and fiscal federalism. prereq: 8001-8004 or ECON 8101-8104

APEC 8401. Consumer Behavior and Household Economics. (2 cr.; A-F or Audit; Periodic Fall) Seven-week course. Microeconomic analysis of individual and household behavior, both theoretical and empirical issues. Demand theory?static models to dynamic models. Equivalence scales/intrahousehold allocation. prereq: [8001 or concurrent registration in 8001], [8002 or concurrent registration in 8002], [8003 or concurrent registration in 8003], [8004 or concurrent registration in 8004] or [ECON 8001 or concurrent registration in ECON 8001], [ECON 8002 or concurrent registration in ECON 8002], [ECON 8003 or concurrent registration in ECON 8003], [ECON 8004 or concurrent registration in ECON 8004] or [ECON 8001 or concurrent registration in ECON 8001], [ECON 8002 or concurrent registration in ECON 8002] or [ECON 8003 or concurrent registration in ECON 8003] or [ECON 8004 or concurrent registration in ECON 8004] or [ECON 8101 or concurrent registration in ECON 8101], [ECON 8102 or concurrent registration in ECON 8102] or [ECON 8103 or concurrent registration in ECON 8103], [ECON 8104 or concurrent registration in ECON 8104], [8211 or concurrent registration in 8211], [8212 or concurrent registration in 8212]

APEC 8402. Information and Behavioral Economics. (2 cr.; A-F or Audit; Periodic Fall) Consumer behavior. Standard economic models. Alternative models that incorporate psychological phenomena. Influence of information on consumer choice over time and under uncertainty. Expected and unexpected utility theory, bounded rationality, prospect theory, choice over time. prereq: 8401, [8001 or concurrent registration in 8001], [8002 or concurrent registration in 8002], [8003 or concurrent registration in 8003], [8004 or concurrent registration in 8004] or [ECON 8001 or concurrent registration in ECON 8001], [ECON 8002 or concurrent registration in ECON 8002], [ECON 8003 or concurrent registration in ECON 8003], [ECON 8004 or concurrent registration in ECON 8004] or [ECON 8001 or concurrent registration in ECON 8010], [ECON 8010 or concurrent registration in ECON 8103], [ECON 8010 or concurrent registration in ECON 8104], [8211 or concurrent registration in 8211], [8212 or concurrent registration in 8212]

APEC 8403. Consumer Theory and Demand Analysis. (3 cr.: A-F only; Periodic Fall & Spring) Microeconomic analysis of consumer theory and demand analysis. Theoretical and empirical issues. Measurement issues and index numbers in consumer theory, develops empirical demand specifications. Theoretical and empirical consumer demand specifications are then applied to current topics in food assistance, food nutrition, and health topics. prereq: [8001 or concurrent registration in 8001], [8002 or concurrent registration in 8002], [8003 or concurrent registration in 8003], [8004 or concurrent registration in 8004] or [ECON 8001 or concurrent registration in ECON 8001], [ECON 8002 or concurrent registration in ECON 8002], [ECON 8003 or concurrent registration in ECON 8003], [ECON 8004 or concurrent registration in ECON 8004] or [ECON 8001 or concurrent registration in ECON 8001], [ECON 8002 or concurrent registration in ECON 8002] or [ECON 8003 or concurrent registration in ECON 8003] or [ECON 8004 or concurrent registration in ECON 8004] or [ECON 8001 or concurrent registration in ECON 8101], [ECON 8102 or concurrent registration in ECON 8102] or [ECON 8103 or concurrent registration in ECON 8103], [ECON 8104 or concurrent registration in ECON 8104], [8211 or concurrent registration in 8211], [8212 or concurrent registration in 8212], [MATH 1271 or equiv]

APEC 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

APEC 8501. Labor Economics I. (2 cr.; A-F or Audit; Periodic Spring) Theoretical and empirical studies of compensating differentials, discrimination, personnel economics, and gross flows. prereq: 8003 or equiv or concurrent registration is required (or allowed) in 8003, 8211, 5032 or equiv

APEC 8502. Labor Economics II. (2 cr.; A-F or Audit; Periodic Spring) Topics in applied microeconomics related to labor supply and human capital. Household decisions and resulting outcomes in labor market. Household labor supply. Estimation of labor supply and earnings functions. Theory of human capital, wage structure and determination, and impacts of tax and transfer policies. prereq: [8211, 8001, 8002] or [ECON 8001, ECON 8002] or [ECON 8001, ECON 8002] or inst consent

APEC 8601. Natural Resource Economics. (3 cr.; Student Option; Periodic Fall & Spring) Economic analysis of resource use and management. Capital theory, dynamic resource allocation. Applications to renewable and nonrenewable resources. Empirical studies, policy issues. prereq: [5151, 8202, 8206 [ECON 5151 or equiv]] or inst consent

APEC 8602. Economics of the Environment. (3 cr.; Student Option; Every Fall) Economic analysis of environmental management, emphasizing environmental policy. Application of microeconomic theory to problems of market failure, market-based pollution control policies, contingent valuation, hedonic models, option value, and other topics. prereq: 8004 or ECON 8004 or ECON 8104 or equiv or inst consent

APEC 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; No Grade Associated; Every Fall, Spring & Summer) Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

APEC 8701. International Economic Development, Growth, and Trade. (3 cr.; Student Option; Every Fall) Development, growth, and trade of developing nations and emerging market economies. Course links stylized characteristics of economic development, economic policy, and political economy using modern economic theory and empirical methods of analysis. prereq: ECON 8002 or ECON 8102 or inst consent

APEC 8702. Economic and Trade Policy: Sectoral and Institutional Issues. (3 cr.; Student Option; Every Spring) International trade across developed and developing countries. National policies, regional agreements and treaties, multilateral arrangements such as World Trade Organization. Applying international trade and multinationals theory and econometric methods. prereq: ECON 8002 or ECON 8102 or inst consent

APEC 8703. Microeconomic Analysis of Economic Development. (3 cr.; A-F or Audit; Periodic Fall) Topics concerning microeconomics of economic development in low-income countries. Focuses on behavior of agricultural households, poverty, inequality, education, health/nutrition, and evaluation of development programs. prereq: ECON 8001-04 or ECON 8101-04, and ApEc 8211-8212 or inst consent. Concurrent registration is ok.

APEC 8777. Thesis Credits: Master's. (1-18 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

APEC 8793. Master's Paper: Plan B Project. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer) Students work under guidance of adviser to complete their Plan B Paper project. prereq: Agri/AgEc MS student or AgEc MS student

non-jointness in production. Index numbers, measures of efficiency/productivity. prereq: [Econ 8001, Econ 8002, Econ 8003] or [Econ 8101, Econ 8102, Econ 8103] or equiv or instr consent

APEC 8803. Marketing Economics. (3 cr.; A-F or Audit; Periodic Fall & Spring) Review of market structure, conduct, and performance. Market interdependency over space/time. Product forms. Issues pertaining to market failures/interventions. prereq: [Econ 8001, Econ 8002] or [Econ 8101, Econ 8102] or instr consent

APEC 8804. Managerial Economics. (3 cr.; Student Option; Periodic Fall & Spring) Analysis of managerial decisions by organizations/individual entrepreneurs. Application of dynamic programming to investment/resource allocation decisions. Economics of business organization, including boundaries of the firm, mechanisms for vertical coordination. Economic implications of alternative ownership structures. prereq: [8001, 8002, 8003, 8004] or [Econ 8101, Econ 8102, Econ 8103, Econ 8104] or instr consent; majors must register on A-F basis.

APEC 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral thesis credit. prereq: ApEc PhD student; max 18 cr per semester or summer; 24 cr required

APEC 8901. Graduate Seminar: MS & PhD. (1 cr.; S-N or Audit; Every Fall) Attendance and active participation in applied economics research seminars. Effective research methods. Research topics and observe professional methods of research presentations.

APEC 8902. Graduate Research Development Seminar. (1 cr.; S-N or Audit; Every Fall & Spring) Faculty, students, outside speakers present research ideas/results, which participants critique. Topics vary according to interests of speakers. prereq: ApEc MS student or ApEc PhD student

APEC 8903. PhD Qualifying Paper Seminar I. (1 cr.; S-N only; Every Fall) Support for writing second year Qualifying Paper. Purpose of paper is to provide guided opportunity for doctoral students to complete substantial research paper. prereq: 8001-8004 or Econ 8001-8004 or Econ 8101-8104

APEC 8904. PhD Qualifying Paper Seminar II. (1 cr.; S-N only; Every Spring) Provides support to doctoral students writing second year Qualifying Paper. Purpose of paper is to provide guided opportunity for students to complete substantial research paper. prereq: APEC 8903

APEC 8991. Advanced Topics in Applied Economics. (1-6 cr. [max 18 cr.]; A-F or Audit; Every Fall, Spring & Summer) Special seminars or individual work on subjects suited to needs of students. prereq: instr consent

Applied Plant Sciences (APSC)

APSC 8123. Research Ethics in the Plant and Environmental Sciences. (0.5 cr.; S-N or Audit; Every Spring) Ethics training to graduate students enrolled in plant/environmental graduate research programs and fulfill requirement for training in responsible conduct of research. Course meets during first seven weeks of spring semester.

APSC 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

APSC 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

APSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

APSC 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

APSC 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Applied Professional Studies (APS)

APS 4072. What Does It Mean to Be Green?. (3 cr.; A-F only; Every Fall) Biodiversity, ecological balance, nutrient cycling, soil quality. Organic practices of tillage, fertility management, weed control, insect control. Specific practices compared with conventional/integrated pest management. Economic analysis of both organic/conventional practices. prereq: AGRO 1101 or AGRO 1103 or BIOL 1001 or BIOL 1002 or HORT 1001 or HORT 1002 or HORT 1001 or Hort 1001 or instr consent, [sr or grad student admitted to MPS in agriculture]

APS 5010. Topics in Applied Professional Studies. (1-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Topics in Applied Professional Studies. prereq: dept consent

APS 5101. Ecological Design for Horticulture. (3 cr.; A-F or Audit; Periodic Summer) Design/systems thinking with plant mechanisms. prereq: SOIL 5125, HORT 1001, dept consent

APS 5102. Garden Design: Theory and Application. (2 cr.; A-F or Audit; Periodic Spring) This course provides an overview of the garden design process, the analysis and conceptual design of the landscape, exploration of the design characteristics of plants, sustainable design and a descriptive journey into several historical garden styles. You will be introduced to a variety of topics, including the design process, basic design principles, and the basic concepts of graphic communication in garden design. A working knowledge of design process and principles is critical to quality design. This course is intended to strengthen student awareness and knowledge of design rather than fully develop the skills necessary to draw, develop and implement garden designs. This course is different from fact-based horticulture science courses. Although you will be held responsible for learning a broad range of principles and processes in this course, there are typically no absolute right answers relative to design assessment and critique. What is more important is that you gain the ability to articulate and assess design character and quality and give evidence of your thought process.

APS 5201. Career and Job Search Preparation for Graduate Students. (1 cr.; S-N only; Every Fall & Spring) Job search and career development tools. Goals, networking, job search, resume/CV, interviewing. Assignments include resume/CV, informational interview, career development plan. prereq: dept consent

APS 5901. Microeconomics for High School Teaching. (3 cr.; A-F only; Every Summer) This is an online course intended for in-service and pre-service teachers who want to build or enhance their content knowledge in microeconomics and their pedagogical skills in teaching microeconomics to high school students. The course will include strategies for developing curriculum and instruction for microeconomics that engage students of diverse backgrounds. prereq: The prerequisites for this course are: licensed secondary school teachers in social studies, business, consumer science, or agricultural education; or pre-service secondary school teachers in a teaching licensure program in social studies, business, consumer science, and dept consent

APS 6950. Topics in Professional Studies. (1-3 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Topics in professional studies. prereq: dept consent

APS 6993. Directed Studies. (1-6 cr.; Student Option No Audit; Every Fall, Spring & Summer) Directed Studies prereq: dept consent

APS 6994. Directed Research. (1-6 cr.; S-N only; Every Fall, Spring & Summer) Directed research. prereq: dept consent

APS 8001. Introduction to Research in the Biological Sciences. (1 cr.; S-N only; Every Fall, Spring & Summer)
Resources available at U of M/College of Continuing Education that will help complete Master of Biological Sciences degree. Required of all MBS students. prereq: Admitted MBS student

**APS 8002. Final Project Course for Plan B MBS Students.** (2 cr.; S-N only; Every Fall, Spring & Summer) Synthesize/complete Plan B graduate final project. prereq: dept consent

**APS 8003. Capstone Course for Plan C MBS Students.** (2 cr.; S-N only; Every Fall, Spring & Summer) MBS students synthesize/complete Plan C graduate final project. prereq: dept consent

**APS 8110. Graduate Seminar Series.** (1 cr. [max 3 cr.]; S-N only; Every Fall, Spring & Summer) Recent developments in student's field of interest presented in research seminars by scientific experts. prereq: dept consent

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**Arabic (ARAB)**

**ARAB 1101. Beginning Arabic I.** (5 cr.; Student Option; Every Fall & Summer) Oral practice, reading, comprehension, basic grammar.

**ARAB 1102. Beginning Arabic II.** (5 cr.; Student Option; Every Spring & Summer) Comprehension, oral practice, reading of standard Arabic. prereq: 1101 or instr consent

**ARAB 3101. Intermediate Arabic I.** (5 cr.; Student Option; Every Fall) Advanced grammar/conversational practice. Reading Arabic texts. prereq: 1102 or instr consent

**ARAB 3102. Intermediate Arabic II.** (5 cr.; Student Option; Every Spring) Advanced grammar, analyses of readings, oral comprehension. prereq: 3101 or instr consent

**ARAB 3290. Arabic Language Teaching Tutorial.** (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring) Students tutor beginning students of Arabic and are part of department's Arabic language team. prereq: Grade of A in 3102/4122

**ARAB 3542. Medieval Islam.** (3 cr.; Student Option.) Islamic dynasties, Mamluks and Mongols, Crusaders and Assassins. Abbasid Caliphate's disintegration and rise of Seljuk Turks.

**ARAB 3811. Egyptian Colloquial Arabic I.** (3 cr.; A-F only; Every Fall & Summer) A course designed for students of Arabic who have taken a minimum of two semesters of Modern Standard Arabic (ARAB 1101 and 1102), or the equivalent thereof as determined by a placement test. The course provides training in the fundamentals of Egyptian Colloquial Arabic, one of the most widely-spoken and widely-understood Arabic vernaculars. Students practice the expression and comprehension of communicative needs in a variety of daily-life, informal situations. In addition, they are acquainted with a range of authentic cultural materials (film, TV broadcasts, songs) in Egyptian Arabic. The course relies heavily on oral practice and class periods are designed to be interactive. This course is open to non-native speakers and non-heritage learners of Arabic only. It cannot be taken in lieu of ARAB 3101 or ARAB 3102 to fulfill the CLA second language requirement; it can, however, be taken concurrently with these classes. Credit will not be granted if student has already taken ARAB 3900 Fall 2015, Summer 2016

**ARAB 3900. Topics in Arabic.** (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Topics specified in course guide.

**ARAB 3993. Directed Study.** (1-3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) For advanced students with individual faculty members. Prereq-instr consent, dept consent, college consent.

**ARAB 4101. Beginning Arabic I for Graduate Student Research.** (5 cr.; Student Option; Every Fall & Summer) Oral practice, reading, comprehension, grammar.

**ARAB 4102. Beginning Arabic II for Graduate Student Research.** (5 cr.; Student Option; Every Spring & Summer) Comprehension, oral practice, reading of standard Arabic. Meets with 1102. prereq: 4101 or equiv

**ARAB 4121. Intermediate Arabic I for Graduate Student Research.** (5 cr.; Student Option; Every Fall) Advanced grammar, conversational practice. Reading Arabic texts. prereq: 4102 or equiv

**ARAB 4122. Intermediate Arabic II for Graduate Student Research.** (5 cr.; Student Option; Every Spring) Advanced grammar, analysis of readings, oral comprehension. Meets with 3102. prereq: 4121 or equiv

**ARAB 5101. Advanced Arabic I.** (4 cr.; Student Option; Every Fall) Advanced readings in classical/modern Arabic. Compositions based on texts. prereq: [3102, successful completion of the Arabic language proficiency exam] or instr consent

**ARAB 5102. Advanced Arabic II.** (4 cr.; Student Option; Every Spring) Readings of Arabic texts. Writing compositions based on texts. Continuation of 5101. prereq: 5101 or instr consent

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**Arabic Lang/Culture in Morocco (MRCO)**

**MRCO 1301. Accelerated Colloquial Moroccan Arabic I.** (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 1401. Intensive Colloquial Moroccan Arabic I.** (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 1701. Accelerated Modern Standard Arabic I.** (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 1801. Intensive Beginning Modern Standard Arabic.** (10 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 2301. Accelerated Colloquial Moroccan Arabic II.** (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 2701. Accelerated Modern Standard Arabic II.** (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 2801. Intensive Low Intermediate Modern Standard Arabic.** (10 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 3005. Introduction to the Arabic Newspaper.** (3-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Basic newspaper vocabulary/structure. Analysis of headlines.

**MRCO 3006. Media Arabic.** (3-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Media vocabulary sufficient to grasp gist of newspaper article/broadcast. Graded newspaper readings from Middle Eastern dailies. Taped material from Moroccan television/radio.

**MRCO 3007. Gender, Modernization, and Social Change in Morocco.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Interrelationships between gender, modernization, and social change in post-colonial Morocco. Emphasizes social institutions, religion, development, traditions, and contemporary issues.

**MRCO 3008. Trajectories of Representation: Indigenous and Western Images of Morocco.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Contemporary Moroccan literature. Selected texts, their social/political contexts. Issues that have shaped national literature and postcoloniality since 1950s.

**MRCO 3009. Moroccan Society and Culture.** (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Political, economic, societal, and cultural trends in old/modern Moroccan society. Walking tour, discussions, guest lecturers.

**MRCO 3010. Readings in Contemporary Maghrebi Literature.** (3-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course

**MRCO 3011. Readings in Islamic Texts I.** (3-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**MRCO 3012. Readings in Islamic Texts II.** (3-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.
MRCO 3013. Islam: Past and Present. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course

MRCO 3599. Morocco in Context. (1-3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3701. Accelerated Modern Standard Arabic III. (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3702. Accelerated Modern Standard Arabic IV. (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3801. Intensive Intermediate Modern Standard Arabic. (10 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3802. Intensive High Intermediate Modern Standard Arabic. (10 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3803. Intensive Low Advanced Modern Standard Arabic. (10 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3804. Intensive Advanced Modern Standard Arabic. (10 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3901. Accelerated Modern Standard Arabic V. (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3902. Accelerated Modern Standard Arabic VI. (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3903. Accelerated Modern Standard Arabic VII. (6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MRCO 3911. Proficiency Arabic I. (; 5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

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**Architecture (ARCH)**

ARCH 1281. Design Fundamentals I. (AH; 4 cr.; A-F only; Every Fall) Introduction to design thinking in architecture through project-based learning. Lectures, films, field trips. Four design projects, including an off-campus service learning.

ARCH 1701H. Honors: The Designed Environment. (; 3 cr.; A-F only; Every Spring) Seminal issues in the designed environment. Relationships between place/space, ideal/real, public/private. How architecture, landscape architecture, and urban design have explored those issues. prereq: [Fr or soph] honors

ARCH 2281. Design Fundamentals II. (4 cr.; A-F only; Every Spring) Foundation architectural design studio. Design principles, technical drawing, material manipulation. prereq: 1281, [Arch mjr or pre-arch]

ARCH 2301. Introduction to Drawing in Architecture. (4 cr.; A-F only; Every Fall, Spring & Summer) Sketching/drawing conventions of visual phenomena/forms. prereq: pre-arch major or BDA major; no prereq in summer

ARCH 3150. Topics in Architecture. (; 1-6 cr. [max 24 cr.]; Student Option; Periodic Fall & Spring) Selected topics in architecture design, theory, representation, or history.

ARCH 3250. Design Workshop. (; 1-6 cr. [max 18 cr.]; A-F only; Every Fall & Spring) Design process as it relates to architecture. Hands-on projects involving interactive design process. Students develop rigorous/inventive graphic means of communicating. prereq: 2281, [Arch BA or BDA major]

ARCH 3281. Undergraduate Architecture Studio I. (; 6 cr.; A-F only; Every Fall) Introduction to architectural design in relation to site. prereq: BS Arch major

ARCH 3282. Undergraduate Architecture Studio II. (; 6 cr.; A-F only; Every Spring) Introduction to architectural design in relation to program. prereq: [3281 or 4281], BS Arch major

ARCH 3301. Drawing for Design in Architecture. (3 cr.; A-F or Audit; Every Fall & Spring) Introduction to practical/conceptual function of drawing in architecture. prereq: [1301 or LA 1301 or 2301], [Arch or BED major]

ARCH 3312. Rome: Drawing (-in) the Eternal City. (; 4 cr.; A-F only; Periodic Spring) Intensive drawing workshop focused on investigating Rome’s urban fabric. Study, document, represent how city’s buildings shape spaces of urban life. How elements help craft unique experience of Eternal City. prereq: jr or sr BDA or BS arch major or landscape arch major

ARCH 3351. AutoCAD I. (; 3 cr.; Student Option; Periodic Fall, Spring & Summer) Concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release. Producing dimensioned/annotated drawings for plotting, 3-D drafting capabilities. Use of dimension variables, attributes, blocks, symbols. prereq: Arch major or BED major or instr consent

ARCH 3381. Introduction to Computer Aided Architectural Design. (; 3 cr.; A-F or Audit; Every Fall) Introduction to 2-D drawing, 3-D modeling/animation, printing, plotting. Electronic networking/communications, database management, spreadsheet analysis, land-use analysis, project management. prereq: Arch major or BED major or instr consent

ARCH 3391. Design and Representation with BIM. (3 cr.; A-F or Audit; Every Fall) In this course, students will be introduced to the concept of Building Information Modeling (BIM) through the use of Autodesk Revit, one of the BIM software tools most commonly used in architectural practice today. Students will engage in a series of design exercises that will require both learning and applying Revit in the context of real world architectural scenarios. In addition to learning Autodesk Revit as a design tool, we will examine the use of BIM technology within the architectural industry through a series of case study examples. Also, presenters will share firsthand accounts of CAD and BIM Software being implemented in architectural practice.

ARCH 3411V. Architectural History to 1750. (GP, WI, HIS; 3 cr.; A-F only; Every Fall) History of architecture/city planning from antiquity to 1750, as illustrated by major monuments from western/non-western cultures. prereq: Soph or above

ARCH 3411W. Architectural History to 1750. (GP, WI, HIS; 3 cr.; A-F or Audit; Every Fall) Built environment as a tool to study the human past from ancient times to 1750. Major trends of style and form and the relationships, practices, beliefs that have shaped human behavior. prereq: Soph or above

ARCH 3412. Architectural History Since 1750. (GP, HIS; 3 cr.; A-F or Audit; Every Spring) Examples of the built environment from the Enlightenment to the present are studied within a broad social, cultural, and political context. Major architectural movements and their associated forms and designs. prereq: Soph or above

ARCH 3412H. Honors: Architectural History Since 1750. (GP, HIS; 3 cr.; A-F or Audit; Every Spring) Built environment from the Enlightenment to the present in a broad social, cultural, and political context. Major architectural movements and associated forms/designs. Ideas/philosophies that have emerged over time. Lecture, textbooks, discussion, writing, drawing, looking, and researching. prereq: Soph, honors

ARCH 3451W. Theory in Design Use. (WI; 3 cr.; A-F only; Every Spring) Introduction to contemporary architectural criticism. Ideas put forth by this criticism in three papers. Related these ideas to student's own design work. prereq: [1701, 3311, 3312, [one BS design studio or two BDA workshops]

ARCH 3511. Material Transformations: Technology and Change in the Built Environment. (TS; 3 cr.; A-F only; Every Fall) Surveys development of significant architectural material technologies/their relationships to society/natural environment.
ARCH 3611. Design in the Digital Age. (3 cr.; A-F or Audit; Every Spring) Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project.

ARCH 3641. Introduction to Heritage Preservation. (3 cr.; A-F only; Every Fall) Potential of, and challenges to, heritage preservation in the United States. Preservation's pros/cons. Lectures, readings, films, class discussions, assignments, local field trips, case studies. prereq: Jr or sr only

ARCH 3711V. Honors: Environmental Design and the Sociocultural Context. (CIV,WI,SOCS; 3 cr.; A-F only; Every Fall) Designed environment as cultural medium and as product of a sociocultural process and expression of values, ideas, and behavioral patterns. Design/construction as complex political process. prereq: Honors, [soph or above]

ARCH 3711W. Environmental Design and the Sociocultural Context. (CIV,WI,SOCS; 3 cr.; A-F only; Every Fall) Designed environment as cultural medium/product of sociocultural process/expression of values, ideas, behavioral patterns. Design/construction as complex political process. prereq: Soph or above

ARCH 3722. Istanbul: The City in Visual Culture. (AH,GP; 3 cr.; A-F only; Every Spring) Examine how spaces of Istanbul are created, experienced, represented through its visual culture. How physical landscape of city has changed over many eras. Seminars, readings, on-site lectures, explorations. prereq: jr or sr arch major or landscape arch major

ARCH 3993. Directed Study. (1-3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent

ARCH 4150. Topics in Architecture. (1-4 cr. [max 24 cr.]; A-F or Audit; Periodic Fall & Spring) Design, technology, history, theory, representation, or urbanism. prereq: Arch major or instr consent

ARCH 4150W. Topics in Architecture (Writing Intensive). (WI; 1-4 cr. [max 24 cr.]; A-F only; Periodic Fall & Spring) Selected topics in Architecture that meet Writing Intensive requirements.

ARCH 4194H. Thesis/Capstone Project. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Individualizes honors experience by connecting aspects of major program with special academic interests. prereq: Arch major, sr, honors

ARCH 4283. Undergraduate Architecture Studio III. (6 cr.; A-F only; Every Fall) Introduction to architectural design in relation to materials, construction methods. prereq: [3282 or 4282], B.S. Arch major

ARCH 4284. Undergraduate Architecture Studio IV. (6 cr.; A-F only; Every Spring) Topical design studio. prereq: 4283, BS Arch major

ARCH 4321. Architecture in Watercolor. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Watercolor as tool in design process. Foundation principles, techniques, medium, tools, materials. Color relationships, mixing, composition, applications to design. prereq: 2301

ARCH 4325. Architectural Photography: Imaging by Design. (4 cr.; A-F only; Periodic Fall & Spring) Principals of architectural photography as language of design through lectures, demonstrations, critical discussions. Ongoing photographic study under framework of conceptual themes, compositional forms, graphic styling, use of natural/artificial light, technical issues. prereq: BDA or BS major or Landscape Design and Planning major or instr consent

ARCH 4341. Architecture Portfolio Design. (3 cr.; A-F only; Every Fall & Spring) An introduction to design principles as they relate to the architecture portfolio. Students extend design thinking and visual communication skills in architecture into broader, life-long applications within the architecture profession by designing a portfolio that represents in a meaningful way a range of architecture and/or other coursework.

ARCH 4361. 3-D Computer Architectural Modeling and Design. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Use of 3D computer modeling for representation in abstract/realistic ways. Creation/arrangement of objects. Setting up lighting. Developing surface materials. Creating still renderings/animations. Ways computer visualization can be used for design exploration, feedback during idea development, and realistic representation of designs. prereq: 3351, Arch major

ARCH 4382. Computer-Aided Architectural Design. (3 cr.; A-F or Audit; Every Spring) Computer-aided tools as used in design. Practice in 2-/3-D CAD, image manipulation. Advanced multimedia visualization techniques, including solid modeling, photo realistic imaging, animation, and video editing/recording.

ARCH 4410. Topics in Architectural History. (1-4 cr. [max 24 cr.]; A-F only; Periodic Fall & Spring) Selected topics in Architectural History

ARCH 4421W. Architecture and Interpretation: The Cave and the Light. (WI; 3 cr.; A-F or Audit; Spring Even Year) Historical/hermeneutical investigation of iconography of grotto. Intertwined themes of descent into earth and ascent to light, from earliest strata of human culture to present day. prereq: [3411, 3412] or instr consent

ARCH 4423. Gothic Architecture. (3 cr.; A-F or Audit; Periodic Fall) History of architecture and urban design in Western Europe, from 1150 to 1400. prereq: [3411 or instr consent

ARCH 4424. Renaissance Architecture. (3 cr.; A-F or Audit; Periodic Fall) History of architecture and urban design in Italy, from 1400 to 1600. Emphasizes major figures (Brunelleschi, Alberti, Bramante, Palladio) and evolution of major cities (Rome, Florence, Venice). prereq: 3411 or instr consent

ARCH 4425. Baroque Architecture. (3 cr.; A-F or Audit; Periodic Fall) Architecture and urban design in Italy, from 1600 to 1750. Emphasizes major figures (Bernini, Borromini, Cortona, Guarini) and evolution of major cities (Rome, Turin). prereq: 3411 or instr consent

ARCH 4428. Byzantium/Istanbul: Crossroads of East and West. (GP,HIS; 3 cr.; A-F only; Every Spring) Survey architecture/landscapes of Byzantium/Istanbul. Visual, chronological, theoretical understandings of key monuments/landscapes in Byzantine/Ottoman architecture. prereq: jr or sr arch major or landscape arch major

ARCH 4432. Modern Architecture. (3 cr.; A-F or Audit; Fall Odd Year) Architecture and urban design in Europe and the United States from early 19th century to World War II. prereq: 3412 or instr consent

ARCH 4434. Contemporary Architecture. (3 cr.; A-F or Audit; Fall Even Year) Developments, theories, movements, and trends in architecture and urban design from World War II to present. prereq: 3412 or instr consent

ARCH 4435. History of American Architecture. (3 cr.; A-F or Audit; Periodic Fall) Through lectures, readings, discussion, and research, we will analyze buildings and spaces?architect designed and ?vernacular?? in the context of social, political, economic, technological, and ecological change. As we address these issues, we will examine the ways design and daily life, performed locally, interacted with national and global systems and flows; and the role the built environment has played in advancing structures and concepts of class, gender, race, ethnicity, and power. Students will gain a broad familiarity with the history of American buildings and landscapes, develop critical frameworks for analysis, and enhance their understanding of the environments they interact with every day?as designers, citizens, consumers, and professionals.

ARCH 4441. Minnesota: Architecture and Landscapes. (3 cr.; A-F only; Every Spring) History of major architectural monuments, urban phenomena, and landscape forms of Minnesota. Interrelationships between architecture, geography, and people. prereq: [3411, 3412] recommended

ARCH 4511. Materials and Methods I. (3 cr.; A-F or Audit; Every Fall)
Building materials, assemblies, construction operations shaping building designs. Material properties for designing/detailing building systems, elements, components. Applications. Modeling, hands-on building experiences. prereq: BS Arch major

ARCH 4521. Environmental Technology I. (3 cr.; A-F or Audit; Every Spring) Issues related to environmental quality/design. Climate response, heating, cooling, lighting design. Indoor air quality. prereq: BS Arch major


ARCH 4671. Historic Preservation. (3 cr.; A-F or Audit; Every Fall) Philosophy, theory, origins of historic preservation. Historic archaeology, research, descriptive analysis, documentation. Government's role, standards/guidelines, building codes, neighborhood preservation, advocacy. Using primary/secondary resources. Controversial aspects. prereq: Jr or sr or instr consent


ARCH 4674. World Heritage Conservation. (3 cr.; A-F only; Periodic Fall) Design/planning options for conservation of historic buildings/cultural heritage sites. Case studies link current practices, methods/solutions with expert preservationists, site conservationists, local communities in development/design of conservation proposals. prereq: Jr or sr or instr consent

ARCH 4701W. Introduction to Urban Form and Theory. (WI; 3 cr.; A-F only; Every Fall) Urban form, related issues of design/theory/culture. Thematic history of cities. Lectures, discussions, assignments. prereq: [3411, 3412] or instr consent

ARCH 4731. Territorial City. (3 cr.; A-F only; Every Fall) Seminar. Students research, define, and test conditions within which the territory and contemporary city coexist. Site for research is Twin Cities metropolitan area. Readings, discussions, field trips, collaborative development of urban proposals. prereq: instr consent

ARCH 5101. Architectural Design Studies. (7 cr.; S-N only; Every Summer) Principles/methods architecture design. Theories, history, technologies, media, and processes as foundation for critical thinking. Analytic modeling, visual thinking. prereq: 3+ track for MArch

ARCH 5110. Architecture as Catalyst. (1 cr. [max 3 cr.]; S-N only; Every Spring) Topical workshops on design methods, theories, or emerging practices. prereq: M.Arch

ARCH 5207. Venice Design Workshop. (4 cr.; A-F only; Every Spring) Design interventions with special concerns for urban landscapes, heritage conservation, and sustainable development. Jointly conducted with a graduate landscape architecture design studio. Design techniques for site plans/masterplans. Final project. prereq: M.Arch or instr consent

ARCH 5212. Undergraduate Architecture Studio 05: Advanced Design. (6 cr.; A-F only; Every Spring) Advanced design studio to engage students in range of critical subjects to be determined by respective instructors. Intended to challenge students with independent/experimental approach to design that builds on prior knowledge, developing working methodologies/design ethics. prereq: Passing grade in 5281, 3282, 4283, 4284


ARCH 5250. Advanced Topics in Design. (1-6 cr. [max 10 cr.]; A-F only; Every Fall, Spring & Summer) Advanced topics in architectural design.

ARCH 5301. Conceptual Drawing. (3 cr.; A-F only; Every Spring) Drawing as way of analyzing, exploring, and generating design ideas. Projection systems, diagramming, mapping. Different modes of visual perception. Nonverbal structures. prereq: MArch major or instr consent

ARCH 5313. Visual Communication Techniques in Architecture. (3 cr.; A-F or Audit; Every Fall & Spring) Delineation, presentation, and design techniques. Various visual media and methods of investigation. prereq: M Arch major or instr consent

ARCH 5321. Architecture in Watercolor. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Watercolor as a tool in design process. Foundation principles, techniques, medium, tools, materials. Color relationships, mixing, composition, applications to design. prereq: M Arch grad student or instr consent

ARCH 5350. Topics in Architectural Representation. (1-4 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer) Selected topics in architectural representation.

ARCH 5361. 3-D Computer Architectural Modeling and Design. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Use of 3D computer modeling for representation in abstract/realistic ways. Computer modeling software. Creation/arrangement of objects, setting up lighting, developing surface materials, creating still renderings/animations. Ways in which computer visualization can be used for design exploration, for feedback during development of ideas, and for realistic representation of fully formed designs. prereq: M Arch major

ARCH 5372. Computer Methods II. (1 cr.; S-N or Audit; Every Spring) Current techniques, computer programs, and their application to architectural computing and design. prereq: 5371, concurrent registration is required (or allowed) in 8252 and M Arch major or instr consent

ARCH 5381. Introduction to Computer Aided Architectural Design. (3 cr.; A-F or Audit; Every Fall) 2-D drawing, 3-D modeling/animations, printing, plotting. Electronic networking/communications, database management, spreadsheet analysis, land-use analysis, project management. prereq: Arch or BED or M Arch or grad student in LA or instr consent

ARCH 5382. Computer Aided Architectural Design. (3 cr.; A-F or Audit; Every Spring) 2-D/3-D CAD, image manipulation. Advanced multimedia visualization techniques for design, including solid modeling, photo-realistic imaging, animation, video-editing/recording.

ARCH 5391. Design and Representation with BIM. (3 cr.; A-F or Audit; Every Fall) In this course, students will be introduced to the concept of Building Information Modeling (BIM) through the use of Autodesk Revit, one, one of the BIM software tools most commonly used in architectural practice today. Students will engage in a series of design exercises that will require both learning and applying Revit in the context of real world architectural scenarios. In addition to learning Autodesk Revit as a design tool, we will examine the use of BIM
ARCH 5392. Digital Documentation: Facades. (3 cr.; A-F or Audit; Every Spring) This course explores two aspects of contemporary architectural practice that are bound up in a constantly evolving relationship: Facades and BIM. Over the course of the semester, students will study the anatomy of contemporary enclosure systems and understand the requirements that shape them. We will look at systems that are complex, layered and multi-functional, and develop an understanding of contemporary enclosure design relative to historical precedents.

ARCH 5410. Topics in Architectural History. (3 cr.; max 12 cr.; A-F or Audit; Every Fall & Spring) Advanced study in architectural history. Readings, research, seminar reports.

ARCH 5411. Principles of Design Theory. (3 cr.; A-F or Audit; Every Fall) Principles of design and their instrumentation. How and why architecture theory is generated. Types and significance of formal analysis. Theoretical positions and modes of criticism. prereq: M Arch major or instr consent

ARCH 5412. Architecture: A Global and Cultural History. (3 cr.; A-F only; Every Fall) This course examines the history of architecture from a global perspective, addressing a variety of traditions and geographical locations, and following their interconnections and exchanges.

ARCH 5421. Architecture and Interpretation: The Cave and the Light. (3 cr.; A-F only; Fall Odd Year) Historical/hermeneutical investigation of iconography of grotto. Intertwined themes of descent into earth and ascent to light, from earliest strata of human culture to present day. prereq: [3411, 3412] or instr consent

ARCH 5423. Gothic Architecture. (3 cr.; A-F or Audit; Spring Odd Year) History of architecture and urban design in Western Europe, from 1150 to 1400. prereq: MS Arch or M Arch major or instr consent

ARCH 5424. Renaissance Architecture. (3 cr.; A-F or Audit; Periodic Fall & Spring) History of architecture and urban design in Italy, from 1400 to 1600. Emphasizes major figures (Brunelleschi, Alberti, Bramante, Palladio) and evolution of major cities (Rome, Florence, Venice). prereq: MS Arch or M Arch major or instr consent

ARCH 5425. Baroque Architecture. (3 cr.; A-F or Audit; Fall Odd Year) Architecture and urban design in Italy, from 1600 to 1750. Emphasizes major figures (Bemini, Borromini, Cortona, Guarini) and evolution of major cities (Rome, Turin). prereq: MS Arch or M Arch major or instr consent

ARCH 5432. Modern Architecture. (3 cr.; A-F or Audit; Periodic Fall) Architecture and urban design in Europe and the United States, from early 19th century to World War II. prereq: MS Arch or M Arch major or instr consent

ARCH 5434. Contemporary Architecture. (3 cr.; A-F or Audit; Every Fall) Developments, theories, movements, and trends in architecture and urban design, from World War II to present. prereq: MS Arch or M Arch major or instr consent

ARCH 5435. History of American Architecture. (3 cr.; A-F or Audit; Periodic Fall) Through lectures, readings, discussion, and research, we will analyze buildings and spaces/architect designed and ?vernacular?? in the context of social, political, economic, technological, and ecological change. As we address these issues, we will examine the ways design and daily life, performed locally, interacted with national and global systems and flows; and the role the built environment has played in advancing structures and concepts of class, gender, race, ethnicity, and power. Students will gain a broad familiarity with the history of American buildings and landscapes, develop critical frameworks for analysis, and enhance their understanding of the environments they interact with every day?as designers, citizens, consumers, and professionals. prereq: [3411, 3412] recommended

ARCH 5446. Architecture Since World War II: Postwar Experimentation: Aesthetics and Politics of Architecture. (3 cr.; A-F only; Every Fall) History of major architectural monuments, urban phenomena, and landscape forms of Minnesota. Interrelationships between architecture, geography, and people. prereq: [3411, 3412] recommended

ARCH 5450. Topics in Architectural Theory. (1-3 cr.; A-F only; Every Fall, Spring) Concepts/principles of daylighting, thermal, energy, and systems integration. Architectural/technological implications of lighting and thermal design. Ecological thinking in support of sustainable design decision making. prereq: M Arch


ARCH 5452. Venice: A Port City. (3 cr.; A-F only; Every Spring) Historic/contemporary principles/theories of North American Indian architecture. Culture, technology, environment, art, and craft of North American Indians in their settlements/architecture. prereq: M Arch major or instr consent

ARCH 5454. Minnesota: Architecture and Cultural History. (3 cr.; A-F only; Every Spring) History of major architectural monuments, urban phenomena, and landscape forms of Minnesota. Interrelationships between architecture, geography, and people. prereq: [3411, 3412] recommended

ARCH 5455. Topics in Architectural History. (3 cr.; A-F only; Every Fall & Spring) Field study of European architectural history. Students will gain a broad familiarity with the history of European buildings and landscapes, develop critical frameworks for analysis, and enhance their understanding of the environments they interact with every day?as designers, citizens, consumers, and professionals. prereq: M Arch student

ARCH 5456. Architecture: Design, Form, Order, and Meaning. (4 cr.; A-F or Audit; Every Fall & Spring) Architecture and the issue of meaning. Explores fundamental and constituent elements of architectural form and order; their inherent tectonic, phenomenal, experiential, and symbolic characteristics; their potential and implications for the creation and structure of meaningful human places. prereq: M Arch major or instr consent

ARCH 5461. North American Indian Architecture. (3 cr.; Student Option; Every Spring) Historic/contemporary principles/theories of North American Indian architecture. Culture, technology, environment, art, and craft of North American Indians in their settlements/architecture. prereq: M Arch major or instr consent

ARCH 5462. Technology Two: Luminous and Thermal Design. (6 cr.; A-F only; Every Spring) Concepts/principles of daylighting, thermal, energy, and systems integration. Architectural/technological implications of lighting and thermal design. Ecological thinking in support of sustainable design decision making. prereq: M Arch

ARCH 5467. Technology Three: Structural Systems. (3 cr.; A-F only; Every Fall) Structural behavior in resisting gravity and lateral forces. Evolution, range, and applications of structural systems. Structural analysis. Graphical methods, site visits, analog/digital modeling. Case studies, problems. prereq: M Arch student

ARCH 5521. Material Investigation: Concrete. (4 cr.; A-F only; Every Spring) Design projects identify common problems/improvements, investigate alternatives, and develop solutions where concrete is primary building material. prereq: MArch or MS

ARCH 5523. Material Investigation: Steel and Glass. (4 cr.; A-F only; Every Spring) Design projects identify common problems and improvements, investigate alternatives and develop solutions where steel and glass are the primary building materials. prereq: Grad student

ARCH 5527. Material Investigations: Stone and Water. (4 cr.; A-F only; Every Spring) Design projects identify common problems/improvements, investigate alternatives, and develop solutions where wood is primary building material. prereq: M.Arch or M.S.
ARCH 5539. Daylighting and Architecture Design. (4 cr.; A-F only; Every Spring) Ecological design approaches that combine ecological, physiological, and experiential aspects to enhance relationship to place. How formal, aesthetic, and experiential aspects of daylighting support foster sustainable architectural design. prerequisite: M Arch major

ARCH 5541. Material Strategies. (3 cr.; A-F only; Every Fall) Emergent materials in advanced building design; strategies for material approaches relevant to global resource flows, technological trajectories, and sociocultural effects. Research projects based on evaulative tools and case studies. prerequisite: M Arch or Arch MS major

ARCH 5550. Topics in Technology. (1-4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Selected topics in architecture technology, e.g., construction, environmental management, energy performance, lighting, materials.

ARCH 5561. Tech 1, Structures for Building. (2 cr.; A-F only; Every Fall) Role of structure in architectural design. Common systems found throughout history. Review systems to identify parameters that influence structural decisions. prerequisite: M Arch major or instr consent

ARCH 5562. Tech 2, Intro to Building Technology. (2 cr.; A-F only; Every Fall) Origin/development of architectural idea. Designs as direct means of representing our underlying intentions. prerequisite: M Arch or instr consent

ARCH 5563. Tech 3: Advanced Building Technology Integrated Building Systems. (0-2 cr.; A-F only; Every Fall) Logic of integrating building systems. Improving understanding of/thinking critically about integration principles, theories, practice, application. Identifying/working through problems project architect must address. prerequisite: M Arch or instr consent

ARCH 5564. Tech 4: Building Structural Systems. (0-2 cr.; A-F only; Every Fall) Main concepts related to building structures. Basic knowledge of flow of forces. Review of rules for sizing structures. Calculations to understand systems behavior. Knowledge/tools to design buildings considering structure within design process. prerequisite: M Arch or instr consent

ARCH 5569. Development and Implementation of Research. (3 cr.; A-F only; Every Fall) Bridge gaps among architectural research, design, practice. Forum for students to independently develop research topics/ implement research methods related to architectural scholarship/practice, aided by classmates, instructor, guest lecturers. prerequisite: instr consent

ARCH 5611. Design in the Digital Age. (3 cr.; A-F or Audit; Every Spring) Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project. prerequisite: Grad student or upper level undergraduate student

ARCH 5621. Professional Practice in Architecture. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Legal, ethical, business, and practical requirements of architectural practice. Contemporary and historical models of contract formation, business principles, accounting, project management, design services, and marketing. prerequisite: M Arch major or instr consent

ARCH 5630. Practicum: Advanced Issues in Practice. (3 cr. [max 6 cr.]; S-N only; Every Fall & Spring) Advanced architectural practice topics not normally covered in curricula are examined/evaluated as foundation for licensure ARE 4.0 testing processes. prerequisite: M.S. Architecture or M Arch

ARCH 5650. Topics in Architectural Practice. (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Topics in architectural practice, methods of design production, marketing, operation, and relationships among clients, architecture, and society. prerequisite: 5621, Arch major or 5621, M Arch major or instr consent

ARCH 5651. Building Stories. (3 cr. [max 12 cr.]; A-F only; Every Fall) Professional practice education by means of case study analysis.

ARCH 5670. Topics in Historic Preservation. (1-3 cr. [max 12 cr.]; Student Option; Periodic Fall) Selected topics in the theory, philosophy, research, and methods of architectural historic preservation.

ARCH 5671. Historic Preservation. (3 cr.; Student Option; Every Fall) Philosophy, theory, origins of historic preservation. Historic archaeology/research, descriptive analysis, documentation of historic buildings. Government’s role in historic preservation, preservation standards/guidelines, preservation/building codes, preservation advocacy.

ARCH 5672. Historic Building Conservation. (3 cr.; Student Option; Every Spring) Historic building materials, systems, and methods of conservation. Discussion of structural systems, building repair and pathology, introduction of new environmental systems in historic buildings, and conservation of historic interiors. Research on historic building materials and techniques using primary and secondary resources and on documentation of a specific historic site through large-format photography and measured drawings. prerequisite: 3412, 5671 or instr consent

ARCH 5673. Historic Property Research and Documentation. (3 cr.; Student Option; Every Spring) Philosophy, theory, methods of historic building research. Descriptive analysis of buildings, building documentation, historical archaeology, architectural taxonomy. prerequisite: 3412, 3641, 4671, 5671, 4672 or 5672)

ARCH 5674. World Heritage Conservation. (3 cr.; A-F only; Periodic Fall) Investigations of World Heritage conservation and nomination for the preservation of historic buildings and sites and their management for public use. Case studies link current practices, methods, and solutions with expert preservationists, site conservationists and local communities in the development and design of preservation strategies. prerequisite: MS in Arch-HP concentration or M.Arch or MLA or instr consent


ARCH 5677. Preservation of the Vernacular Built Environment and Cultural Landscape. (3 cr.; A-F only; Periodic Spring) Theoretical, methodological, practical implications of preserving vernacular environment such as commercial blocks, strips/buildings, warehouses/sheds, wharves/piers, abandoned streetcar tracks/railroad spurs. prerequisite: Grad student, open to upper level (junior/senior) undergraduates with instr consent. Honors student encouraged.

ARCH 5686. Research Practices Final Project: Research into Practice. (4 cr.; A-F only; Every Fall) The course is the first of a three-??course final project sequence required as the capstone experience for MS-??RP students. The course provides a forum for understanding the current state of research in the design and building industry and its trajectories and trends. Student projects will apply this knowledge to a regionally based commercial or non-????profit practices in the building industry, assessing the firm???s research capacity, mapping its potential in context of innovative precedents and suggesting future growth. prerequisite: MS-??RP student

ARCH 5687. Research Practices Final Project: Practice into Research. (4 cr.; S-N only; Every Fall) Course is the second of a three-??course final project sequence required as the capstone experience for MS-??RP students. Building upon the previous semester understanding the state of research in the building industry, this course develops a single case study project in comparative context of contemporary practice. The work of individual students adds to a collective knowledge base on project best practices and development of industry-???? wide metrics and standards. Course meets concurrently with ARCH 5688 Representation of Case Studies. prerequisite: Arch 5686
ARCH 5688. Research Practices Final Project: Representation of Case Studies. (1 cr.; A-F only; Every Fall) The course is the third of a three-credit sequence required as the capstone experience for MS-??RP students. This course meets concurrently to ARCH 5687 Practice into Research. Information graphics are essential to understanding and explaining critical issues in a case study. The format of information can be designed to emphasize comparisons between projects or to highlight unique characteristics of individual projects. This course will explore a variety of strategies commonly used in case study documentation and ask the student to apply one method to present the case developed in ARCH 5687. prereq: Arch 5686

ARCH 5711. Theory and Principles of Urban Design. (3 cr.; A-F or Audit; Every Spring) Seminar. Debate on dominant theories/paradigms informing city design from renaissance to 21st century. Critical issues central to current debates. prereq: M Arch major or LA grad major or grad student or instr consent

ARCH 5721. Case Studies in Urban Design. (3 cr.; A-F or Audit; Every Spring) Reading seminar. Evolution of contemporary city. Dynamics that created contemporary urban spatial patterns. Planning/design theories that have guided public interventions in built environment. Themeatic texts, classroom discussions. prereq: Grad student or instr consent

ARCH 5731. Territorial City. (3 cr.; A-F only; Every Fall) Seminar. Students research, define, and test conditions within which the territory and contemporary city coexist. Site for research is Twin Cities metropolitan area. Readings, discussions, field trips, collaborative development of urban proposals.

ARCH 5750. Topics in Urban Design. (1-4 cr.; max 16 cr.); A-F or Audit; Every Fall, Spring & Summer) Special topics in theory/practice of urban design.

ARCH 5993. Directed Study. (1-4 cr.; max 8 cr.); A-F or Audit; Every Fall & Spring) Guided individual reading or study. prereq: instr consent

ARCH 8101. Subjects and Methods in Architecture. (2 cr.; S-N or Audit; Periodic Fall & Spring) The discipline of architecture. prereq: Grad Arch major or instr consent

ARCH 8250. Advanced Topics in Design. (1-6 cr.; S-N or Audit; Periodic Spring & Summer) Design studio. prereq: Admitted to 3+ track for M Arch prog or instr consent

ARCH 8251. Graduate Architectural Design I. (9 cr.; A-F or Audit; Every Fall) Design projects focus on fundamental issues of space/form/light/materiality in relation to human habitation. Design as a process of exploration/inquiry. Modes/media of representation, their critical impact. prereq: M Arch or instr consent

ARCH 8252. Graduate Architectural Design II. (6 cr.; A-F or Audit; Every Spring) Fundamental architectural problems involving design as a creative inquiry. Individual and collaborative effort. prereq: 8251, grad Arch major or instr consent

ARCH 8253. Graduate Architectural Design III. (9 cr.; A-F or Audit; Every Fall) Issues of design process, representation, programming, technology, and urban relations. prereq: [8251, M Arch] or instr consent

ARCH 8254. Technical Applications in Design. (4 cr.; max 8 cr.); A-F or Audit; Every Fall) Design potential inherent in technical development process of design project. Testing concepts, developing details, integrating building systems. Structural bay enclosure, cost considerations, regulatory compliance. Building-information modeling, analog/digital representations in architecture document production. prereq: [8253, M Arch major] or dept consent

ARCH 8255. Graduate Architectural Design V. (6 cr.; max 12 cr.); A-F or Audit; Every Fall & Spring) Fundamental architectural problems involving design as a creative inquiry. Individual/collaborative effort. prereq: [8254, grad Arch major] or instr consent

ARCH 8299. Master’s Final Project. (10 cr.; S-N only; Every Spring) Final studio project for Plan C master’s. Measures knowledge of architecture and ability to conduct research for design proposal, communicate in visual/written representations. Proposal, graphic presentation of project. prereq: Plan C, M Arch

ARCH 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

ARCH 8350. Advanced Topics in Representation. (1-3 cr.; A-F or Audit; Every Summer) Theory and practice of visual representation in architecture. prereq: Grad Arch major or instr consent

ARCH 8400. Topics in Theory. (1-3 cr.; A-F or Audit; Every Fall & Spring) Topics vary per 5411, grad Arch major or instr consent

ARCH 8405. Topics in History. (1-3 cr.; A-F or Audit; Every Fall) Topics vary per 5411, grad Arch major or instr consent

ARCH 8494. Directed Research in Architectural History. (1-3 cr.; A-F or Audit; Every Spring) tbd prereq: Grad Arch major or instr consent

ARCH 8550. Topics in Technology. (1-3 cr.; A-F or Audit; Every Fall & Spring) Special topics in theory/practice of architecture technologies. prereq: Grad arch major or instr consent

ARCH 8561. Sustainable Design Theory and Practice. (3 cr.; A-F only; Every Fall) History, theory, and ethics of sustainable design processes/practices. Emphasizes approaches to sustainable architecture. Regional/global ecological issues, design strategies, methods of assessment. Primary architectural/technological implications of sustainable design theory/practice that inform design thinking/research. Sustainable design issues. Research projects, case studies, fieldwork. prereq: [5513, grad MS or MArch] or instr consent

ARCH 8563. Energy and Indoor Environmental Quality Issues in Sustainable Design. (3 cr.; A-F or Audit; Every Spring) Energy/IEQ aspects of sustainable design related to global environmental issues. Energy/IEQ strategies, methods, and tools as applied to sustainable building design. Research projects, case studies. prereq: [5513, grad MS or MArch] or instr consent

ARCH 8565. Materials Performance in Sustainable Building. (3 cr.; A-F only; Every Fall) Building-material properties, resource conservation, fabrication/construction processes in production of high performance sustainable building designs. Application of assessment/evaluation tools (LEED, LCA, Athena or BREEAM) for IEQ, waste reduction and management with an emphasis on experimental/analytic methods. Aesthetic/technical solutions that integrate design selection processes, construction methods, commissioning processes, and facility management, maintenance, and decommissioning. prereq: [5512, grad MS or MArch] or instr consent

ARCH 8567. Site and Water Issues in Sustainable Design. (3 cr.; A-F only; Every Spring) Site, water and site/building integration aspects of sustainable design. Ecological principles, site analysis. Water/site/building integration strategies, methods, and tools integrated with sustainable design issues such as energy, indoor environmental quality, and materials. Research projects, case studies, measurement methods. prereq: [5512, grad MS or MArch student] or instr consent

ARCH 8650. Topics in Architectural Practice. (1-3 cr.; A-F or Audit; Periodic Fall) N/A prereq: Grad Arch major or instr consent

ARCH 8750. Topics in Urban Design. (1-3 cr.; A-F or Audit; Periodic Fall) N/A prereq: Grad Arch major or instr consent

ARCH 8777. Thesis Credits: Master’s. (1-18 cr.; max 50 cr.); No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]
ARTS 1001H. Honors Introduction to Contemporary Art and Theory. (AH,DSJ; 3 cr.; A-F or Audit; Every Fall & Spring) Introductory overview of contemporary artistic practices/theoretical foundations. Familiarization with contemporary critical/creative practices. Approaches to contemporary art through lens of cultural diversity/social justice.

ARTS 1002. Art and Life: Thinking About Ethics Through Art. (AH,CIV; 3 cr.; Student Option; Every Fall & Spring) Case examples from visual arts. Ethical theories. Philosophical take on relationship between art, life, ethics.

ARTS 1003. MyMovies. (AH; 4 cr.; Student Option; Every Fall) Examination of new moving image/filmmaking practices. How technology has changed practice, aesthetics, discourse of moving images. Hybrid practice/study course. Create short films using new technologies such as smart-phones/other hand-held devices.

ARTS 1004. Artistic Interpretation from Vintage Cinema. (3 cr. [max 4 cr.]; S-N only;) For non-art majors who enjoy classic movies/want to familiarize themselves with basic artistic techniques. View twelve rarely seen short films using new technologies such as smart-phones/other hand-held devices.

ARTS 1101. Drawing. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) Fundamental principles/processes of drawing: various drawing media.

ARTS 1102. Painting. (; 4 cr.; Student Option; Every Fall, Spring & Summer) Introduction to painting with attention to understanding and applying the fundamental principles of spatial organization and color interaction. prereq: 1101 or 2101

ARTS 1301. Sculpture. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) Introduction to sculptural practice. Materials, methods, concepts, history. Emphasizes correlation between concepts and materials. Creative work in clay, plaster, metal, and wood.

ARTS 1490. Workshop in Art. (; 1-4 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer) Selected topics. Intensive studio activity.

ARTS 1501. Printmaking: Intaglio and Lithography. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) Introduction to techniques of intaglio etching/lithography. Historical approaches/use through contemporary materials/concepts. Emphasizes interrelationship of process, materials, and ideas/aesthetics.

ARTS 1502. Printmaking: Relief, Screen, and Digital Processes. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) Techniques of relief (linoleum and woodcut), screenprint, and digital printmaking. Historical approaches and use through contemporary materials, concepts, and practices. Emphasizes interrelationship of process, materials, and ideas.

ARTS 1505. Papermaking. (; 4 cr.; Student Option; Every Fall & Spring) Introduction to approaches, forms, and aesthetic possibilities of paper as an expressive medium. Studio work in both Eastern and Western traditions and sculptural applications.

ARTS 1601. Experimental and Media Arts. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) New technologies as a source for creative art making. Basic processes in digital video, sound, animation, interactive, and networked technologies. Integration of new technologies with more traditional media arts and art disciplines, including filmmaking, sculpture, painting, printmaking, photography, and ceramic arts.

ARTS 1701. Photography: Darkroom & Digital. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) Presents conceptual, technical, historical aspects of photography within fine arts context. Emphasis on creative process through hands-on experience in use of camera, digital, black/white, darkroom processes.

ARTS 1801. Ceramics. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer) An introduction to ceramic practice. Materials, methods, concepts, and history. Correlation between concepts and materials. Creative work with clay, glaze, kilns, and related procedures.

ARTS 1902. Freshman Seminar. (; 3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics specified in Class Schedule. prereq: freshman

ARTS 1903. Freshman Seminar. (; 3 cr.; Student Option; Every Spring) Topics specified in Class Schedule.

ARTS 1904. Freshman Seminar. (GP; 3 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Fr

ARTS 1905. Freshman Seminar. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule.

ARTS 1910W. Freshman Seminar. (WI; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in class schedule.

ARTS 3091. Intermediate Drawing. (; 4 cr.; Student Option; Every Fall & Spring) Further exploration and understanding of drawing elements with emphasis on developing visual judgment, drawing process, and execution. Specific problems to promote the understanding of pictorial structure and personal expression. prereq: 1001, 1101 or 2101

ARTS 3092. Intermediate Painting. (; 4 cr.; Student Option; Every Fall & Spring) Emphasizes development of visual sensibility, individual direction, critical judgment. prereq: 1001, 1101 or 2101, 1102 or 2102

ARTS 3093. Dimensional Painting. (; 4 cr.; Student Option; Every Spring) Application of two-dimensional visual concerns as they relate to sculptural form. Exploration of how painting ideas affect perception of real space. prereq: 1001, 1101 or 2101, 1102 or 2102

ARTS 3094. Drawing: Interpreting the Site. (; 4 cr.; Student Option; Every Summer) Field trips to draw or paint in various metropolitan area locations. Site interpretations, experimentation with marks/symbols. Focuses on search for personal content as inspired by site. prereq: 1001, 1101 or 2101

ARTS 3095. Drawing Using Digital Media as an Essential Tool. (; 4 cr.; Student Option; Every Fall & Spring) Possibilities of digital technology as tool/component in contemporary, creative drawing practice. prereq: 1001, 1101 or 2101

ARTS 3111. Life Drawing I. (; 4 cr.; Student Option; Every Fall, Spring & Summer) Focus on the human form with an introduction to anatomy. Exploration of various concepts of representation and methods of image construction. Work from life, anatomical casts, memory, and imagination. prereq: 1001, 1101 or 2101

ARTS 3112. Life Drawing II. (; 4 cr.; Student Option; Every Spring) The human form in pictorial structure, single, and multiple figure compositions. The creative process, work toward a personal direction. Attention to representation of the human image in cultural, historical, and contemporary context. prereq: 3111 or inst consent

ARTS 3300. Intermediate Sculpture. (4 cr.; Student Option; Every Fall & Spring) Studio practice. Historical/contemporary methods/concepts. Personal sculptural thinking in various media platforms. Individual/collaborative modes for contemporary sculptural practice. prereq: [1001, 1301] or [2301, 3390]

ARTS 3303. Sculpture: Metalcasting. (4 cr.; Student Option; Every Fall & Spring) Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts. prereq: 1001, 1301

ARTS 3304. Sculpture: Carving and Construction. (; 4 cr.; Student Option; Every Fall & Spring) Carving/construction using wood, other materials. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery. prereq: 1001, 1301

ARTS 3307. Contemporary and Traditional Approaches to Figurative Sculpture. (; 4 cr.; Student Option; Every Spring) Clay modeling of human figure, other forms. Mold-making, plaster casting with historical/
ARTS 3609. Art for the People/Art on Wheels. (4 cr.; Student Option; Every Fall & Spring) Introduction to the Minneapolis Art on Wheels (MAW) project and participation in a student-run public art group. Engage in creative uses of MAW’s hardware and software technologies for mobile projections and current urban projection techniques that rely on bicycles. Opportunities to develop and exhibit large scale works in public spaces. prereq: 1001, 1601 or 2601

ARTS 3701. Photography: Silver Processes. (4 cr.; Student Option; Every Fall & Spring) Classical photographic practice, concentrating on camera/darkroom controls. Historical overview of the medium. Conceptual/contemporary approaches to traditional themes. prereq: 1001, 1701 or 2701

ARTS 3702. Photography: The Extended Image. (4 cr.; Student Option; Every Fall & Spring) Manipulation of the photo image using various camera and darkroom methods including sequence, multiples, narrative, and book formats. Marking and altering photographic surfaces, applied color, and toning. Use of the photograph in interdisciplinary projects. prereq: 1001, 1701 or 2701

ARTS 3703. Photography: Digital Imaging. (4 cr.; Student Option; Every Fall, Spring & Summer) Photographic digital imaging in fine arts. Manipulation, computer applications. Editing in photo imaging software. prereq: 1001, [1703 or 2703]

ARTS 3801. Ceramics: Wheel Throwing. (4 cr.; Student Option; Every Fall & Spring) Expands wheel-throwing skills, develops aesthetic awareness of ceramic forms. Kiln firing, glaze formulation. prereq: 1001, 1801 or 2801

ARTS 3802. Ceramics: Handbuilding. (4 cr.; Student Option; Every Fall & Spring) Intermediate handbuilding. Development of abilities, critical awareness. Kiln firing, glaze formulation. prereq: 1001, 1801 or 2801

ARTS 5105. Advanced Dimensional Painting. (4 cr.; Student Option; Every Spring) Illusionary space applied to sculptural forms. Practical applications of spatial/painterly concepts. Emphasizes critical/visual judgment. Development of cohesive body of work reflecting interaction of two/three dimensions. prereq: 3105 or instr consent

ARTS 5106. Advanced Drawing: Interpreting the Site. (4 cr.; Student Option; Every Summer) Search for personal content as inspired by site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations enhanced by experimentation with new marks/symbols. prereq: 3106 or instr consent

ARTS 5107. Advanced Drawing Using Digital Media. (4 cr.; Student Option; Every Fall & Spring) Advanced, individual creative work using digital technology as tool/component in contemporary drawing practice. prereq: 3107 or instr consent

ARTS 5110. Advanced Drawing. (4 cr.; max 16 cr.; Student Option; Every Fall & Spring) Developing personal direction in form/content. Various media. Various aesthetic/conceptual organizations. prereq: BFA Art major, instr consent

ARTS 3499. Internship at Katherine E. Nash Gallery. (3 cr.; A-F only; Every Fall, Spring & Summer) Hands-on experience in day-to-day operation/mission of Department of Art's professional gallery. prereq: 1001 or ARTH 1XXX or instr consent

ARTS 3510. Intermediate Printmaking: Traditional and Contemporary Approaches. (4 cr.; Student Option; Every Fall & Spring) The print as vehicle for conceptual/personal expression. Traditional printmaking techniques, evolving contemporary processes for realizing visual concepts. Historical/cultural development of multiple/matrix as means of communication. prereq: 1001, [1501 or 2501 or 1502 or 2502]

ARTS 3601. New Media: Making Art Interactive. (4 cr.; Student Option; Periodic Fall & Spring) Conceptual/aesthetic development with digital, interactive art. Experimental approaches to interactive technologies. Responsive, tangible media. Critical theory/history of new media. prereq: 1001, 1601 or 2601

ARTS 3602. Narrative Digital Video. (4 cr.; Student Option; Every Fall & Spring) Narrative forms of video. Documentary, live action, memoir, experimental forms. Digital video production/editing. Personal aesthetic/conceptual directions. Theory, critical readings about historical/contemporary works in video. prereq: 1001, [1601 or 2601 or instr consent]

ARTS 3603. Experimental Video. (4 cr.; Student Option; Every Fall & Spring) Experimental approaches in producing digital video within contemporary art context. Digital media technologies in installation, performance, interactive video art. Emphasizes development of personal, creative projects. Theoretical issues. Critical/historical readings. prereq: 1001, [1601 or 2601 or instr consent]

ARTS 3604. Animation. (4 cr.; Student Option; Every Fall & Spring) Creating ideas visually with 2-/3-dimensional animation technologies. Vector-/layer-based raster animation. Modeling objects/spaces, creating textures, lighting, movement, sound track. prereq: 1001, 1601 or 2601

ARTS 3605. Sound Art. (4 cr.; Student Option; Every Fall & Spring) Sound Art practice/theory. Students produce creative projects using sound as primary material. History of experimental sound art from early 20th century to present. Critiques, readings, writing, public presentations. prereq: 1001, 1601 or 2601

ARTS 3801. Ceramics: Wheel Throwing. (4 cr.; max 8 cr.; Student Option; Every Fall & Summer) Expands wheel-throwing skills, develops aesthetic awareness of ceramic forms. Kiln firing, glaze formulation. prereq: 1001, 1801 or 2801

ARTS 3802. Ceramics: Handbuilding. (4 cr.; max 8 cr.; Student Option; Every Fall & Spring) Intermediate handbuilding. Development of abilities, critical awareness. Kiln firing, glaze formulation. prereq: 1001, 1801 or 2801

ARTS 3411H. Honors Tutorial in Visual Arts. (1-4 cr.; max 6 cr.; A-F or Audit; Every Fall, Spring & Summer) Individual consultation with a faculty member on visual work, research project, presentation, paper, or bibliography. prereq: Honors, instr consent

ARTS 3415H. Honors Exhibition. (2 cr.; A-F or Audit; Every Fall, Spring & Summer) Advanced problems in studio and research, leading to a magna or summa exhibition. prereq: [Magna or summa honors candidate], instr consent, dept consent

ARTS 3416H. Honors Thesis: Supporting Paper. (1 cr.; A-F or Audit; Every Fall, Spring & Summer) Summa thesis paper written in support of honors exhibition or in relation to candidate's visual/conceptual interests. prereq: Summa level honors candidate, instr consent

ARTS 3444. Major Project. (1 cr.; S-N only; Every Fall & Spring) Develop professional skills. Exhibition in Regis Center public spaces.

ARTS 3490. Workshop in Art. (1-4 cr.; max 12 cr.; Student Option; Every Fall, Spring & Summer) Selected topics and intensive studio activity; topics vary yearly.

ARTS 3496. Internship in the Arts. (1-3 cr.; S-N or Audit; Every Fall, Spring & Summer) Field work at local, regional, national, or international arts organization or with professional artist provides experience in activities/administration of art-based...
ARTS 5120. Advanced Painting. (4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)

Developing personal vision/content through painting. Emphasizes critical thinking, self-evaluation, and independent pursuit of ideas. prereq: 3102 or instr consent

ARTS 5130. Advanced Painting: Watercolor. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)

Expressive/technical possibilities of transparent watercolor. Emphasizes pictorial structure, color relationships, visual expression. Work from still life, nature, life model, imagination. prereq: 3102 or instr consent

ARTS 5300. Advanced Sculpture. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)


ARTS 5330. Advanced Sculpture: Metal Casting. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery. prereq: 3303 or instr consent

ARTS 5340. Advanced Sculpture: Carving and Construction. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)

Carving/construction using wood, other materials. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery. prereq: 3304

ARTS 5390. Advanced Sculpture Methods and Practice. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Work in selected sculptural processes with intense studio activity. Development of innovative methods/techniques. prereq: 5300

ARTS 5400. Seminar: Concepts and Practices in Art. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)

Various ideologies, cultural strategies that influence practice/interpretation of art. Emphasizes diversity of viewpoints. Application of issues in developing final BFA exhibition. prereq: BFA candidate or instr consent

ARTS 5441. Professional Practices. (3 cr.; A-F only: Periodic Fall & Spring)

Theoretical issues, business practices, professional skills required for career management/development in visual arts. prereq: Grad student or [Art BFA student or Art Major, Jr or Sr]

ARTS 5444. Bachelor of Fine Arts Exhibition. (1 cr.; S-N only; Every Fall & Spring)

Final solo or small group exhibit and artist's statement developed in consultation with faculty adviser. Visual documentation of work and statement as appropriate to media.

ARTS 5490. Workshop in Art. (1-4 cr. [max 48 cr.]; Student Option; Every Fall, Spring & Summer)

Selected topics and intensive studio activity. Topics vary yearly.

ARTS 5510. Advanced Printmaking. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

In-depth research of personal imagery using a broad range of historical and contemporary applications. Development of imagery using color, photo-mechanical, digital processes. Cross-media approaches. prereq: 3510 or instr consent

ARTS 5610. New Media: Making Art Interactive. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Conceptual/aesthetic development with digital, interactive art. Experimental approaches to interactive technologies. Projects with responsive/tangible media. Theory/history of new media. prereq: 3601 or instr consent

ARTS 5620. Narrative Digital Video. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Individual, advanced, creative projects with narrative forms of video art. Documentary, live action, memoir. Relationships between conceptual, aesthetic, and artistic process. prereq: 3602

ARTS 5630. Advanced Experimental Video. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Experimental approaches in producing digital video within a contemporary art context. Using digital media technologies in installation, performance, and interactive video art. Emphasizes expanding personal artistic development. Theoretical issues, critical/historical readings/writings in media arts. prereq: 3603 or instr consent

ARTS 5640. Advanced Animation. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Two-/three-dimensional animation with digital technologies. Individual projects. Expansion of personal voice/visual clarity within framework of animated imagery and time-based artwork. prereq: 3604 or instr consent

ARTS 5650. Advanced Sound Art. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Sound art practice/theory. Emphasizes individual creative projects using sound as primary material. History of experimental sound art from early 20th century to present. Critiques, readings, writing, public presentations. prereq: 3605

ARTS 5670. Interdisciplinary Media Collaborations. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)

Interdisciplinary, collaborative artist teams explore modes of creative expression at intersections of the arts. Students collaborate to co-author/produce works of art for public presentation. Emphasizes integration of media arts with visual art, music, dance, and theater to produce interdisciplinary/collaborative art. prereq: Upper-division undergraduate or graduate student in art, creative writing, dance, music or theater.

ARTS 5690. Art for the People/Art on Wheels: Advanced Projects. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Advanced work in the Minneapolis Art on Wheels (MAW) project/participation in a student-run public art group. Use MAW's hardware/software technologies for mobile projections and current urban projection techniques that rely on bicycles. Opportunities to develop/exhibit large scale works in public spaces. prereq: Arts 3609

ARTS 5701. Performed Photography: Documentation of Artistic Acts and Social Interventions. (4 cr.; Student Option; Periodic Fall & Spring)

Studio course. Use of image-based media to document various artistic, site-specific acts that may otherwise go unnoticed. Relationship between original event (performance, social intervention, sculptural prop, ephemeral gesture) and memory trace left in image/record. prereq: Two 3xxx [photography or video] courses

ARTS 5710. Advanced Photography. (4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Design/implementation of individual advanced projects. Demonstrations, lectures, critique. Reading, writing, discussion of related articles/exhibitions. prereq: Two semesters of 3xxx photography or instr consent

ARTS 5810. Advanced Ceramics. (4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)

Critical discourse of aesthetics. History of, contemporary issues in clay and criticism. Independent, advanced projects. prereq: [3801, 3802, 3810] or instr consent

ARTS 5990. Independent Study in Art. (1-4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Independent study project designed by student in consultation with instructor. prereq: Major, completed regular course with instructor, instr consent

ARTS 8100. Practice and Critique: Drawing and Painting. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring)

Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism. prereq: Art MFA student

ARTS 8300. Practice and Critique: Sculpture. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)

Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

ARTS 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
This workshop aims to facilitate the writing process of the MFA Thesis Supporting Paper for third-year graduate students. In accordance with the MFA advisory manual, students are challenged to articulate their creative investigations and processes as well as philosophical and critical perspectives developed throughout their course of study. By the time third-year reviews take place in December, students are expected to have a full-length draft of their text (15 pages, double-spaced, 12-point type) that names relevant reference points of the work, historical and contemporary art influences, a bibliography, and completes the requirements laid out in the MFA Advising Manual.

**ARTS 8450. MFA Creative Thesis.**  (1-9 cr. ; A-F only; Every Fall & Spring) Research/studio work in preparation for thesis exhibition. Third year students are required to complete 18 cr. of this course in their final year.

**ARTS 8490. Workshop in Art.**  (1-4 cr. ; max 12 cr.; A-F only; Every Fall & Spring) Selected topics/intensive studio activity. Topics vary yearly.

**ARTS 8500. Practice and Critique: Printmaking.**  (3 cr. ; max 12 cr.; A-F only; Every Fall & Spring) Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

**ARTS 8600. Practice and Critique: Experimental and Media Arts.**  (3 cr. ; max 12 cr.; A-F only; Every Fall & Spring) Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

**ARTS 8700. Practice and Critique:Photography.**  (3 cr. ; max 12 cr.; A-F only; Every Fall & Spring) Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

**ARTS 8800. Practice and Critique: Ceramics.**  (3 cr. ; max 12 cr.; A-F or Audit; Every Fall & Spring) Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

**ARTS 8990. MFA Creative Thesis.**  (1-9 cr. ; max 18 cr.; A-F only; Every Fall & Spring) Research/studio work in preparation for thesis exhibition.

**Art History (ARTH)**

**ARTH 1001. Introduction to Art History: Prehistoric to Contemporary.**  (4 cr.; A-F only; Every Fall & Spring) Major monuments/trends in art, prehistoric to present. Style, subject matter, patronage. Reconstructing artworks' original setting; religious, political, and social contexts. Western art canon, occasionally in comparison with non-Western works.

**ARTH 1002W. Why Art Matters.**  (AH,WI,GP; 4 cr.; A-F only; Every Fall) Introduction to history of topics that investigate power/importance of art both globally and in its diverse forms, from architecture and painting to video and prints. Sacred space, propaganda, the museum, art/genre, art/authority, tourism.

**ARTH 1004W. Introduction to Asian Art.**  (HIS,WI; 3 cr.; A-F only; Every Fall) South, Southeast, East Asian art/material culture from Neolithic Age to twentieth century.

**ARTH 1921W. Introduction to Film Study.**  (AH,WI; 4 cr.; A-F only; Every Fall) Fundamentals of film analysis and an introduction to the major theories of the cinema, presented through detailed interpretations of representative films from the international history of the cinema.

**ARTH 3005. American Art.**  (AH; 4 cr.; A-F only; Every Fall & Spring) Artistic practice in the United States: colonial period to cold war. America as idea/identity shaped, expressed, represented, and contested through art. Canon of American art history. Works by individuals outside of traditional channels of art instruction/reception. Questions about what does/does not count as art history.

**ARTH 3009. Medieval Art.**  (AH; 3 cr.; A-F only; Every Fall & Spring) Medieval art in Western Europe, from around 1000 to the mid-14th century. Works from France, Spain, Germany, Italy, and England examined in their historical context. Cross cultural relations, development of completely new forms of art and techniques, and the processes of realization.

**ARTH 3012. 19th and 20th Century Art.**  (AH; 3 cr.; A-F only; Every Fall & Spring) Medieval art in Western Europe, from around 1000 to the mid-14th century. Works from France, Spain, Germany, Italy, and England examined in their historical context. Cross cultural relations, development of completely new forms of art and techniques, and the processes of realization.

**ARTH 3013. Introduction to East Asian Art.**  (GP; 3 cr.; A-F only; Every Fall & Spring) A selective examination of works of art produced in China, Korea and Japan from the neolithic era to modern times. Nearly every major type of object and all major styles are represented.

**ARTH 3014V. Art of India.**  (AH,WI,GP; 4 cr.; A-F only; Every Fall & Spring) Indian sculpture, architecture, and painting from the prehistoric Indus Valley civilization to the present day.

**ARTH 3014W. Art of India.**  (AH,WI,GP; 4 cr.; A-F only; Every Fall & Spring) Indian sculpture, architecture, and painting from the prehistoric Indus Valley civilization to the present day.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
ARTH 3015W. Art of Islam. (AH, WI, GP; 4 cr.; Student Option; Every Fall) Architecture, painting, and other arts from Islam's origins to the 20th century. Cultural and political settings as well as themes that unify the diverse artistic styles of Islamic art will be considered.

ARTH 3017. Islamic Culture. (AH, GP; 4 cr.; Student Option; Every Fall & Spring) Emphasis on visual arts and literature produced by the Muslim world from Spain to the Indian sub-continent. Analysis of original visual and literary sources will form the basis for understanding diverse cultural developments.

ARTH 3152. Art and Archaeology of Ancient Greece. (HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year) Introduction to history of Greek/Hellenistic art, from formation of Greek city states, through conquest of last Hellenistic Kingdoms in Mediterranean (Egypt) and South Asia (Punjab).

ARTH 3162. Roman Art and Archaeology. (HIS; 3 cr.; Student Option; Fall Odd, Spring Even Year) Introduction to history of Roman art, from formation of city-state of Rome under Etruscan domination, to transformation of visual culture in late antiquity under peoples influenced by the Romans.

ARTH 3182. Egypt and Western Asia: Art and Archaeology of Ancient Egypt and Western Asia. (AH, GP; 3 cr.; Student Option; Every Fall & Spring) Art, architecture, and archaeology of Egypt, East Africa, Asia Minor, Mesopotamia, Iran, and Central Asia from the Neolithic through Late Antiquity (ca. 7,000 B.C.E.-650 C.E.). Relationship between the visual material and the social, intellectual, political, and religious contexts. Evolution of, and exchanges and differences among, the visual cultures of these time periods and regions.

ARTH 3205. Art of Central and South America Before Columbus. (AH; 3 cr.; Student Option; Fall Even Year) Art/architecture of native peoples of Americas from twelfth century B.C. until arrival of Europeans in sixteenth century. Ways that people living in diverse areas of South America/Mesoamerica used art/architecture. Tools to investigate Pre-Columbian art at more advanced levels.

ARTH 3208. Mexico on My Mind. (AH, GP; 3 cr.; Student Option; Every Fall & Spring) Images/issues across time and over a vast geographic territory—of art of Pre-Columbian cultures of Mesoamerica to colonial, post-Independence, and modern Mexico to modern Chicano art in the United States. How Mexico and its people have represented themselves and been represented by others. Identify, define, and solve some of the intricate problems that arise when representing and viewing images of oneself and others. Interpret/make more informed choices. Role images play in community, national, and international politics through history. How these images have come to shape modern perceptions and how these perceptions affect people in Mexico and the United States today.

ARTH 3302. Print Culture in Early Modern Europe. (3 cr.; A-F or Audit; Fall Odd Year) Cultural history of printed images in Europe from their emergence in 15th century through about 1750. Book illustration, reproductive printmaking. History of print connoisseurship. Prints and scientific knowledge. Role of print culture in major social/political events such as Protestant Reformation.

ARTH 3309. Renaissance Art in Europe. (AH; 3 cr.; A-F or Audit; Every Fall & Spring) Major monuments of painting/sculpture in Western Europe, 1400-1600. Close reading of individual works in historical context. Influence of patrons. Major social/political changes such as Renaissance humanism, Protestant Reformation, market economy.


ARTH 3312. European Art of the Eighteenth Century: Rococo to Revolution. (HIS; 3 cr.; Student Option; Every Fall) Major developments in 18-century painting, sculpture, and interior decoration, from emergence of Rocco to dawn of Neoclassicism. Response of art to new forms of patronage. Erotics of 18-century art. Ways art functioned as social/political commentary.

ARTH 3315. The Age of Curiosity: Art and Knowledge in Europe, 1500-1800. (AH, TS; 3 cr.; Student Option; Every Fall & Spring) Diverse ways in which making of art and scientific knowledge intersected in early modern Europe. Connections between scientific curiosity and visual arts in major artists (e.g., da Vinci, Durer, Vermeer, Rembrandt). Artfulness of scientific imagery/diagrams, geographical maps, cabinets of curiosities, and new visual technologies, such as the telescope and microscope.

ARTH 3335. Baroque Rome: Art and Politics in the Papal Capital. (HIS; 3 cr.; Student Option; Fall Even Year) Center of baroque culture—Rome—as city of spectacular and pageantry. Urban development. Major works in painting, sculpture, and architecture. Ecclesiastical/private patrons who transformed Rome into one of the world's great capitals.

ARTH 3401. Art Now. (AH, CIV; 3 cr.; A-F or Audit; Every Spring) Analysis of visual representations in fine arts and popular media, in context of social issues. Obscenity, censorship, democracy, technology, commerce, the museum, propaganda, social role of artist. Understanding the contemporary world through analysis of dominant aesthetic values.

ARTH 3422. Off the Wall: History of Graphic Arts in Europe and America in the Modern Age. (4 cr.; Student Option; Periodic Spring) History/theory of creation of lithography, social caricature (e.g., Daumier, Gavarni), revival of etching (e.g., Goya/mid-century practitioners, Whistler), and color lithography (e.g., Toulouse-Lautrec, Vuillard, Bonnard). Media changes of 20th century. Revolutionäre neue media.

ARTH 3434. Art and the Environment. (AH, ENV; 3 cr.; Student Option; Every Fall & Spring) Historical development of land, earth, and environmental art since 1968. Artists' engagement with environmental problems. Responses to changing aesthetic, political, biological, economic, agricultural, technological, and climatic conditions from global perspective.

ARTH 3464. Art Since 1945. (HIS; 4 cr.; Student Option; Every Fall & Spring) Broad chronological overview of U.S./international art movements since 1945. Assessment of critical writings by major theoreticians (e.g., Clement Greenberg) associated with those movements. Theoretical perspective of postmodernism.

ARTH 3484. The Art of Picasso and the Modern Movement. (4 cr.; Student Option; Every Fall & Spring) Works of Picasso in all media. Blue, Rose, Cubist, Classical, and later periods of Picasso's development against innovations in media; collage, utilization of found-objects, printmaking and ceramics. Autobiographical nature of imagery gives methodological basis for exploring frequently personalized themes.

ARTH 3494. East/West, West/East. (3 cr.; Student Option; Every Fall & Spring) Beginning in the early 18th century and culminating at the dawn of the First World War. Chinoiserie, Orientalism, Japonisme, and western influence in Japan during the Meiji Era. Historical and critical context of trade competition, the colonial race, and the shrinking geopolitical map as the period progresses. Paintings to prints, decorative arts to architecture, and world fair exhibitions to photography.


ARTH 3600. The Renaissance. (3 cr.; Student Option; Periodic Spring) Relationships between the visual arts, literature, science, philosophy and politics in Europe from about 1300-1600. Works of artists, writers, and intellectuals (e.g., Michelangelo
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
History of art from late 19th to early 21st century. How gender/sexuality have been central to that period's artistic production, art criticism, and aesthetic theorization. How gender/sexuality are important themes for artists. How the writing of history reveals assumptions about gender/sex. Critical reading/writing.

ARTH 5413. Alternative Media: Video, Performance, Digital Art. (3 cr.; A-F or Audit; Periodic Fall)
In-depth examination of development of alternative media in 20th/21st century art. Video technologies. Performance, time based art. Digital art. prereq: 3464 or instr consent

ARTH 5417. Twentieth Century Theory and Criticism. (3 cr.; Student Option; Periodic Fall)
Trends in 20th-century art theory, historical methodology, criticism. Key philosophical ideas of modernism/postmodernism: formalism, semiotics, poststructuralism, feminism, Marxism, psychoanalysis, deconstruction. prereq: 3464 or instr consent

ARTH 5422. Off the Wall: History of Graphic Arts in Europe and America in the Modern Age. (4 cr.; Student Option; Periodic Spring)
History/theory of creation of lithography, social caricature (e.g., Daumier, Gavarni), revival of etching (e.g., Goya, mid-century practitioners, Whistler), and color lithography (e.g., Toulouse-Lautrec, Vuillard, Bonnard). Media changes of 20th century. Revolutionary nature of new media.

ARTH 5454. Design Reform in the Era of Art Nouveau. (3 cr.; Student Option)
History of art nouveau in France, Belgium, England, Germany, Austria, Scotland, United States. Innovations in architecture, graphics, decorative arts; continental variants of the style. Major promoters and pioneers of modern design. Critical issues of design reform; texts integrated with principal monuments.

ARTH 5466. Contemporary Art. (3 cr.; Student Option; Periodic Spring)
Survey of the art and important critical literature of the period after 1970. Origins and full development of postmodern and subsequent aesthetic philosophies. prereq: 3464 or instr consent

ARTH 5484. The Art of Picasso and the Modern Movement. (4 cr.; Student Option; Every Fall & Spring)
Works of Picasso in all media. Blue, Rose, Cubist, Classical, and later periods of Picasso's development against innovations in media; collage, utilization of found-objects, printmaking and ceramics. Autobiographical nature of imagery gives methodological basis for exploring frequently personalized themes.

ARTH 5494. East/West, West/East. (3 cr.; Student Option; Every Fall & Spring)
Beginning in the early 18th century and culminating at the dawn of the First World War. Chinoiserie, Orientalism, Japonisme, and western influence in Japan during the Meiji Era. Historical and critical context of trade competition, the colonial race, and the shrinking geopolitical map as the period progresses. Paintings to prints, decorative arts to architecture, and world fair exhibitions to photography.

ARTH 5565. American Art in the Gilded Age. (3 cr.; Student Option; Periodic Fall & Spring)
Major artists, artistic movements, and aesthetic concerns that dominated American art history from the Civil War to the turn of the century. Nationalism and cosmopolitanism as well as masculinity and femininity, industrialization and the "invention of America," methods of art instruction and its social role. Place of art in civic life.

ARTH 5575. Boom to Bust: American Art from the Roaring Twenties to the Great Depression. (3 cr.; Student Option; Every Fall & Spring)
American art/culture from 1917 to 1940. Boom of post-WWI affluence, bust of stock market crash, Great Depression. How tumultuous times influenced painting, sculpture, photography, and industrial design.

ARTH 5577. Art of the Harlem Renaissance. (3 cr.; Student Option; Every Fall)
Visual side of Harlem Renaissance, as represented by painters, illustrators, sculptors, and photographers. How African-Americans in 1920s/30s tried to reclaim visual field for purpose of racial redenfition.

ARTH 5585. African-American Cinema. (AH,DSJ; 3 cr.; Student Option; Periodic Fall)
African American cinematic achievements, from silent films of Oscar Micheaux through contemporary Hollywood and independent films. Class screenings, critical readings.

ARTH 5766. Chinese Painting. (3 cr.; Student Option; Fall Odd Year)
Major works from the late bronze age to the modern era that illustrate the development of Chinese landscape painting and associated literary traditions.

ARTH 5775. Formation of Indian Art: 2500 BCE to 300 CE. (3 cr.; Student Option; Sculpture/architecture, from Indus Valley civilization through Kushana period.

ARTH 5777. The Diversity of Traditions: Indian Art 1200 to Present. (3 cr.; Student Option; Every Fall, Spring & Summer)
Issues presented by sculpture, architecture and painting in India, from prehistoric Indus Valley civilization to present day.

ARTH 5781. Age of Empire: The Mughals, Safavids, and Ottomans. (3 cr.; Student Option)
Artistic developments under the three most powerful Islamic empires of the 16th through 19th centuries: Ottomans of Turkey; Safavids of Iran; Mughals of India. Roles of religion and state will be considered to understand their artistic production.

ARTH 5785. Art of Islamic Iran. (3 cr.; Student Option)
Architecture, painting, and related arts in Iran from the inception of Islam (7th century) through the 20th century. Understanding the nature of Islam in Persian cultural settings and how artistic production here compares to the Islamic world.

ARTH 5786. Theorizing City and Space in the Mediterranean and Western Asia. (3 cr.; Student Option; Spring Odd Year)
Development of greatest cities of Eastern Mediterranean/Western Asia from age of Alexander to rise of Islam. Methodological/ theoretical approaches to study of cities where as much evidence exists in texts as archaeological form.

ARTH 5787. Visual Cultures in Contact: Cross-Cultural Interaction in the Ancient and Early Medieval Worlds. (3 cr.; Student Option; Fall Even Year)
Evaluate critical perspectives from variety of interdisciplinary conversations. Framework for studying cross-cultural interaction among ancient visual cultures that integrates practical, cognitive, object oriented approaches. Cross-continental movement/selective appropriation of objects/motifs.

ARTH 5802. Art of the Inka and their Ancestors. (3 cr.; Student Option; Every Spring)

ARTH 5926. The Cinema of Alfred Hitchcock. (3 cr.; Student Option; Fall Even Year)
Achievement/significance of Alfred Hitchcock. British/American periods of career, major films, television program. Biographical, historical, technological, industrial, aesthetic issues surrounding his achievement.

ARTH 5950. Topics: Art History. (3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

ARTH 5993. Directed Study. (1-4 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)
TBD prereq: instr consent

ARTH 5994. Directed Research. (1-4 cr.; A-F or Audit; Every Fall, Spring & Summer)
tbd prereq: instr consent

ARTH 8001. Art Historiography: Theory and Methods. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Key texts, from Renaissance to present, from western/non-western fields, relating to history/ criticism of both art and visual culture. Focuses on recent critical theory, its re-examination of assumptions underlying the discipline.

ARTH 8120. Computer Applications in Art History and Archaeology. (3 cr.; Student Option; Every Fall & Spring)
Seminar. Potential of digital technology as applied to art history/archaeology. Computer technologies as affecting methodologies of art history/archaeology. Way in which art history/archaeology can contribute to emerging computer applications.

ARTH 8190. Seminar: Issues in Ancient Art and Archaeology. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Selected topics with special attention to current scholarly disputes. Topics specified in Class Schedule.

ARTH 8200. Seminar: Medieval Art. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Focus on a major art historical theme, artist, period, or genre.

ARTH 8320. Seminar: Issues in Early Modern Visual Culture. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Issues in visual culture of Europe and the Americas, 1500-1750. Topics vary, may include representation of body, collectors/collection, impact of Reformation, image/book, art/discovery, early modern vision/visuality.

ARTH 8333. FTE: Master's. (1 cr. No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

ARTH 8340. Seminar: Baroque Art. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Typical seminars have included symbolism, role of the academy and the avant-garde, surrealism in art and theory, and Franco-American relationships at the turn of the 20th century. prereq: inst consent


ARTH 8444. FTE: Doctoral. (1 cr. No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

ARTH 8500. Issues in Latin American Art. (3 cr. [max 12 cr.]; Student Option; Every Spring) Topics vary.

ARTH 8520. Seminar: American Art and Material Culture. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Topics in American art, popular art, and material culture, emphasizing methods and techniques of inquiry: creation and use of archives, oral history, sources for pictorial evidence, and current approaches to interpreting traditional and non-traditional data. prereq: inst consent

ARTH 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; dept consent for 3rd/4th registrations, up to 24 combined cr.; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ARTH 8710. Seminar: Islamic Art. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Focus depends on current research interests of the professor and needs and interests of graduate students in Islamic and Asian art history. prereq: instr consent

ARTH 8720. Seminar: East Asian Art. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Research focuses on closely defined topic, such as a short period of Chinese art, a restricted subject, or role of a single artist. A substantive research paper is required and participation in the seminar dialogue is expected. prereq: instr consent

ARTH 8770. Seminar: Art of India. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Selected problems and issues in history of South Asian art. Topic varies by offering. prereq: 3 cr art history, instr consent

ARTH 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

ARTH 8920. Seminar: Film History and Criticism. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Selected topics in film history and theory, including specific directors, genres, movements, periods, and critical issues (e.g., violence). prereq: instr consent

ARTH 8950. Seminar: Issues in the History of Art. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Theoretical or topical issues. Topics vary. prereq: 3 cr art history, instr consent

ARTH 8970. Directed Studies. (1-3 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) tbd prereq: instr consent

**Arts and Cultural Leadership (ACL)**

ACL 5100. Topics in Arts and Cultural Leadership. (1-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Topics in Arts and Cultural Leadership.

ACL 5200. Trends and Impacts in Arts and Cultural Leadership. (3 cr.; A-F or Audit; Every Fall) Seminar exploring the theoretical foundations/policies from which nonprofit arts and culturally-related organizations are built and the practical influences that affect leaders and their ability to achieve mission delivery, set strategic goals and translate strategy into successful, daily operations. prereq: dept consent

ACL 5220. Philanthropy, Development, and Strategic Leadership. (3 cr.; A-F or Audit; Every Fall) Funding sources available to nonprofit organizations/strategies employed to acquire/ sustain necessary resources. Investigate/discuss complexities and nuances of both earned/unearned income for nonprofits, motives/perspectives of funders and donors, role of communications strategies in support of fund-raising, importance of leadership in acquiring resources to sustain/grow a successful organization. Participants interact with leaders from the foundation and nonprofit community during most class sessions, including the State Arts Board, St. Paul Foundation, TPT, Jerome Foundation, Bush Foundation, prereq: dept consent


ACL 5240. Financial Management for Arts Nonprofits. (2 cr.; A-F or Audit; Every Fall) This course introduces students to concepts and applications of financial management and leadership practices for nonprofits with a specific focus on arts and cultural organizations. The goal of the course is to develop both theoretical and practical understanding of the central responsibilities of financial management and leadership in order to equip students to use financial information, identify business models, and employ a financial lens for planning and decisions. Focus will be on the fundamentals of budgeting and accounting, interpretation of financial statements, data, and procedures for operational forecasts, as well as the fiduciary responsibilities of nonprofit boards.

ACL 5250. Art and Public Policy. (2 cr.; A-F or Audit; Every Fall) No artist or arts organization functions in a vacuum. They are surrounded by communities dealing with many social issues, and by governments that can help or harm their ability to create art and serve the public. In this class, we will explore how social movements have used the arts to create social change, and how arts organizations can navigate in the political and fiscal environments surrounding them. Our key emphasis will be on the need for arts organizations, and artists, to have the knowledge, capacity, and skills to engage in shaping policies that impact their ability to be strong and effective, to have the resources and opportunities they want and need. The intersection of the role of arts in inspiring and advancing movements, and the need for arts entities to know how to navigate policy arenas in their enlightened self interest and to support social change movements, makes for a dynamic study of how artists, arts
organizations, governments, and social change movements intersect.

AACL 5950. Special Topics. (2-4 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer) Special topics. prereq: dept consent

AACL 5993. Directed Studies. (2-4 cr. [max 15 cr.]; A-F only; Every Fall, Spring & Summer) Guided individual reading or study for qualified graduate students. prereq: Grad student, dept consent

ACL 8001. Introduction to Interdisciplinary Inquiry. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Emphasizes what students need to know to successfully complete their individually crafted program, including critical thinking, clear writing, interdisciplinary research. prereq: ACL student or dept consent

ACL 8002. Final Project Seminar. (3 cr.; S-N only; Every Fall) Required final project seminar for graduate students in MPS in Arts/Cultural Leadership program.

ACL 8201. Leadership: Skills and Practice. (2 cr.; A-F only; Every Summer) Students will reflect on how their personal passions, skills, and strengths align with different situations arts and cultural leaders face. Students will explore their own leadership strengths. Students will be broken into three case presentation teams where they will explore specific arts leadership styles. During these class periods, a local arts leader will join the class for the case discussion as well as to share their background and experiences. Finally, students will write a final synthesis paper identifying their career and leadership aspirations, personal mission and values, and how they intend to apply and develop their leadership strengths over the remainder of their engagement in the ACL program.

ACL 8202. Nonprofit Board Practicum. (1 cr. [max 2 cr.]; A-F only; Every Fall) Fiduciary, strategic, generative governance explored through lens of peer-learning and facilitation by seasoned board/non-profit professional. Role of executive leader to board. How executive leadership can foster healthy organization in concert with strong and highly functioning board.

Asian American Studies (AAS)

AAS 1101. Imagining Asian America. (DSJ,SOCS; 3 cr.; Student Option; Every Fall) Issues in Asian American Studies. Historical/recent aspects of the diverse/multifaceted vision of "Asian America," using histories, films, memoirs, and other texts as illustrations.

AAS 1201. Racial Formation and Transformation in the United States. (DSJ,SOCS; 3 cr.; Student Option; Every Fall) How aggrieved racialized groups struggle over identity, culture, place, and meaning. Histories of racialization. Strategies toward rectification of historical injustices from dispossession, slavery, exploitation, and exclusion.

AAS 1902. Freshman Seminar. (DSJ; 3 cr.; Student Option; Periodic Fall) Topics specified in Class Schedule. prereq: Freshman


AAS 3211W. American Race Relations. (DSJ, WI; 3 cr.; A-F or Audit; Every Fall & Spring) This course is designed to provide students with an understanding of the contours of race in the post-civil rights era United States. This course will focus on race relations in today's society with a historical overview of the experiences of various racial and ethnic groups in order to help explain their present-day social status. The class will also consider the future of race relations in the U.S. and evaluate remedies to racial inequality.

AAS 3251W. Sociological Perspectives on Race, Class, and Gender. (DSJ, WI, SOCS; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Race, class, and gender as aspects of social identity, and as features of social organization. Experiences of women of color in the United States. Family life, work, violence, sexuality, and reproduction. Possibilities for social change.

AAS 3301. Asian America Through Arts and Culture. (AH,DSJ; 3 cr.; Student Option; Spring Even Year) Interdisciplinary questions of Asian American experience, identity, and community. Literature, dance, music, photography, film, theater, other cultural forms. Students work with local Asian American arts groups/oranizations. Students express their own cultural contradictions through writing and other forms of artistic expression and attend local arts events.

AAS 3303W. Writing Differences: Literature by U.S. Women of Color. (DSJ, WI, LITR; 3 cr.; Student Option; Fall Odd Year) Interpret/analyze poetry, fiction, drama of U.S. women minority writers. Relationship of writer's history, ethnicity, race, class, gender to her writings.

AAS 3409W. Asian American Women's Cultural Production. (AH, WI, DSJ; 3 cr.; Student Option; Every Fall) Diversity of cultures designated "Asian American." Understanding women's lives in historical, cultural, economic, and racial contexts.

AAS 3483. Hmong History Across the Globe. (3 cr.; Student Option; Fall Odd, Spring Even Year) Hmong interaction with lowland Southeast Asian states (Laos, Vietnam) and Western colonial powers (French, American) since 19th century. Changes to religious, social, political, and gender institutions. Aspirations for political autonomy.

AAS 3486. Hmong Refugees from the Secret War: Becoming Americans. (3 cr.; Student Option; Spring Odd Year) Socio-economic, political, gender, cultural/religious changes in Hmong American community during last three decades. How Hmong are racialized in American society. Impact to first/second generations.


AAS 3862. American Immigration History. (DSJ, HIS; 3 cr.; A-F or Audit; Every Spring) Global migrations to U.S. from Europe, Asia, Latin America, and Africa, from early 19th century to present. Causes/cultures of migration. Migrant communities, work, and families. Xenophobia, assimilation/integration, citizenship, ethnicity, race relations. Debates over immigration. Place of immigration in America's national identity.

AAS 3875W. Comparative Race and Ethnicity in U.S. History. (DSJ, WI, HIS; 3 cr.; A-F or Audit; Periodic Fall & Spring) This writing-intensive course examines the racial history of modern America. The focus is placed on how American Indians, African Americans, and immigrants from Europe, Asia, and Latin America struggle over identity, place, and meanings of these categories in society where racial hierarchy not only determined every aspect of how they lived, but also functioned as a lever to reconstitute a new nation and empire in the aftermath of the Civil War. We are interested in studying how these diverse groups experienced racialization not in the same way but in various and distinct ways in relation to each other.

AAS 3877. Asian American History, 1850 to Present. (DSJ, HIS; 3 cr.; Student Option; Every Fall & Spring) Asian American history and contemporary issues, from 1850 to present. Immigration, labor, anti-Asian movements, women/families, impact of World War Two, new immigrant/refugee communities, civil rights, Asian American identity/culture.

AAS 3920. Topics in Asian American Studies. (2-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

AAS 3993. Directed Studies in Asian American Studies. (1-9 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent

AAS 4231. Color of Public Policy: African Americans, American Indians, Asian...
Americans & Chicanos in the U.S. (3 cr.; Student Option; Periodic Fall & Spring) Structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporary communities of color in the United States.

AAS 4322. American Drama by Writers of Color. (3 cr.; A-F or Audit; Periodic Fall & Spring) Selected works by Asian American, African American, American Indian, Latino, and Chicano playwrights. How racial/ethnic differences are integral to shaping different visions of American drama. History of minority/ethnic theaters, politics of casting, mainstreaming of the minority playwright.

AAS 4311. Asian American Literature and Drama. (DSJ,LITR; 3 cr.; A-F or Audit; Fall Odd Year) Literary/dramatic works by Asian American writers. Historical past of Asian America through perspective of writers such as Sui Sin Far and Carlos Bulosan. Contemporary artists such as Frank Chin, Maxine Hong Kingston, David Henry Hwang, and Han Ong. Political/historical background of Asian American artists, their aesthetic choices.

AAS 4920. Topics in Asian American Studies. (2-4 cr.; max 8 cr.; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

AAS 5920. Topics in Asian American Studies. (1-4 cr.; max 12 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule.

AAS 5993. Directed Readings. (1-4 cr.; max 8 cr.; Student Option; Periodic Fall) Directed reading—must be set up with individual instructor.

AAS 5996. Graduate Proseminar. (1 cr.; max 4 cr.; S-N only; Every Fall & Spring) Discussions/presentations from various disciplinary perspectives on research, activism, and performance in Asian American/ Diasporic Studies. Students engage in dialogue, observe models of scholarly engagement, and reflect on issues within Asian American/diasporic studies.

Asian Languages and Literature (ALL)


ALL 1201. Arrow, Fist, and Sword: Conceptions of the Hero in Asian Cultures. (GP,LITR; 3 cr.; A-F only; Every Fall) Concepts of the "hero" in South Asian, Chinese and Japanese culture: How did various societies in Asia define the ethos of the "hero" and how's his relationship to the community? How did versions of the hero change over time, and how was the hero redefined in the context of modern nationalism? What part have traditional gender roles played in defining the hero, and is a "female" hero possible within these traditions? And how has popular film allowed modern Asian societies to reinterpret their traditional conceptions of the hero? Specific explorations: The Ramayana in India and its retellings; the Chinese assassin, the haohan and their evolution into the martial artist of popular culture; Mulan and the Chinese female warrior; and shifting Japanese constructions of the samurai from medieval war tales to modern times.

ALL 1904. Freshman Seminar. (3 cr.; max 6 cr.; A-F or Audit; Every Fall) Topics specified in Class Schedule and Course Guide. prereq: freshman

ALL 1905. Freshman Seminar. (3 cr.; max 6 cr.; A-F or Audit; Periodic Fall) Topics specified in Class Schedule and Course Guide.

ALL 1909W. Freshman Seminar. (GP, WI; 3 cr.; max 6 cr.; A-F or Audit; Every Fall & Spring) Topics specified in Class Schedule and Course Guide.

ALL 1910W. Freshman Seminar. (WI; 3 cr.; max 6 cr.; A-F or Audit; Every Fall) Topics specified in Class Schedule and Course Guide. prereq: freshman

ALL 3001. Reading Asian Cultures. (3 cr.; A-F or Audit; ) Introduction to primary Asian texts in translation. Emphasizes introducing/applying various methods of interpretation to a particular text in sequence. Close reading, methodological rigor. Practice, application.

ALL 3014W. Art of India. (AH, WI, GP; 4 cr.; Student Option; Every Fall, Spring & Summer) Indian sculpture, architecture, and painting from the prehistoric Indus Valley civilization to the present day.

ALL 3110. Study of an Asian Language. (1-5 cr.; max 10 cr.; Student Option; Every Fall & Spring) Study of an Asian language in another country or at other non-campus locations. Students study in situations complementary to regular University course offerings. prereq: dept consent


ALL 3261W. Writing (in) East Asian Cultures: From Oracle Bones to Tattoos. (AH, WI; 3 cr.; Student Option; Fall Even Year) History, materiality, practice of writing Chinese characters (hanzi/kanji/hanja) in cultural venues in East Asia, including contemporary society. Sites/practices where writing takes on high cultural value. Oracle bone writing, calligraphy, advertisements, tattooing. Identity construction, nationalism, prereq: One year in Chinese or Japanese or Korean language or similar exposure to East Asian writing systems

ALL 3265W. The Fantastic in East Asia: Ghosts, Foxes, and the Alien. (LITR, WI; 3 cr.; Student Option; Fall Odd Year) How the strange/alien is constructed in premodern Chinese/Japanese literature. East Asian theories of the strange and their role in the classical tale, through the works of Pu Songling, Ueda Akinari, and others. Role of Buddhist cosmology/salvation in other works (e.g., Journey to the West, drama). prereq: Some coursework in East Asia recommended

ALL 3334. Voices from Ancient China: The Book of Songs and The Songs of the South. (LITR; 3 cr.; Student Option; Fall Odd Year) Beginnings of Chinese culture in the songs, poems, and stories from two important classics, "The Book of Songs" and "Songs of the South." "Voices" from these early texts, including love songs, prayers to the ancestors, soldier complaints, and a poet's fantasies.


ALL 3356W. Chinese Film. (AH, WI; 3 cr.; A-F or Audit; Spring Odd Year) Survey of Chinese cinema from China (PRC), Taiwan, and Hong Kong. Emphasizes discussion/comparison of global, social, economic, sexual, gender, psychological, and other themes as represented through film.

ALL 3361W. Maps, Pictures, and Writing in the Representation of Taiwan. (AH, WI, GP; 3 cr.; A-F or Audit; Spring Odd Year) How visual/written media is used to form identity in representing people, places, history of Taiwan. Historical/contemporary contexts.


ALL 3372. History of Women and Family in China, 1600–2000. (3 cr.; Student Option; Fall Even, Spring Odd Year)

ALL 3373. Religion and Society in Imperial China. (3 cr.; Student Option; Periodic Fall & Spring) Introduction to religious traditions of imperial China (Buddhism, Daoism, Confucianism, “popular” religion), their relation to society. Role of gender. Conceptualizing relations with the divine. Ritual and its goals. Position of religious specialists such as monks and Daoist priests. Primary/secondary readings.

ALL 3377. A Thousand Years of Buddhism in China: Beliefs, Practices, and Culture. (3 cr.; Student Option; Fall Even Year) Buddhism in China, 4th-15th centuries. Introduction of Buddhism to China. Relevance of Buddhist teaching to indigenous thought (e.g., Taoism, Confucianism). Major “schools”: Tiantai, Huayan, Chan/Zen, etc. Cultural activities of monks, nuns, and lay believers.

ALL 3400. Topics in Japanese Literature. (3 cr. [max 9 cr.]; Student Option; ) Selected topics in Japanese literature. Topics specified in the Class Schedule.

ALL 3433W. Traditional Japanese Literature in Translation. (LITR, WI; 3 cr.; A-F or Audit; Fall Odd Year) Survey of texts in different genres, from 8th to early 19th centuries, with attention to issues such as “national” identity, gender/sexuality, authorship, popular culture. No knowledge of Japanese necessary.

ALL 3436. Postwar Japanese Literature in Translation. (3 cr.; Student Option; Every Fall) Survey of ideas/styles of recent Japanese literature. Writers include Dazai Osamu, Ibuse Masuji, Oe Kenzaburo, Mishima Yukio, and Yoshimoto Banana. All readings in English translation. prereq: Basic knowledge of modern Japanese history helpful, knowledge of Japanese language not required.

ALL 3437. Early 20th Century Japanese Literature in Translation. (GP,LITR; 3 cr.; Student Option; Every Fall) Survey of the principal authors and genres of the period spanning Japan’s opening to the West (1860s) to World War II. Writers include Natsume Soseki, Shiga Naoya, Kawabata Yasunari, and Tanizaki Junichiro.

ALL 3441W. Japanese Theater. (AH, WI; 3 cr.; A-F or Audit; Spring Even Year) Japanese performance traditions. Emphasizes noh, kabuki, and bunraku in their literary/cultural contexts. Relationship between these pre-modern traditions and modern theatrical forms (e.g., Takarazuka Revue).

ALL 3456. Japanese Film. (GP; 3 cr.; Student Option; Periodic Fall & Spring) Themes, stylistics, and genres of Japanese cinema through work of classic directors (Kurosawa, Mizoguchi, and Ozu) and more recent filmmakers (Itami, Morita). Focuses on representations of femininity/masculinity.

ALL 3457. War and Peace in Japan Through Popular Culture. (4 cr.; A-F or Audit; Periodic Fall & Spring) War-related issues in Japan. Animation films, comics from 1940s to 1990s. Mobilization of culture for WWll. Conflict between constitutional pacifism/national security. Japan’s role in cold war/post-cold war worlds.

ALL 3458. Japanese Animation. (3 cr.; A-F only; Spring Even Year) This course takes up the technologies, genres, and themes of Japanese animation. By examining the works of important directors alongside media theories and other related writings, the course will cover not only the major genres and recurrent themes of anime, but also the cultural and critical contexts for apprehending anime.


ALL 3467. Science Fiction, Empire, Japan. (3 cr.; A-F only; Fall Even Year) Premised on its historical position as a non-Western colonial empire, this course takes up Japan as a focal point for examining the relations between science fiction and imperialism. Discussions center on the colonial underpinnings of Japanese science fiction and how particular motifs (future war, time travel, posthuman bodies) critically interrogate this history.

ALL 3468. Environment, Technology and Culture in Modern Japan. (ENV; 3 cr.; Student Option; Fall Even Year) Read/view historical, literary, visual texts to discover guiding ideas about nature, environment, technology use in Japan. No prior knowledge of Japan is necessary.


ALL 3536. Modern Korean Literature. (GP,LITR; 3 cr.; Student Option; Every Fall) Modern Korean literature in English translation from the colonial period until the 1990s. Read literary texts critically, using genre categories, theories of narrative voice, different understandings of modern literary subjectivity, and historical contextualization.

ALL 3556. Korean Film. (3 cr.; Student Option; Every Spring) Introduction to Korean film from the Japanese colonial period to the present day, with a particular emphasis on the last two decades.

ALL 3576. Language & Society of the Two Koreas. (3 cr.; A-F only; Every Spring) This course is designed to offer an introduction and contrastive analysis of the language and society of the two Koreas: the Republic of Korea (better known as South Korea) and the Democratic People's Republic of Korea (better known as North Korea). This course will introduce the growing divide of the past 70 years between North and South Korea in the areas of language, society, and culture.

ALL 3586. Cold War Cultures in Korea. (3 cr.; A-F only; Every Fall) In this course we will analyze the Cold War (1945-1989) not only as an era in geopolitics, but also as a historical period marked by specific cultural and artistic forms. We focus on the Korean peninsula, looking closely at the literary and film cultures of both South Korea and North Korea. We discuss how the global conflict between U.S.-centered and Soviet-centered societies affected the politics, culture, and geography of Korea between 1945 and 1989, treating the division of Korea as an exemplary case extending from the origins of the Cold War to the present. We span the Cold War divide to compare the culture and politics of the South and the North through various cultural forms, including anti-communist and socialist realist films, biography and autobiography, fiction, and political discourse. We also discuss the legacy of the Cold War in contemporary culture and in the continued existence of two states on the Korean peninsula. The primary purpose is to be able to analyze post-1945 Korean cultures in both their locality and as significant aspects of the global Cold War era.

ALL 3637W. Modern Indian Literature. (WI; 3 cr.; A-F or Audit; Every Spring) Survey of 20th century literature from South Asian countries, including India, Pakistan, and Sri Lanka. All readings in English. Focuses on colonialism, post-colonialism, power, and representation.

ALL 3671. Hinduism. (3 cr.; Student Option; Periodic Fall & Spring) Development of Hinduism focusing on sectarian trends, modern religious practices, myths/rituals, pilgrimage patterns/religious festivals. Intereelationship between Indian social structure/Hinduism.

ALL 3672. Buddhism. (GP; 3 cr.; Student Option; Summer Even Year) Historical and contemporary account of the Buddhist religion in Asia/world in terms of its rise, development, various schools, practices, philosophical concepts, and ethics. Current trends in the modern faith and the rise of “socially engaged” Buddhism.

ALL 3673. Survey of India: Languages, Literature, and Film. (3 cr.; A-F only; Every Spring)
Survey course of Indian languages and literatures that explores the languages of India from genealogical, linguistic, typological, historical and sociological perspectives. Diachronic analysis of the languages of India in relation to some structural features will be also investigated. This course will also provide an overview of literatures of several main South Asian languages with a focus on Hindi - Urdu literatures. We will address the origin of Hindi-Urdu literatures, periodization, and naming of each period. We will also examine the important writers and their representative work, along with the literary trends and influences of each period, including political, social, and cultural situations which helped to shape the writers and their work. Among the representative literary works in Hindi-Urdu, some have been made into films.

ALL 3676. Culture and Society of India. (GP, SOCS; 3 cr.; Student Option; Fall Odd, Spring Even Year)
Contemporary society/culture in South Asia from anthropological perspective with reference to nationalism; post-colonial identities; media and public culture; gender, kinship, and politics; religion; ethnicity; and Indian diaspora.

ALL 3771. History of Southeast Asia. (GP; 3 cr.; A-F or Audit; Every Fall & Spring)

ALL 3832. The Politics of Arabic Poetry. (GP, LITR; 3 cr.; A-F only; Every Spring)
This course engages with Arabic poetry in its socio-political context. How have Arab poets from the pre-Islamic era till the present time used their verse as a tool to affirm the structure of their society, or to struggle with it? What roles did Arabic poetry play at the Abbasid imperial courts? How does Arabic poetry participate in the constitution and promulgation or subversion of political ideologies? What role has religious or political conflict played in poetry? What are the effects of the Arab Spring on poetry?

ALL 3871. Islam: Religion and Culture. (3 cr.; Student Option; Every Fall)
Religion of Islam, faith, practices, sectarian splintering. Expansion outside original home to status of world religion. Institutions. Status in Asia, Europe, Americas. prereq: Soph or jr or sr

ALL 3872. The Cultures of the Silk Road. (3 cr.; Student Option; Every Fall & Spring)
Past/present state of cultures that flourished in Central Asia (present-day CA republics, Iran, Afghanistan) after Alexander the Great. Decline with opening of sea routes.

ALL 3883. The Ottoman Empire. (GP, HIS; 3 cr.; Student Option; Every Fall & Spring)
Survey of Islam's most successful empire, from its founding circa 1300 to its demise in 1923. Lands, institutions, peoples, historical legacy.

ALL 3900. Topics in Asian Literature. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

ALL 3920. Topics in Asian Culture. (3 cr. [max 9 cr.]; A-F only; Every Fall & Spring)
Topics specified in Class Schedule.

ALL 3990. Directed Study. (1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Individual reading/study, with guidance of a faculty member, on topics not covered in regular courses. Prereq-instr consent, dept consent, college consent.

ALL 4900W. Major Project. (WI; 3 cr.; A-F or Audit; Every Fall & Spring)
Directed research/writing on topic selected according to individual interest, in consultation with faculty adviser. prereq: ALL major, sr

ALL 5261. Work of Translation: Theory, Function, and Practice. (3 cr.; A-F only; Periodic Fall & Spring)
Issues surrounding translation. Theories of representation. Ideological work. Readings/discussion of both historical/contemporary writing on translation. Actual translation tasks. prereq: [Native or near-native] speaker of English, advanced speaker/reader of at least one other [classical or vernacular] language

ALL 5276. Liberalism and Its Critics: Global Perspectives. (3 cr.; A-F only; Fall Odd Year)
Survey of liberal political thought and various critics of it that arose in extreme left/right political perspectives, including those in colonial contexts and within non-Western religious formations, especially Hindu and Muslim.

ALL 5359. Early Shanghai Film Culture. (3 cr.; Student Option; Spring Even Year)
Shanghai film culture, from earliest extant films of 1920s to end of Republican Era in 1949. Influences on early Chinese film, from traditional Chinese drama to contemporary Hollywood productions. Effects of leftist politics on commercial cinema. Chinese star system, material film culture.

ALL 5436. Literature by 20th-Century Japanese Women in Translation. (3 cr.; Student Option; Periodic Fall)
Literary/historical exploration of selected works by Japanese women writers in variety of genres. All literary texts read in English.

ALL 5486. Representations and Reimaginations of "Japan". (3 cr.; A-F only; Fall Even Year)
This course examines non-Japanese texts that deploy the imagination of "Japan" in their narratives. Discussions will take up such focal points as: ethnographic cinema, the politics of travel and translation, the intersections of race and gender, the cultural politics of alternate histories, and the ramifications of technocentric discourse.

ALL 5671. Hinduism. (3 cr.; Student Option; Periodic Fall & Spring)
Development of Hinduism focusing on sectarian trends, modern religious practices, myths/rituals, pilgrimage patterns/religious festivals. Interrelationship between Indian social structure/Hinduism.

ALL 5900. Topics in Asian Literature. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

ALL 5920. Topics in Asian Culture. (3 cr. [max 12 cr.]; A-F only; Every Fall)
Topics specified in Class Schedule.

ALL 5990. Directed Study. (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer)
Individual reading/study, with guidance of a faculty member, on topics not covered in regular courses. Prereq-instr consent, dept consent, college consent.

ALL 8001. Critical Approaches to Asian Literary and Cultural Studies. (3 cr.; Student Option; Fall Odd Year)
Constructions of national identity, its consolidation in current disciplinary/academic structures.

ALL 8002. Critical Approaches to Asian Studies. (3 cr.; Student Option; Spring Odd Year)

ALL 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
 prereq: Master's student, [adviser, DGS] consent

ALL 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
 prereq: Doctoral student, [adviser, DGS] consent

ALL 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
 prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ALL 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)

ALL 8920. Topics in Asian culture. (1-3 cr. [max 9 cr.]; S-N only; Every Fall & Spring)
Topics specified in Class Schedule.

ALL 8990. Directed Readings. (1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Directed readings in foreign language(s) of specialty, where appropriate. prereq: PhD student

Astronomy (AST)

AST 1001. Exploring the Universe. (ENV, PHYS; 4 cr.; Student Option; Every Fall, Spring & Summer)
The human place in the Universe. Study of Earth, other planets, sun, stars, galaxies.
AST 1005. Descriptive Astronomy. (.3 cr.; Student Option; Every Fall, Spring & Summer) Twentieth century astrophysics, current frontiers of astrophysical research. prereq: non-science major

AST 1011H. Exploring the Universe, Honors. (ENVS, PHYS; 4 cr.; A-F only; Every Fall & Spring) Human place in universe. Earth, other planets, sun, stars, galaxies. Background/fragility of life on Earth. Scale, origin, history of universe, our relationship to it. Honors version of 1001. prereq: High school trigonometry, [high school physics or chemistry]

AST 1905. Freshman Seminar. (.2 cr. [max 6 cr.]; Student Option No Audit; Every Fall & Spring) Topics vary. See Class Schedule.

AST 2001. Introduction to Astrophysics. (.4 cr.; Student Option; Every Fall & Spring) Physical principles and study of solar system, stars, galaxy, and universe. How observations/conclusions are made. prereq: [One yr calculus, PHYS 1302] or instr consent

AST 2990. Directed Studies. (.1-5 cr. [max 10 cr.]; Student Option; Every Fall & Spring) Independent, directed study in observational and theoretical astrophysics. Arranged with faculty member. prereq: 2001, instr consent


AST 4031. Interpretation and Analysis of Astrophysical Data. (.4 cr.; A-F only; Periodic Spring) Introduction to analysis techniques with applications to modern astrophysics. Methods to interpret/analyze large data sets from experiments. Principles/methods of analysis, with applications to current research. For senior undergraduate/graduate students in Physics/ Astronomy. prereq: [Math 2243 or 2373 or equivalent], [Math 2263 or 2374 or equivalent]. Ast 2001 or instr consent

AST 4101. Computational Methods in the Physical Sciences. (.4 cr.; Student Option; Periodic Fall & Spring) Introduction to using computer programs to solve problems in physical sciences. Selected numerical methods, mapping problems onto computational algorithms. Arranged lab. prereq: Upper div or grad student or instr consent

AST 4299H. Senior Honors Astrophysics Research Seminar. (.1 cr.; Student Option; Every Fall & Spring) Based on department's research seminar. prereq: upper div honors student in IT or CLA, instr consent

AST 4990. Directed Studies. (.1-5 cr. [max 10 cr.]; Student Option; Every Fall & Spring) Independent, directed study in observational and theoretical astrophysics. Senior Thesis for undergraduate astrophysics majors. Arranged with faculty member. prereq: instr consent

AST 5001. Galactic Astronomy. (.4 cr.; A-F only; Fall Odd Year) Structure of the Milky Way galaxy. Stellar populations including, open and globular clusters and the solar neighborhood, and the formation/evolution of its structure. Stellar distances/motions. prereq: 2001 or grad student

AST 5012. The Interstellar Medium. (.4 cr.; Student Option; Periodic Fall) Survey of physical processes in the interstellar medium. Dynamic processes, excitation processes, emission and absorption by gas and dust. Hot bubbles, HI regions, molecular clouds. prereq: 2001, Phys 2601 or instr consent

AST 5022. Relativity, Cosmology, and the Universe. (.4 cr.; Student Option; Periodic Fall & Spring) Large-scale structure/history of universe. Introduction to Newtonian/relativistic world models. Physics of early universe, cosmological tests, formation of galaxies. prereq: [2001, Phys 2601] or instr consent

AST 5201. Stellar Astrophysics. (.4 cr.; Student Option; Spring Even Year) Contemporary astronomical techniques and instrumentation. Emphasizes data reduction and analysis, including image processing. Students make astronomical observations at O'Brien Observatory and use department's computing facilities for data analysis. Image processing packages include IRAF, AIPS, IDL, MIRIA. prereq: Upper div CSE or grad or instr consent

AST 6001. High Energy Astrophysics. (.4 cr.; Student Option; Periodic Fall) Energetic phenomena in the universe. Radiative processes in high energy regimes; supernovae, pulsars, and X-ray binaries; radio galaxies, quasars, and active galactic nuclei. prereq: instr consent

AST 8001. Radiative Processes in Astrophysics. (.4 cr.; Student Option; Periodic Fall) Introduction to classical/quantum physics of electromagnetic radiation as it applies to astrophysics. Emphasizes radiative processes (e.g., emission, absorption, scattering) in astrophysical contexts (e.g., ordinary stars, ISM, neutron stars, active galaxies). prereq: instr consent

AST 8011. High Energy Astrophysics. (.4 cr.; Student Option; Periodic Fall) Energetic phenomena in the universe. Radiative processes in high energy regimes; supernovae, pulsars, and X-ray binaries; radio galaxies, quasars, and active galactic nuclei. prereq: instr consent

AST 8021. Stellar Astrophysics. (.4 cr.; Student Option; Periodic Fall) Stellar structure, evolution, and star formation. Emphasizes contemporary research. prereq: instr consent

AST 8031. Astrophysical Fluid Dynamics. (.4 cr.; Student Option; Periodic Fall) Introduction to physics of ideal/non-ideal fluids with application to problems of astrophysical interest. Steady/unsteady flows, instabilities, turbulence. Conducting fluid flows. Magnetohydrodynamics. prereq. instr consent

AST 8041. Comparative Planetology. (.4 cr.; Student Option; Periodic Fall) Overview of current knowledge of the solar system. Formation history of protostellar nebula, physical properties of major planetary bodies/moons. Sun and fossils of epoch of planetary system formation: comets, asteroids, minor bodies. prereq: instr consent

AST 8051. Galactic Astronomy. (.4 cr.; Student Option; Periodic Fall) Content, structure, evolution, and dynamics of Milky Way Galaxy. Emphasizes recent observations from space-ground-based telescopes. prereq: instr consent


AST 8071. Infrared Astronomy. (.4 cr.; Student Option; Periodic Fall) Techniques/applications of infrared astronomy. Basics of signal-to-noise ratios/ sensitivities, challenges of developing infrared instrumentation. Observations of continuum emission (blackbody, free-free, synchrotron), Spectral line emission/absorption, infrared polarization. Astrophysical examples. prereq: instr consent

AST 8081. Cosmology. (.4 cr.; Student Option; Periodic Fall) Role of gravity in cosmology. Background, recent research advances. prereq: instr consent

AST 8110. Topics in Astrophysics. (.2-4 cr.; Student Option; Periodic Fall & Spring) Current topics in Astrophysics. prereq: instr consent

AST 8120. Topics in Astrophysics. (.2-4 cr.; Student Option; Periodic Fall) N/A prereq: instr consent

AST 8200. Astrophysics Seminar. (.1-3 cr.; Student Option; Every Fall & Spring) TBD prereq: instr consent

AST 8333. FTE: Master's. (.1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
AST 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

AST 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

AST 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

AST 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

AST 8990. Research in Astronomy and Astrophysics. (1-4 cr.; Student Option; Every Fall & Spring) Research under supervision of a graduate faculty member. prereq: instr consent

Biochemistry (BIOC)


BIOC 2011. Biochemistry for the Agricultural and Health Sciences. (3 cr.; Student Option; Every Fall & Spring) Survey of organic chemistry and biochemistry outlining structure and metabolism of biomolecules, metabolic regulation, principles of molecular biology. prereq: Chem 1015, Bio 1009

BIOC 2331. Chemical Mechanisms in Biology. (3 cr.; A-F only; Every Fall & Spring) Organic structures, properties, chemical mechanisms as they apply to biological systems. Theoretical approach. Metabolic conversions, biodegradation, other biology-specific aspects of chemistry. prereq: [CHEM 1062 or equiv], one semester of general biology recommended

BIOC 3021. Biochemistry. (3 cr.; Student Option; Every Fall, Spring & Summer) Fundamentals of biochemistry. Structure/function of proteins, nucleic acids, lipids, and carbohydrates. Metabolism/regulation of metabolism. Quantitative treatments of chemical equilibria, enzyme catalysis, and bioenergetics. Chemical basis of genetic information flow. prereq: [BIOC 1002 or BIOL 1009 or BIOL 2003] or instr consent

BIOC 3022. Biochemistry for Life Scientists. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) This course provides an introduction to biochemistry including discussion of the structure and functions of biomolecules (proteins, carbohydrates, lipids, and nucleic acids), central metabolic pathways, and the mechanisms of enzyme action. This course is for students in the College of Biological Sciences who have completed Biol 3020? Molecular Biology and Society?, and does not cover molecular biology. Students from other Colleges should register for BIOC 3021, which includes an introduction to molecular biology.

BIOC 3960. Research Topics in Biochemistry. (1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring) Lectures, discussion on current research in the department. prereq: 3021 or concurrent registration is required (or allowed) in 3021 or 4331 concurrent registration is required (or allowed) in 4331 or instr consent

BIOC 402SW. Laboratory in Biochemistry. (WI; 2 cr.; Student Option; Every Fall & Spring) Theory, principles, and use of fundamental techniques in modern biochemistry labs. prereq: 3021 or 4331 or equiv

BIOC 4125. Laboratory in Molecular Biology and Biotechnology. (3 cr.; A-F or Audit; Every Spring & Summer) Basic recombinant DNA techniques: methods for growing, isolating, and purifying recombinant DNA and cloning vectors, DNA sequencing and sequence analysis, gene expression, Polymerase Chain Reaction (PCR), other current techniques. prereq: [3021 or Biol 3021 or Biol 4003], [4025 or GCD 4015 or GCD 4025 or MicB 3301]

BIOC 4185. Laboratory in Molecular Genetics. (3 cr.; A-F or Audit; Every Summer) Basic recombinant DNA techniques. Methods for growing, isolating, and purifying recombinant DNA and cloning vectors. DNA sequencing, sequence analysis. Gene expression, Polymerase Chain Reaction (PCR). Current techniques. prereq: Enrollment in Life Sciences Summer Undergraduate Research Program

BIOC 4225. Laboratory in NMR Techniques. (1 cr.; S-N only; Every Summer) Practical aspects of nuclear magnetic resonance (NMR) spectrometry. Hands-on experience with 500/600 MHz instruments. Sample preparation/handling, contamination sources, tube/probe options, experiment selection, experimental procedures, software, data processing. prereq: 4331; 4521 recommended; intended for biochemistry majors

BIOC 4325. Laboratory in Mass Spectrometry. (1 cr.; S-N only; Every Spring) Hands-on experience with techniques/instruments. Sample preparation/handling, 2-dimensional gels, MS-MS, MALDI-TOF, electrospray/LC-MS, experiment selection/procedures, software, data processing. prereq: 4332, 4521

BIOC 4331. Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems. (4 cr.; Student Option; Every Fall & Spring) Advanced survey of structure/catalysis, metabolism/bioenergetics. prereq: [BIOC 1002 or BIOL 1009 or BIOL 2003 or equiv], [CHEM 2302 or equiv] or instr consent

BIOC 4332. Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression. (4 cr.; Student Option; Every Fall & Spring) Advanced survey of molecular biology. Mechanisms of gene action/biological regulation. prereq: 4331 or instr consent

BIOC 4521. Introduction to Physical Biochemistry. (3 cr.; Student Option; Every Fall & Spring) Physical chemical principles, their applications in biochemistry. Thermodynamics, kinetics, spectroscopy, solution dynamics as applied to biochemical reactions/biopolymers. prereq: 4331 recommended, [Chem 1062 and Chem 1066 and Phys 1202] or [Chem 1022 and Phys 1202]

BIOC 4793W. Directed Studies: Writing Intensive. (WI; 1-7 cr.; S-N or Audit; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Written report. prereq: instr consent, dept consent

BIOC 4794W. Directed Research: Writing Intensive. (WI; 1-6 cr.; max 42 cr.); S-N or Audit; Every Fall, Spring & Summer) Laboratory or field investigation of selected areas of research, including written report. prereq: instr consent, dept consent

BIOC 4960. Special Topics in Biochemistry. (3 cr.; A-F only; Every Spring) In-depth study of a topic in biochemistry. prereq: [(3021 or equiv) or CHEM 2301] or instr consent

BIOC 4993. Directed Studies. (1-7 cr.; S-N or Audit; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature. prereq: instr consent, dept consent

BIOC 4994. Directed Research. (1-6 cr.; max 42 cr.; S-N or Audit; Every Fall, Spring & Summer)
Laboratory or field investigation of selected areas of research. prereq: instr consent, dept consent

BIOC 5213. Selected Topics in Molecular Biology. (3 cr.; A-F only; Every Fall)
Cutting edge areas in molecular biology. Topics focus on the "3 Rs" of DNA: repair, replication, and recombination. Faculty who are experts in these areas teach modules on specific topics, including discussion of their research interests. prereq: 4332 or 6002 or [3021, BIOL 4003] or instr consent

BIOC 5216. Current Topics in Signal Transduction. (3 cr.; A-F only; Every Spring)
Principles of cell signaling. Important signaling pathways/experimental approaches to study signal transduction. Discussion of current issues/ unanswered problems in field. prereq: BioC 4332 or Biol 4004 or instr consent

BIOC 5225. Graduate Laboratory in NMR Techniques. (1 cr.; S-N only; Every Spring)
Practical aspects of nuclear magnetic resonance (NMR) spectrometry. Hands-on experience with 500/600 MHz instruments. Sample preparation/handling, contamination sources, tube/probe options, experiment selection, experimental procedures, software, data processing. prereq: 8001 or instr consent

BIOC 5309. Biocalification and Biodegradation. (3 cr.; Student Option; Every Spring)
Fundamentals of microbial enzymes/metabolism as pertaining to biodegradation of environmental pollutants/biosynthesis for making commodity chemicals. Practical examples. Guest speakers from industry.

BIOC 5351. Protein Engineering. (3 cr.; A-F only; Every Fall)
Key properties of enzymes/molecular basis, computer modeling strategies, mutagenesis strategies to create protein variants, expression/screening of protein variants. Evaluate research papers, identify unsolved practical/theoretical problems, plan protein engineering experiment.

BIOC 5352. Biotechnology and Bioengineering for Biochemists. (3 cr.; A-F or Audit; Periodic Spring)
Protein biotechnology. Microorganisms used as hosts for protein expression, protein expression, and engineering methods. Production of enzymes of industrial interest. Applications of protein biotechnology in bioelectronics. Formulation of therapeutic biopharmaceuticals. prereq: [3021 or 4331 or BIOL 3021 or MICB 4111], [BIOL 3301 or MICB 3301] or instr consent

BIOC 5353. Microbial Biochemistry and Biotechnology: Small Molecules. (3 cr.; A-F or Audit; Periodic Fall)
Small molecule biotechnology. Screening strategies for drug discovery. Secondary metabolite and antibiotic biosynthesis. Combinatorial methods for generating new pharmaceutically active natural products. Production of organic acids and vitamins. Introduction to metabolic engineering. prereq: [3021 or 4331 or Biol 3021 or MicB 4111], [Biol 3301 or MicB 3301] or instr consent

BIOC 5361. Microbial Genomics and Bioinformatics. (3 cr.; Student Option; Every Fall & Spring)
Introduction to genomics. Emphasizes microbial genomics. Sequencing methods, sequence analysis, genomics databases, genome mapping, prokaryotic horizontal gene transfer, genomics in biotechnology, intellectual property issues. Hands-on introduction to UNIX shell scripting, genomic data analysis using R and Excel in a computer lab setting. prereq: College-level courses in [organic chemistry, biochemistry, microbiology]

BIOC 5444. Muscle. (3 cr.; Student Option; Every Spring)
Muscle molecular structure/function and disease. Muscle regulation, ion transport, and force generation. Muscular dystrophy and heart disease. prereq: 3021 or BIOL 3021 or 4331 or BIOL 4331 or PHSL 3061 or instr consent

BIOC 5527. Introduction to Modern Structural Biology. (4 cr.; Student Option; Every Fall)
Methods employed in modern structural biology to elucidate macromolecular structures. Primary focus on X-ray diffraction, nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry. Principles underlying structural biology and structure/function relationships. prereq: [intro biochemistry, intro physics] or physical chemistry or instr consent

BIOC 5528. Spectroscopy and Kinetics. (4 cr.; Student Option; Every Spring)
Biochemical dynamics from perspectives of kinetics and spectroscopy. Influence of structure, molecular interactions, and chemical transformations on biochemical reactions. Focuses on computational, spectroscopic, and physical methods. Steady-state and transient kinetics. Optical and magnetic resonance spectroscopies. prereq: Intro physical chemistry or equiv; intro biochemistry recommended

BIOC 5531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr.; S-N or Audit; Every Fall)
Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction. prereq: [One organic chemistry or biochemistry course], [two calculus or college physics courses] or instr approval

BIOC 5532. Macromolecular Crystallography II: Techniques and Applications. (1 cr.; S-N or Audit; Every Spring)
Determining structure of macromolecule by diffraction. Using software in macromolecular crystallography. prereq: 5531

BIOC 5960. Special Topics in Biochemistry. (3 cr.; A-F only; Every Spring)
In-depth study of topics in biochemistry. prereq: [3021 or equiv]. CHEM 2301] or instr consent

BIOC 6011. Biochemistry for Dental Students. (4 cr.; A-F or Audit; Every Fall)
Survey of chemical properties, biosynthesis, catalysis, structure/function of biomolecules. Fundamentals of molecular biology/metabolic regulation. prereq: Dental student

BIOC 6021. Biochemistry. (3 cr.; Student Option; Every Fall, Spring & Summer)

BIOC 8001. Biochemistry: Structure, Catalysis, and Metabolism. (3 cr.; Student Option; Every Fall)
Protein structure, methods to determine structure, protein folding, forces stabilizing macromolecular structure, protein engineering, design. Dynamic properties of proteins/enzymes, enzyme substrate complexes, mechanism of enzyme catalysis. Enzymology of metabolic regulation and cell signaling. prereq: BMBB or MCDBG concurrent registration is required (or allowed) in Grad student or instr consent

BIOC 8002. Molecular Biology and Regulation of Biological Processes. (3 cr.; A-F only; Every Fall)
Classical to current topics in molecular biology. Aspects of DNA, RNA, and protein biology. DNA replication, repair, and recombination. RNA transcription, editing, and regulation. Protein translation/modification. Technologies such as deep-sequencing micro-RNA and prions. prereq: BMBB or MCDBG grad student or instr consent

BIOC 8084. Research and Literature Reports. (1 cr. [max 5 cr.]; S-N or Audit; Every Fall & Spring)
Current developments. prereq: Grad BMBB major or instr consent

BIOC 8184. Graduate Seminar. (1 cr. [max 5 cr.]; S-N or Audit; Every Fall & Spring)
Reports on recent developments in the field and on research projects in the department. prereq: grad BMBB major or DGS consent

BIOC 8216. Signal Transduction and Gene Expression. (3 cr.; Student Option; Every Fall & Spring)
Cell signaling, metabolic regulation in development. Procaryotic/eucaryotic systems used as models for discussion. Literature-based course. prereq: 6002 or instr consent

BIOC 8290. Current Research Techniques. (1-3 cr. [max 9 cr.]; S-N or Audit; Every Fall & Spring)
Research project carried out in laboratory of a staff member. prereq: Grad BMBB major

BIOC 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master’s student, adviser and DGS consent

BIOC 8401. Ethics, Public Policy, and Careers in Molecular and Cellular Biology. (1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Ethics of scientific investigation from viewpoint of western scientific enterprise. Relationship between science, culture, and public policies. Careers in molecular/cellular biology. Nontraditional career tracks. Invited speakers, case studies, small-group discussions, lectures. prereq: Grad student in [MBMB or MCDB] concurrent registration is required (or allowed) in [G]

**BIOC 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

**BIOC 8666. Doctoral Pre-Thesis Credits.** (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**BIOC 8777. Thesis Credits: Master’s.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**BIOC 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

### Bioethics, Center for (BTHX)

**BTHX 5000. Topics in Bioethics.** (1-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Bioethics topics of contemporary interest. Topics specified in Class Schedule.

**BTHX 5010. Bioethics Proseminar.** (2 cr.; A-F only; Every Fall) Introduction to topics in bioethics. prereq: Bioethics grad student or grad minor

**BTHX 5100. Introduction to Clinical Ethics.** (3 cr.; Student Option; Every Fall & Spring) Most frequent ethical problems faced by clinicians, patients/families, and ethics consultants. Forgoing life sustaining treatment, decisional capacity, informed consent, treatment refusal, death/dying, pediatric ethics, reproductive issues, research ethics, psychiatric illness. Real cases. prereq: Jr or sr or grad student or instr consent

**BTHX 5110. Ethical Issues in Pediatrics.** (2 cr.; A-F or Audit; Every Spring) Bioethics concerns the identification, analysis, and resolution of ethical problems that arise in planning for the care of patients in biomedical research, and in relation to the natural world. This course deals with ethical problems that occur frequently in pediatrics settings, in clinical and public health venues, in research and in the environment. The course emphasizes the ethical responsibilities of laypersons, health professionals, researchers and policy makers in planning for and resolving bioethics issues in pediatrics, including the prenatal and perinatal period. Issues addressed include reproductive issues, death and dying, forgoing life-sustaining treatment, conflicts and war, research with children and pregnant women, genetics, public and global health, social justice and other topics.

**BTHX 5120. Dying in Contemporary Medical Culture.** (2 cr.; Student Option; Every Fall) Examines practices of dying and death in contemporary U.S. culture, moral problems associated with these practices, possible solutions, and practical applications. Readings will consist of cultural critiques, bioethics literature, and empirical research.

**BTHX 5210. Ethics of Human Subjects Research.** (3 cr.; Student Option; Fall Even Year) Issues in ethics of human subjects research. prereq: Grad student or instr consent

**BTHX 5220. Standards for Research with Human Participants: A Lecture Series for Researchers.** (1 cr.; Student Option; Fall Even Year) This series of lectures presents various legal and regulatory standards that apply to research using human participants. Some are of general interest (e.g., Informed Consent); others will interest more specialized researchers (e.g., International Research).

**BTHX 5300. Foundations of Bioethics.** (3 cr.; Student Option; Every Spring) Overview of major contemporary frameworks used to approach ethical issues in bioethics. prereq: Grad student or instr consent

**BTHX 5325. Biomedical Ethics.** (3 cr.; Student Option; Every Fall & Spring) Major topics/issues in biomedical ethics. Patients’ rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, allocation of medical resources. prereq: Jr or sr or grad student or instr consent

**BTHX 5400. Intro Ethics in Hlth Policy.** (3 cr.; Student Option; Spring Even Year) Topics vary to reflect issues of current significance. Relates to law/politics as appropriate but focuses on moral analyses of policy issues. prereq: Grad student or professional student or instr consent

**BTHX 5411. Health Law and Policy.** (3 cr.; A-F or Audit; Spring Even Year) Organization of health care delivery. Physician-patient relationship, informed consent, quality control. Responses to harm and error, including through medical malpractice litigation. Access. Proposals for reform. prereq: Grad student or instr consent

**BTHX 5453. Law, Biomedicine, and Bioethics.** (3 cr.; A-F only; Spring Even Year) Law/bioethics as means of controlling important biomedical developments. Relationship of law and bioethics. Role of law/bioethics in governing biomedical research, reproductive decisionmaking, assisted reproduction, genetic testing/screening, genetic manipulation, and cloning. Definition of death. Use of life-sustaining treatment. Organ transplantation. prereq: Grad student or instr consent

**BTHX 5520. Social Justice and Bioethics.** (3 cr.; Student Option; Fall Even Year) This course explores matters of social justice related to health. Readings from multiple disciplinary perspectives ground examination of how to understand social justice in this context. Class sessions will predominantly focus on specific practical issues such as health disparities, the politics of inclusion and exclusion in clinical research, resource allocation in resource poor settings, and health professional roles during war. Discussions incorporate consideration of these issues? institutional and broader social contexts. This course is appropriate for a wide audience including students from the health professions, philosophy, social science, and law.

**BTHX 5530. Investigative Journalism and Bioethics.** (3 cr.; Student Option; Periodic Fall & Spring) This seminar will explore the links between bioethics and journalism, examining classic and contemporary works of investigative health journalism, works of literary non-fiction related to medicine and health, and investigative work by bioethicists. It will also examine the art of muckraking, non-profit investigative journalism, the public relations industry, the decline of print journalism and the rise of digital media, and how these developments are shaping the relationship between bioethicists and the press.

**BTHX 5561. Research & Publication Seminar.** (1 cr.; Student Option; Every Fall) Publication strategy/venues. Authorship issues/ ethics in publication. Manuscript formatting/ letters of submission. Peer review. prereq: [Junior or senior or grad student], bioethics grad majors must register A-F

**BTHX 5620. Social Context of Health and Illness.** (3 cr.; Student Option; Spring Even Year) Social context in which contemporary meanings of health and illness are understood by providers/patients. Ethical implications. Readings from history, social science, literature, and first-person accounts. prereq: Grad student or instr consent

**BTHX 5710. Ethical Issues in Global Health.** (3 cr.; Student Option; Fall Even Year) This course examines ethical issues related to global health. In the first half of the course we explore topics related to health-related travel, globalization of health services, medical consumerism, and commodification of the body. In particular, we address marketing by medical tourism companies & public health effects of medical travel, commercial surrogacy in India and elsewhere, organ trafficking, cosmetic surgery ?tourism?, travel abroad for unproven stem cell interventions, and efforts to create ?destination medical centers? by blurring distinctions between hospitals and hotels. In the second half of the course we shift our focus to the ethics of global health research. In particular, we study globalization
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

of clinical research, research partnerships, local interpretations of the meaning of clinical studies, conducting research in cross-cultural settings, community engagement, and the ethics of global public health philanthropy. By the end of the course students will have a good understanding of many important ethical issues related to global health and global health research.

BTHX 5900. Independent Study in Bioethics. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Students propose area for study with faculty guidance, write proposal which includes outcome objectives and work plan. Faculty member directs student's work and evaluates project. prereq: instr consent

BTHX 8000. Advanced Topics in Bioethics. (1-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Advanced study of bioethics topics of contemporary interest. prereq: Grad or professional student

BTHX 8100. Advanced Theory & Practice of Clinical Ethics. (2 cr.; Student Option; Every Spring) This graduate seminar examines the principles and practices of health care ethics consultation. Focuses on the Core Competencies for Health Care Ethics Consultation promulgated by the American Society for Bioethics and Humanities. Topics include the nature and goals of health care ethics consultation, methods and processes of health care ethics consultation, evolving standards of clinical practice, core skills and core knowledge for ethics consultation, consultation evaluation, accountability, and institutional relationships, and special obligations of ethics consultants and institutions. The course serves graduate students in bioethics, ethics committee members (including community/lay members) and ethics consultants, clinical staff and faculty, law students, student clinicians, and students of the social and behavioral sciences and other disciplines. prereq: BTHX 5100 or instr consent

BTHX 8110. Ethical Issues in Pediatrics. (2 cr.; A-F or Audit; Every Spring) Bioethics concerns the identification, analysis, and resolution of ethical problems that arise in planning for the care of patients in biomedical research, and in relation to the natural world. This course deals with ethical problems that occur frequently in pediatrics settings, in clinical and public health venues, in research and in the environment. The course emphasizes the ethical responsibilities of laypersons, health professionals, researchers and policy makers in planning for and resolving bioethics issues in pediatrics, including the prenatals and perinatal period. Issues addressed include reproductive issues, death and dying, forgoing life-sustaining treatment, conflicts and war, research with children and pregnant women, genetics, public and global health, social justice and other topics.

BTHX 8114. Ethical and Legal Issues in Genetic Counseling. (3 cr.; A-F or Audit; Every Spring) Professional ethics. Ethical/legal concerns with new genetic technologies. prereq: [MD/MS, genetic counseling specialization] or instr consent

BTHX 8120. Dying in Contemporary Medical Culture. (2 cr.; Student Option; Every Fall) Examines practices of dying and death in contemporary U.S. culture, moral problems associated with these practices, possible solutions, and practical applications. Readings will consist of cultural critiques, bioethics literature, and empirical research.

BTHX 8331. The Psychology of Morality. (3 cr.; A-F or Audit; Fall Even Year) Current research topics in socio-political moral judgment and moral development. prereq: Grad

BTHX 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Master's student, adviser consent, DGS consent

BTHX 8500. Practicum in Bioethics. (1-4 cr. [max 16 cr.]; Student Option No Audit; Every Fall & Spring) Supervised placement to apply knowledge/skills from core courses. Individualized plan is developed between student, bioethics adviser or DGS, and mentor at practicum site. prereq: Bioethics grad [major or minor] or instr consent

BTHX 8510. Gender and the Politics of Health. (3 cr.; Student Option; Spring Even Year) Significance of gender to health and health care. Feminist analysis regarding moral/political importance of gender, possibly including contemporary western medicine's understanding of the body, childbirth, and reproductive technologies; cosmetic surgery; chronic illness; disability; participation in research; gender and classification of disease. Care work, paid/non-paid. Readings from feminist theory, history, social science, bioethics, and moral philosophy. prereq: instr consent

BTHX 8520. Social Justice and Bioethics. (3 cr.; Student Option; Fall Even Year) This course explores matters of social justice related to health. Readings from multiple disciplinary perspectives ground examination of how to understand social justice in this context. Class sessions will predominantly focus on specific practical issues such as health disparities, the politics of inclusion and exclusion in clinical research, resource allocation in resource poor settings, and health professional roles during war. Discussions incorporate consideration of these issues institutional and broader social contexts. This course is appropriate for a wide audience including students from the health professions, philosophy, social science, and law.

BTHX 8610. Medical Consumerism. (3 cr.; Student Option; Spring Even Year) Roots/implications of "medical consumerism." How consumerist model shapes concepts of disease/disability. Larger historical developments that have led to current situation. How movement toward consumerism changes the profession of medicine. How tools of medical enhancement shape the way we think about our identities and live our lives. Texts from philosophy, history, literature, law, film, and social sciences.

BTHX 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd

BTHX 8900. Advanced Independent Study in Bioethics. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Students propose area for individual study with faculty guidance. Students write proposal, which includes outcome objectives and work plan. Faculty member directs student's work and evaluates project. prereq: instr consent

Bioinformatics (BINF)

BINF 5480. Bioinformatics Journal Club. (1 cr. [max 6 cr.]; S-N or Audit; Every Fall, Spring & Summer) Bioinformatics Journal Club

BINF 5490. Topics in Bioinformatics. (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Independent or group study in bioinformatics. prereq: instr consent

Biology (BIOL)

BIOL 1001. Introductory Biology: Evolutionary and Ecological Perspectives. (BIOL; 4 cr.; Student Option; Every Fall & Spring) Biological diversity from genetic variation to diversity of species/ecosystems. Genetic, evolutionary, and ecological processes governing biological diversity. Genetic, evolutionary, and ecological perspectives on issues concerning human diversity, human population growth, health, agriculture, and conservation. Lab.

BIOL 1001H. Introductory Biology I: Evolutionary and Ecological Perspectives. (BIOL; 4 cr.; A-F only; Every Fall) Biological diversity from genetic variation to diversity of species/ecosystems. Genetic, evolutionary, and ecological processes governing biological diversity. Issues of human diversity, population growth, health, agriculture, and conservation. Lab. prereq: Honors


BIOL 1009. General Biology. (BIOL; 4 cr.; Student Option; Every Fall, Spring & Summer) Major concepts of modern biology. Molecular structure of living things, energy recruitment/utilization, flow of genetic information
through organisms/populations. Principles of inheritance, ecology, and evolution. Includes lab. prereq: high school chemistry; 1 term college chemistry recommended

**BIOL 1009H. Honors: General Biology.**
(BIOL; 4 cr.; Student Option; Every Spring)
Major concepts of modern biology. Molecular structure of living things, energy recruitment/utilization, flow of genetic information through organisms/populations. Principles of inheritance, ecology, and evolution. Includes lab. prereq: high school chemistry, honors; one term of college chemistry recommended

**BIOL 1010. Human Biology: Concepts and Current Ethical Issues.**
(BIOL; 4 cr.; Student Option; Every Fall & Spring)
Concepts related to structure/function of human body. Unifying themes such as homeostasis. Impact of science on society, civic life, and ethics. Weekly debates/discussion relating to current issues in science.

**BIOL 1015. Human Physiology, Technology, and Medical Devices.**
(BIOL; 4 cr.; Student Option; Every Fall & Spring)
This life-science course is organized around the core principles of anatomy and physiology, such as homeostasis, information flow, causal mechanisms, structure and function relationships, and the levels of organization. Interrelatedness between body systems (cardio-pulmonary, skeletal-muscular) will be used as a theme throughout the course.

**BIOL 1020. Biology Colloquium.**
(; 1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Introduction to the diverse fields of biology through seminars, lab tours, trips to Itasca Biological Station, and interaction with other biology students and faculty. Course may be repeated once.

**BIOL 1050. Environmental Biology: Science and Solutions.**
(ENV; 3 cr.; Student Option; Every Fall)
Independently explore science behind environmental topics. Ethics of environmental science, policy, personal choice. Environmental toxicology, biodiversity, food production, global climate change.

**BIOL 1055. Environmental Biology: Science and Solutions with Laboratory.**
(BIOL, ENV; 4 cr.; Student Option; Every Fall & Spring)
Conduct work of biologists, proposing hypotheses. Conduct experiments, analyzing/interpreting data.

**BIOL 1093. Biology Colloquium: Directed Study.**
(; 1 cr.; S-N or Audit; Every Fall & Spring)
Individual study or research undertaken by a student concurrently enrolled in BIOL 1093 with oversight by a faculty sponsor. prereq: 1020 and concurrent registration is required (or allowed) in 1020

**BIOL 1101. Genetics and Society.**
(CIV; 3 cr.; Student Option; Every Spring)
Principles of heredity and their social and cultural implications. prereq: No cr if taken after 4003 or GCB 3022

**BIOL 1301. Becoming a Reflective Leader.**
(; 1 cr.; S-N only; Every Fall)
Leadership theory/concepts. Personal views on leadership. Characteristics for effective leadership. Course uses experiential teaching methods, self-reflection. prereq: Dean's Scholar

**BIOL 1805. Nature of Life: Introducing New Students to the Biological Sciences.**
(; 0.5 cr.; S-N or Audit; Every Fall & Spring)
Biological sciences, from molecules to ecosystems and from laboratory science to field biology. Introduction to the College of Biological Sciences community and opportunities. Held at Itasca Biological Station and Laboratories. Transportation, board, and lodging fee. prereq: Fr in College of Biological Sciences

**BIOL 1806. Nature of Life, Part Two.**
(; 0.5 cr.; S-N only; Every Spring)
Second semester of Nature of Life with focus on building intentional pathway in CBS/student success/engagement. prereq: 1805

**BIOL 1904. Freshman Seminar for the Biological Sciences.**
(GP; 1-3 cr. [max 6 cr.]; A-F only; Every Spring)
Orientation to University environment. Special topics that illustrate importance of biological topics/issues in modern society. prereq: Freshman

**BIOL 1905. Freshman Seminar for the Biological Sciences.**
(; 1-3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)
Orientation to University environment. Special topics that illustrate the importance of biological topics/issues in modern society.

**BIOL 2001. Career Planning for Biologists.**
(; 1 cr.; S-N or Audit; Every Fall & Spring)
Introduction to career planning. Students assess their strengths, interests, values, and motivations. Decision making, campus/community resources, developing an action plan. Online modules/assessments, in-class discussions, presentations, one-to-one consultations.

**BIOL 2002. Foundations of Biology for Biological Sciences Majors, Part I.**
(BIOL; 6 cr.; A-F only; Every Fall & Spring)
Core biological concepts, from biomolecules to ecosystems. Emphasizes evolution, organismal diversity, and genetics within context of problem solving/applications. prereq: [CHEM 1021 or 1061 or equiv]; CBS major or dept consent; calculus I or equiv recommended

**BIOL 2002H. Foundations of Biology for Biological Sciences Majors, Part I.**
(BIOL; 6 cr.; A-F only; Every Fall & Spring)
Core biological concepts, from biomolecules to ecosystems. Emphasizes evolution, organismal diversity, and genetics within context of problem solving/applications. prereq: [CHEM 1021 or 1061 or equiv]; CBS major, honors student) or dept consent; calculus I or equiv recommended

**BIOL 2003. Foundations of Biology for Biological Sciences Majors, Part II.**
(; 3 cr.; A-F only; Every Fall & Spring)
Second of two courses. Biological concepts, from biomolecules to ecosystems. Ecology/biochemistry concepts within problem solving/application. prereq: 2002 or 2002H or CBS major

**BIOL 2003H. Foundations of Biology for Biological Sciences Majors, Part II.**
(; 3 cr.; A-F only; Every Fall & Spring)
Second of two courses. Biological concepts, from biomolecules to ecosystems. Ecology/biochemistry concepts within problem solving/application. prereq: [2002 or 2002H], honors

**BIOL 2005. Animal Diversity Laboratory.**
(; 2 cr.; Student Option; Every Fall, Spring & Summer)
Dissection, direct observation of representatives of major animal groups.

**BIOL 2007. Marine Animal Diversity Laboratory.**
(; 2 cr.; A-F only; Every Fall & Spring)
Survey of marine animal diversity.
Understanding major animal groups, how they relate to one another, how they differ in structure, how each group achieves survival/reproduction in diverse environments. Lab includes dissections, including vertebrates, such as fish. prereq: Introductory biology with lab

**BIOL 2102. General Botany.**
(; 4 cr.; Student Option; Every Fall & Spring)
Principles of plant biology. Organization, function, growth/development, and reproductive biology of plants and plant-like organisms. Lab. prereq: One semester of college biology

**BIOL 2103. Brewing: The Biology, History, and Practice.**
(; 3 cr.; A-F only; Periodic Fall & Spring)
History of brewing, microbiology, biochemistry and biological concepts such as competition, using brewing as a model. Practical aspects of modern brewing, prereq: 1001 or 1009 or 2002 or 2003 or 2004

**BIOL 2301. Leadership and Service.**
(; 2 cr.; S-N only; Every Fall & Spring)
Importance of service in leadership. How personal experiences influence perspectives on social issues. Techniques for group work. Service project with community organization related to biological sciences. prereq: 1301, CBS Dean's Scholar

**BIOL 2300. Understanding the Environment: Ecology for Educators.**
(5 cr.; A-F only; Every Summer)
Ecology/earth systems science content, concepts, and investigation skills that environmental educators, science communicators, and natural history interpreters should be proficient in when addressing respective audiences about science, environmental issues, and nature studies.

**BIOL 2905. Nature of Life, Part III.**
(; 0.5 cr.; S-N only; Every Fall)
Reflect on aspirations, personal characteristics, experiences. Resources/practical tools to reach...
BIOL 2906. Nature of Life, Part IV. (0.5 cr.; S-N only; Every Spring)
Reflect on aspirations, personal characteristics, experiences. Resources/practical tools to reach educational/professional goals. Special focus on developing personal/professional goals, articulating personal experiences in light of aspirations. prereq: 1805, 1806

BIOL 2906H. Exploring Research in the Biological Sciences. (1 cr.; A-F only; Every Fall)
Explore areas of biological research. Learn where/how to access research papers. Prepare in-depth review paper. prereq: CBS, Honors program, soph, dept consent

BIOL 3001. Nature of Science and Research. (1 cr.; S-N only; Every Fall)
Explore how to read/use research papers. Role of research ethics. Financial, legal, regulatory oversight on research/other topics. prereq: College-level biology

BIOL 3002. Plant Biology: Function. (2 cr.; Student Option; Every Spring)
How plants make/use food. Mineral function/uptake. Water relations. Transport processes. Growth/development. prereq: [1002 or 1009 or 2003 or equiv], [CHEM 1011 or one semester chemistry with some organic content]

BIOL 3004. Foundations of Biology for Biological Sciences Majors, Part II Laboratory. (3 cr.; A-F only; Every Fall & Spring)
Accompanies 2003. Students design and perform research projects that will require an additional 4-6 hours of lab work per week; times to be arranged. Each section is devoted to either Pseudomonas adaptive radiation, zebrabish environmental toxicology, or microbiome/bioinformatics research. If you have taken BIOL 2002 before Fall 2015 you should register for a Pseudomonas or zebrabish research project; only students with previous command line coding experience should apply for a bioinformatics research project. All projects involve relationships between biology and other sciences, and applying quantitative skills, scientific method, and modern biological tools to real-world questions. prereq: [2002 or 2024H or CBS major]

BIOL 3004H. Foundations of Biology for Biological Sciences Majors, Part II Laboratory. (3 cr.; A-F only; Every Fall & Spring)
Accompanies 2003H. Students design/perform research projects. Relationship between biology and other sciences. Applying quantitative skills, scientific method, and modern biological tools to real-world questions. prereq: [2002 or 2002H], honors

BIOL 3005W. Plant Function Laboratory. (Wi; 2 cr.; Student Option; Every Spring)
Various plant processes at subcellular, organ, whole plant levels. Lab, recitation. prereq: Concurrent enrollment 3002

BIOL 3007W. Plant, Algal, and Fungal Diversity and Adaptation. (Wi; 4 cr.; Student Option; Every Fall)
Evolution/diversity of plants. Their adaptations for survival in varied environments. Includes lab, prerequisite: One semester college biology, CHEM 1021

BIOL 3020. Molecular Biology and Society. (TS; 3 cr.; S-N only; Every Fall, Spring & Summer)
An in-depth analysis of molecular biology topics and methods related to the Central Dogma of modern biology. Successful completion of this course is required as the prerequisite for most upper-level CBS courses. prereq: Biol 1009 or 2002, and Chem 1062

BIOL 3209. Understanding the Evolution- Creationism Controversy. (CIV; 3 cr.; A-F only; Every Fall & Spring)
Aspects of evolution-creationism controversy, including its history, legacy, relevance, and key people. Court decisions, public opinion, and related issues (e.g., racism, politics). prereq: 1009 or 1002 or 2003 or equiv

BIOL 3211. Physiology of Humans and Other Animals. (3 cr.; Student Option; Every Fall & Spring)
Ways different animals solve similar physiological problems. prereq: [1009 or 2003 or equiv], [CHEM 1021 or 1061], [2005 is recommended]

BIOL 3270. Introduction To Systems Biology. (3 cr.; A-F only; Every Spring)
Emergent properties of metabolic networks; Computational modeling of metabolism; Parameter estimation from high-throughput measurements; Prediction of metabolic phenotypes for knockout mutants; Flux balance analysis; Metabolic control analysis. prereq: Recommended prereq MATH1241, BIOL3021

BIOL 3272. Applied Biostatistics. (3 cr.; A-F only; Every Fall)
Conceptual basis of statistical analysis. Statistical analysis of biological data. Data visualization, descriptive statistics, significance tests, experimental design, linear model, simple/multiple regression, general linear model. Lectures, computer lab. prereq: High school algebra; 2003 recommended

BIOL 3302. Leadership For Change. (1 cr.; S-N only; Every Fall & Spring)
Practice of leading change. Students create vision for change initiative, develop/implement action plan, and evaluate outcomes of their work within a project focused on areas of professional interest. prereq: 1301, 2301, CBS dean's scholar

BIOL 3303. Peer Leadership Practicum. (1 cr.; S-N only; Every Fall)
This course teaches theoretical frameworks, principles, and practices of effective peer leadership. As a Dean’s Scholars Peer Mentor, you are in a peer leadership role that requires you to serve as a support, resource, connection, and bridge between first year students and their campus experience. This course will teach you in-depth, academic frameworks about the theory behind peer leadership; how it impacts the college student experience, why it works, and tools and practices that distinguish role modeling from exceptional peer leadership. The course also offers a learning laboratory for you to reflect and synthesize various aspects of your student leadership experience with a community of fellow leaders.

BIOL 3503. Biology of Aging. (2 cr.; A-F only; Periodic Fall)
Age-related changes in individuals/populations. Evolution of senescence. Genes that influence aging. Interventions. Prospects for an aging human society. prereq: 1002 or 1009 or 2003 or equiv

BIOL 3600. Directed Instruction. (1-3 cr.; Student Option; Every Fall & Spring)
Students assist with biology colloquium. prereq: 1020, upper div, application, instr consent; up to 4 cr may apply to major

BIOL 3610. Internship: Professional Experience in Biological Sciences. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Matches student's academic or career goals with opportunities in industry, non-profit organizations, and government agencies. Prereq-Acceptance into CBS Internship Program, internship workshop, college consent.

BIOL 3700. Undergraduate Seminar. (1-3 cr.; S-N or Audit; Every Fall & Spring)
Faculty members lead students in discussions on topics of interest.

BIOL 3807. Ecology. (4 cr.; A-F or Audit; Every Summer)
Population growth/interactions. Ecosystem function applied to ecological issues. Regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, biodiversity. Lab, field work, prereq: [One semester college biology], [MATH 1142 or MATH 1271 or MATH 1281 or equiv]

BIOL 3809. Evolution In Lab and Field. (4 cr.; A-F or Audit; Every Summer)
Foundations of evolutionary biology. Experimental evolution with model organism in lab. Context-dependent evolutionary stable strategies in field. Pose own evolution-related hypothesis, based on natural phenomena at Itasca State Park field setting. Observational or experimental test of hypothesis. prereq: Introductory Biology with laboratory, college-level math

BIOL 3811. Introduction to Animal Behavior. (4 cr.; A-F or Audit; Every Summer)
Biological study of animal behavior. Mechanism development, function, evolution. Emphasizes evolution of adaptive behavior, social behavior in natural environment. Lab, field work. prereq: 1002 or 1009 or 2003 or equiv or instr consent

BIOL 3960H. Communicating in the Biological Sciences. (1 cr.; A-F only; Every Fall)
Oral reports on topics of current interest to biologists. Progress reports on lab and field research by students.
BIOL 4003. Genetics. (3 cr.; Student Option; Every Fall, Spring & Summer) Genetic information, its transmission from parents to offspring, its expression in cells/organisms, and its course in populations. prereq: [BIOC 3021 or BIOC 4331], any CBS major or major in [animal science or applied plant science or BA biology or BA microbiology or nutrition or physiology or biology/society/environment or biomedical engineering] or Grad MBS major] or instr consent

BIOL 4004. Cell Biology. (3 cr.; Student Option; Every Fall, Spring & Summer) Processes fundamental to cells. Emphasizes eukaryotic cells. Assembly/function of membranes/organelles. Cell division, cell form/movement, intercellular communication, transport, secretion pathways. Cancer cells, differentiated cells. prereq: 4003, [BIOC 3021 or BIOC 4331], [CBS major or CSE major or grad MBS major]


BIOL 4201. Teaching in the Biology Laboratory. (1 cr.; max 2 cr.; S-N only; Every Fall & Spring) Pedagogical underpinnings for teaching in lab. prereq: Student who is teaching in CBS lab course

BIOL 4321W. Deconstructing Research: Writing about Biological Research for Non-scientists. (WI; 2 cr.; Student Option; Every Spring) Deconstructing Research is designed to help majors in the College of Biological Sciences improve their skills in selecting primary research papers, understanding the experimental approaches taken by the authors of those papers, and evaluating the results and conclusions. Students will then share that knowledge by writing effective deconstructions that explain the research approaches and results for different audiences, including the public at large, prereq: (Biol 2002 or 2002H) and Biol 2003 and Biol 2004

BIOL 4590. Coral Reef Ecology. (2 cr.; A-F only; Every Fall) Contemporary issues in tropical reef ecology from diverse perspectives. Option of two-credit seminar during fall semester plus additional two-credit field option (BIOL 4596) to involve SCUBA diving/snorkeling on tropical reef. prereq: Introductory biology course with lab

BIOL 4596. Coral Reef Ecology (Dive Trip). (2 cr.; A-F only; Every Fall) SCUBA diving/snorkeling on tropical reef. Conduct primary research/writing. prereq: Introductory biology with lab, valid passport, and SCUBA certification.

BIOL 4793W. Directed Studies: Writing Intensive. (WI; 1-6 cr. [max 36 cr.]; S-N only; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature or literature on biology education. prereq: instr consent, dept consent

BIOL 4794W. Directed Research. (WI; 1-6 cr. [max 36 cr.]; S-N only; Every Fall, Spring & Summer) Lab or field investigation of selected areas of research. prereq: instr consent, dept consent

BIOL 4850. Special Topics in Biology. (1-5 cr. [max 10 cr.]; A-F only; Periodic Summer) Offered at Itasca Biological Station and Laboratories. Metagenomics, telemetry/animal behavior, aquatic botany, field evolution, parasite and disease ecology. prereq: Beginning biology

BIOL 4950. Special Topics in Biology. (1-4 cr. [max 12 cr.]; Student Option; Periodic Spring) In-depth study of special topic in life sciences.

BIOL 4960H. Thesis Writing in the Biological Sciences: Developing the Literature Review. (1 cr.; A-F only; Every Fall) Develop and refine literature review component of honors thesis. Conceptualizing, drafting, and revision process. Give and receive formative feedback. Unpack conventions of scientific writing. Develop at least one draft module of each data-related thesis section.

BIOL 4961H. Thesis Writing in the Biological Sciences: Conveying and Contextualizing Results. (1 cr.; A-F only; Every Fall) Continue work in Biol 4960H to develop/ draft/revise results/methods/discussion sections of honors thesis. Prepare and present professional research poster. Complete thesis assessed against standards outlined in CBS Thesis Assessment Rubric. prereq: honors, CBS student or interdisciplinary major with life sciences focus

BIOL 4993. Directed Studies. (1-6 cr. [max 36 cr.]; S-N only; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature or literature on biology education. prereq: instr consent, dept consent

BIOL 4994. Directed Research. (1-6 cr. [max 36 cr.]; S-N only; Every Fall, Spring & Summer) Lab or field investigation of selected areas of research. prereq: instr consent, dept consent

BIOL 5272. Applied Biostatistics. (3 cr.; A-F only; Every Fall) Conceptual basis of statistical analysis. Statistical analysis of biological data. Data visualization, descriptive statistics, significance tests, experimental design, linear model, simple/multiple regression, general linear model. Lectures, computer lab. prereq: One semester of college-level [(calculus or statistics or computer programming), general biology]

BIOL 5309. Molecular Ecology And Ecological Genomics. (3 cr.; Student Option; Fall Even Year) Application of molecular tools (PCR, sequencing, AFLP, SNPs, OTL) and analyses of molecular data for understanding ecological/evolutionary processes. Strengths/weaknesses of techniques/analyses. Questions molecular tools are used to answer; prereq: BIOL 3407 or BIOL 3409 or BIOL 4003

BIOL 5407. Ecology. (3 cr.; Student Option; Every Fall & Spring) Principles of population growth/interactions and ecosystem function applied to ecological issues, including regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, and biodiversity. Lab. prereq: [One semester college biology, [MATH 1142 or MATH 1271 or MATH 1281 or equiv], grad student] or instr consent

BIOL 5409. Evolution. (3 cr.; Student Option; Every Fall) Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution. Examples of ongoing evolution in wild/domesticated populations and in disease-causing organisms. Lab. prereq: One semester of college biology, grad student

BIOL 5910. Special Topics in Biology for Teachers. (1-4 cr. [max 12 cr.]; Student Option; Every Spring & Summer) Courses developed for K-12 teachers depending on topics or subtopics which might include any of the following: plant biology, animal biology, genetics, cell biology, biochemistry, microbiology. prereq: BA or BS in science or science education or elementary education or K-12 licensed teacher

BIOL 5950. Special Topics in Biology. (1-4 cr. [max 8 cr.]; A-F only; Periodic Fall, Spring & Summer) In-depth study of special topic in life sciences.

BIOL 6793. Directed Studies. (1-7 cr.; Student Option; Every Fall, Spring & Summer) Individual study on selected topics/problems. Emphasizes either readings/use of scientific literature or laboratory/field techniques. prereq: MBS, 7 cr max, instr consent

BIOL 6794. Directed Research. (1-7 cr.; S-N or Audit; Every Fall, Spring & Summer) Laboratory or field investigation of selected areas of research. prereq: MBS, instr consent

BIOL 6999. Capstone Project. (2 cr.; S-N or Audit; Every Fall, Spring & Summer) Independent, original investigation of a relevant subject, challenge, or issue within biological sciences. Project takes approximately 120 hours. prereq: MBS, instr consent

Biology, Society, and Environment (BSE)

BSE 2001. An Introduction to Biology, Society, and Environment. (2 cr.; A-F only; Every Fall & Spring) Intellectual threads and faculty for courses in BSE major, especially social sciences. Content varies. prereq: BSE major. Must be completed prior to senior year.
**BSE 3361W. Geography and Public Policy.** (WI; 3 cr.; Student Option; Every Fall) Nature/effects of federal policy in United States. How documents produced as policy are crafted/implemented. Policies relating to food/ agriculture, forestry, wildlife, transportation.

**BSE 3996. Senior Project Directed Research.** (3-4 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer) Individual guided research course taken in fulfillment of BSE senior project requirement. Prereq-instr consent, dept consent, college consent.

**BSE 3996H. Honors: Senior Project Directed Research.** (1-3 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer) Individual guided research course taken in fulfillment of BSE senior project requirement. Prereq-instr consent, dept consent, college consent.

**BSE 3997. Senior Project.** (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer) Senior Project add-on credit. Must be taken concurrently with "BSE Core" or "BSE Theme Elective" course related to area of specialization. Prereq-instr consent, dept consent, college consent.

**BSE 3997H. Honors: Senior Project.** (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer) Senior Project add-on credit. Must be taken concurrently with "BSE Core" or "BSE Theme Elective" course related to area of specialization. Prereq-instr consent, dept consent, college consent.

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**Biomedical Engineering (BMEN)**

**BMEN 1601. Biomedical Engineering Undergraduate Seminar I.** (1 cr.; A-F only; Every Fall) Introduction to biomedical engineering from academic/industrial perspectives. Survey of current/emerging areas. prereq; CSE student

**BMEN 1602. Biomedical Engineering Undergraduate Seminar II.** (1 cr.; A-F only; Every Spring) Continuation of 1601. Emphasizes biomedical engineering design and numerical analysis. prereq; CSE student

**BMEN 2101. Biomedical Thermodynamics.** (3 cr.; A-F only; Every Spring) Introduction to thermodynamics with biological emphasis. First Law, Boltzmann distribution, reaction equilibrium, random walks, friction, diffusion in fluids, entropy, free energy, Maxwell relations, phase equilibria, chemical forces, self-assembly, cooperative transitions, molecular machines, membranes. Introduction to statistical mechanics. prereq; 2501, CHEM 1022, MATH 2373, concurrent registration is required (or allowed) in MATH 2374

**BMEN 2401. Programming for Biomedical Engineers.** (2 cr.; A-F only; Every Fall) Introduction to structured programming in biomedical engineering. Development of programming skills/logic relevant for numerical methods used for analyzing biomedical signals and solving algebraic/differential equations using Matlab. Programming logic/structured programming, introduction to scientific computation motivated by signal representations. Weekly lecture, computer lab modules, prereq; MATH 1272, PHYS 1302, CSE student

**BMEN 2501. Cellular and Molecular Biology for Biomedical Engineers.** (BIOL; 4 cr.; A-F or Audit; Every Fall) Fundamentals of cellular/molecular biology. Chemistry of proteins, lipids, and nucleic acids. Applications to biomedical engineering. Function/dynamics of intracellular structures and differentiated animal cells. Application of physical/chemical fundamentals to modeling cellular/subcellular processes. Lecture/lab. prereq: concurrent registration is required (or allowed) in CHEM 1022, concurrent registration is required (or allowed) in MATH 1372, concurrent registration is required (or allowed) in PHYS 1302, CSE student

**BMEN 3011. Biomechanics.** (3 cr.; A-F or Audit; Every Fall) Statics, dynamics, deformable body mechanics applied to biological/biomedical problems. Mechanical properties of biological/commonly used biomedical engineering materials. Techniques for numerical solution of biomechanics problems. Lecture/Discussion. prereq; BMES Upper Div or dept consent

**BMEN 3015. Biomechanics Lab.** (1 cr.; A-F or Audit; Periodic Fall) Lab accompanies BMEn 3011 Biomechanics. prereq: BMES UD or dept consent, concurrent registration is required (or allowed) in 3011

**BMEN 3111. Biomedical Transport Processes.** (3 cr.; A-F or Audit; Every Spring) Principles of momentum, heat, mass transfer illustrated with applications in physiological processes. Fluid mechanics, heat condition, mass diffusion, convection. Lecture. prereq; [3011, 3015]. [BMEN upper div or dept consent]

**BMEN 3115. Biomedical Transport Processes Lab.** (1 cr.; A-F or Audit; Every Spring) Lab accompanies BMEn 3111 Biomedical Transport Processes. prereq; [3011, concurrent registration is required (or allowed) in 3111]. [BMEN upper div or dept consent]

**BMEN 3211. Bioelectricity and Bioinstrumentation.** (3 cr.; A-F or Audit; Every Fall) Principles of electrical phenomena, instruments relevant to biomedical applications. Lecture/discussion. prereq; BMES Upper Div or dept consent

**BMEN 3215. Bioelectricity and Bioinstrumentation Lab.** (1 cr.; A-F or Audit; Periodic Fall) Lab accompanies BMEn 3211 Bioelectricity/ Bioinstrumentation. prereq; [BMEN Upper Div or dept consent], concurrent registration is required (or allowed) in 3211


**BMEN 3315. Biomaterials Lab.** (1 cr.; A-F or Audit; Every Spring) Lab accompanies BMEn 3311 Biomaterials. prereq; [2101, concurrent registration is required (or allowed) in 3311], [BMEN Upper Div or dept consent]

**BMEN 3411. Biomedical Systems Analysis.** (3 cr.; A-F or Audit; Every Spring) Quantitative analysis of physiological/biological systems. First/second order systems, linear time-invariant systems, systems classification/identification. Linear control theory/controller synthesis. Electrical, mechanical, thermal, chemical/biomedical control systems. prereq; 3211, [BMEN Upper Div or dept consent]

**BMEN 3415. Biomedical Systems Analysis Lab.** (1 cr.; A-F or Audit; Every Spring) Lab accompanies BMEn 3411 Biomedical Systems Analysis. prereq; [3211, concurrent registration is required (or allowed) in 3411], [BMEN Upper Div or dept consent]

**BMEN 3601. Biomedical Engineering Careers and Practice in the Med Tech Industry.** (1 cr.; A-F only; Every Spring) Local industry speakers describe various job roles available to BBMEn graduates at graduation. Input from Career Center on internship/job searching/interviewing. Exposure to other aspects of the medical devices industry (e.g. failure mode analysis, tolerancing, reading/interpreting clinical literature, etc).

**BMEN 4001W. Biomedical Engineering Design I.** (WI; 3 cr.; A-F or Audit; Every Fall) Design/analysis of biomedical devices/technologies. Students work in teams on open ended design project, present completed work at design show. prereq; 2501, 3001, 3101, 3201, 3301, 3701

**BMEN 4002W. Biomedical Engineering Design II.** (WI; 3 cr.; A-F or Audit; Every Spring) Continuation of 4001W. prereq; 4001W

**BMEN 4011. CAD/CAE of Bioelectrical Devices.** (1 cr.; A-F or Audit; Every Fall) Simulation, analysis, design of industry common Bioelectrical Devices with using CAD software. Altium Designer CAD/LT Spice. prereq; [3211, 3215] or instr consent

**BMEN 4013. CAD of Biomechanical/transport Devices.** (1 cr.; A-F or Audit; Every Fall) Introduction to CAD modeling/analysis for medical device engineers using SOLIDWORKS CAD platform. Emphasis on practical applications of CAD for engineers using real-world examples from actual industry projects. prereq; BMES Upper Division or inst consent

**BMEN 4015. CAE of Biomechanical/transport Devices.** (1 cr.; A-F or Audit; Every Fall)
Analyze transport/mechanical problems involving biomedical engineering/medical devices. prereq: 3011, 3015, 3111, 3115

BMEN 4710. Directed Research. (1-4 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Independent laboratory research under faculty supervision. prereq: instr consent, dept consent

BMEN 4720. Directed Study. (1-4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Directed study under faculty supervision. prereq: instr consent, dept consent

BMEN 4794H. Directed Research Honors. (1-4 cr. [max 24 cr.]; A-F only; Every Fall, Spring & Summer)
Independent laboratory research under faculty supervision. prereq: BME UD, UHP student, instr consent, dept consent

BMEN 4896. Industrial Assignment I: Co-op Program. (2 cr.; A-F only; Every Fall)
Industrial assignment in co-op program. Formal written report on assignment. prereq: BMEn upper div, completion of required courses in BMEn prog through spring sem of 3rd yr, registered in co-op prog

BMEN 4996. Industrial Assignment II: Co-op Program. (3 cr.; A-F only; Every Spring)
Industrial Assignment in co-op program. Formal written final report on assignment. Oral presentation. prereq: 4896, registration in co-op prog

BMEN 5001. Advanced Biomaterials. (3 cr.; A-F or Audit; Every Fall)
Commonly used biomaterials. Chemical/physical aspects. Practical examples from such areas as cardiovascular/orthopedic applications, drug delivery, and cell encapsulation. Methods used for chemical analysis and for physical characterization of biomaterials. Effect of additives, stabilizers, processing conditions, and sterilization methods. prereq: 3301 or MatS 3011 or grad student or instr consent

BMEN 5041. Tissue Engineering. (3 cr.; Student Option; Every Fall)
Fundamentals of wound healing and tissue repair; characterization of cell-matrix interactions; case study of engineered tissues, including skin, bone marrow, liver, vessel, and cartilage; regulation of biomaterials and engineered tissues. prereq: CSE upper div or grad student or med student or instr consent

BMEN 5101. Advanced Bioelectricity and Instrumentation. (3 cr.; Student Option; Periodic Spring)
Instrumentation, computer systems, and processing requirements for clinical physiological signals. Electrode characteristics, signal processing, and interpretation of physiological events by ECG, EEG, and EMG. Measurement of respiration and blood volume/flow. prereq: [CSE upper div, grad student] or instr consent

BMEN 5111. Biomedical Ultrasound. (3 cr.; Student Option; Every Spring)
Introduction to biomedical ultrasound, including physics of ultrasound, transducer technology, medical ultrasound imaging, photocoustic imaging, applications of non-linear acoustics, and high-intensity ultrasound. prereq: [PHYS 1302 or equiv], [MATH 2374 or equiv] or instr consent

BMEN 5151. Introduction to BioMEMS and Medical Microdevices. (2 cr.; A-F or Audit; Every Spring)
Design/microfabrication of sensors, actuators, drug delivery systems, microfluidic devices, and DNA/protein microarrays. Packaging, biocompatibility, ISO 10993 standards. Applications in medicine, research, and homeland security. prereq: CSE sr or grad student or medical student

BMEN 5201. Advanced Biomechanics. (3 cr.; Student Option; Periodic Fall & Spring)
Introduction to biomechanics of musculoskeletal system. Anatomy, tissue material properties. Kinematics, dynamics, and control of joint/limb movement. Analysis of forces/motions within joints. Application to injury, disease. Treatment of specific joints, design of orthopedic devices/implants. prereq: [3501 or equiv]. [CSE upper div or grad student] or instr consent

BMEN 5311. Advanced Biomedical Transport Processes. (3 cr.; Student Option; Every Spring)

BMEN 5321. Microfluidics in Biology and Medicine. (3 cr.; A-F or Audit; Every Fall)
Fundamentals of microfluidics. Fluid mechanics/transport phenomena in microscale systems. Pressure/surface driven flows. Capillary forces, electrokinetics, hydraulic circuit analysis. Finite element modeling for microfluidic devices. Design/fabrication methods for microfluidic devices. prereq: [3111, AEM 4201, ChEn 4005, [ME 3331 or ME 3332 or CSE grad student or instr consent]

BMEN 5351. Cell Engineering. (3 cr.; Student Option; Periodic Fall & Spring)
Engineering approaches to cell-related phenomena important to cell/tissue engineering. Receptor/ligand binding. Trafficking/signaling processes. Applications to cell proliferation, adhesion, and motility. Cell-matrix interactions. prereq: [2401, [2501 or concurrent registration is required (or allowed) in 5501], [MATH 2243 or MATH 2373] or CSE upper div or grad student or instr consent

BMEN 5401. Advanced Biomedical Imaging. (3 cr.; A-F or Audit; Every Fall)
Functional biomedical imaging modalities. Principles/applications of technologies that offer high spatial/temporal resolution. Bioelectromagnetic and magnetic resonance imaging. Other modalities. prereq: CSE upper div or grad student or instr consent

BMEN 5411. Neural Engineering. (3 cr.; Student Option; Every Fall)
Theoretical basis. Signal processing techniques. Modeling of nervous system, its response to stimulation. Electrode design, neural modeling, cochlear implants, deep brain stimulation. Prosthetic limbs, micrturbation control, prosthetic vision. Brain machine interface, seizure prediction, optical imaging of nervous system, place cell recordings in hippocampus. prereq: 3401 recommended

BMEN 5412. Neuromodulation. (3 cr.; A-F or Audit; Every Fall)
Fundamentals of bioengineering approaches to modulate the nervous system, including bioelectricity, biomagnetism, and optogenetics. Computational modeling, design, and physiological mechanisms of neuromodulation technologies. Clinical exposure to managing neurological disorders with neuromodulation technology.

BMEN 5413. Neural Decoding and Interfacing. (3 cr.; A-F or Audit; Every Spring)
Neural interface technologies currently in use in patients as well as the biological, neural coding, and hardware features relating to their implementation in humans. Practical and ethical considerations for implanting these devices into humans. prereq: 5411, [3201 or 3401 or equiv recommended]

BMEN 5421. Introduction to Biomedical Optics. (3 cr.; A-F or Audit; Periodic Spring)
Biomedical optical imaging/sensing principles, laser-tissue interaction, detector design, noise analysis, interferometry, spectroscopy. Optical coherence tomography, polarization, birefringence, flow measurement, fluorescence, nonlinear microscopy. Tours of labs. prereq: CSE sr or grad student

BMEN 5501. Biology for Biomedical Engineers. (3 cr.; Student Option; Periodic Fall & Spring)
Concepts of cell/tissue structure/function. Basic principles of cell biology. Tissue engineering/artificial organs. prereq: Engineering upper div or grad student

BMEN 5507. Cancer Bioengineering. (3 cr.; A-F or Audit; Every Fall)
Cancer-specific cell, molecular/genetics events. Quantitative applications of bioinformatics/systems biology, optical imaging, cell/matrix mechanics. Drug transport (with some examination of design of novel therapeutics). prereq: [Upper division CSE undergraduate, CSE graduate student] or instr consent

BMEN 5910. Special Topics in Biomedical Engineering. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Special topics in biomedical engineering.

BMEN 5920. Special Topics in Biomedical Engineering. (1-3 cr. [max 6 cr.]; Student Option; Every Fall)
Special topics in biomedical engineering.

BMEN 8001. Polymeric Biomaterials. (3 cr.; A-F or Audit; Every Spring)
Introduction to polymeric biomaterial research. Molecular engineering, characterization of properties, material-cell interaction, biocompatibility/bioactivity. Applications in
biology and medicine. prereq: [5001, [CHEN 4214 or MATS 4214 or equiv]] or instr consent

BMEN 8041. Advanced Tissue Engineering Lab. (3 cr. ; A-F or Audit; Every Spring) Tissue engineering refers to the generation of biological substitutes to restore, maintain or improve tissue function. Toward this end, tools and knowledge from several disciplines might be applied including biological sciences (molecular, cellular and tissue anatomy and physiology), engineering (transport phenomena, material science, mechanical characterization) and biotechnology (cell culture, gene transfer, metabolomics). This course will cover some introductory and advanced lab techniques used in tissue engineering.

BMEN 8101. Biomedical Digital Signal Processing. (3 cr. ; A-F or Audit; Every Fall) Signal processing theory for analyzing real world digital signals. Digital signal processing and mathematically derived algorithms for analysis of stochastic signals. Spectral analyses, noise cancellation, optimal filtering, blind source separation, beamforming techniques. prereq: ([MATH 2243 or MATH 2373], [MATH 2263 or MATH 2374]) or equiv

BMEN 8201. Advanced Tissue Mechanics. (3 cr. ; A-F or Audit; Every Spring) Tissues exist in dynamic mechanical environments where they must maintain a fine balance between applied loads and internal tension. Active adaptability of biological materials can significantly complicate measurement of their mechanical behavior. This course will cover fundamental continuum approaches for determining the complex stress states of actively responsive tissues as well as the force-feedback relationships that drive early development and allow mature tissues to maintain mechanical equilibrium. Topics will include theoretical approaches for active force generation, soft tissue finite growth, extracellular matrix remodeling, and constrained mixtures. These methods are applicable to a wide range of biomechanical systems. In this course, they will be applied to mechanics of two model systems: arterial growth and remodeling in hypertension and sheet folding in early organogenesis and morphogenesis. prereq: 3011 or AEM 2021 or equiv

BMEN 8333. FTE: Master’s. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

BMEN 8334. Laboratory Neuroengineering. (3 cr. ; max 6 cr.) ; S-N only; Every Fall, Spring & Summer) Lab rotation in neuroengineering. prereq: Grad student in CSE or neuroscience

BMEN 8335. Neuroengineering Practicum. (3 cr. ; max 6 cr.) ; A-F only; Every Spring) Topics/issues in neuroengineering. Ethics, professional conduct, conflicts, plagiarism, copyright, authorship, research design considerations, IRB, intellectual properties, review process, professional presentations, proposal writing. prereq: PhD student in BMEn, EE, ME, or NSci or instr consent

BMEN 8381. Bioheat and Mass Transfer. (3 cr. ; Student Option; Periodic Spring) Analytical/numerical tools to analyze heat/ mass transfer phenomenon in cryobiological, hyperthermic, other biomedically relevant applications. prereq: CSE grad student, upper div transport/fluids course; [physics, biology] recommended

BMEN 8401. New Product Design and Business Development. (4 cr. ; A-F or Audit; Every Fall) Student teams work with CSE and CSOM faculty and company representatives to develop a product concept for sponsoring company. Assignments include concept/detail design, manufacturing, marketing, introduction strategy, profit forecasting, production of product prototype. prereq: BME graduate student, some design experience; 8401, 8402 must be taken same yr

BMEN 8421. Biophotonics. (3 cr. ; A-F or Audit; Every Spring) Understanding light microscopy and the interaction of light with biological materials is widely applicable to numerous research programs. In fact, it is a fundamental approach to addressing critical questions at the cellular and subcellular scales. This course will emphasize the fundamentals of light microscopy and microscopes, fundamentals of fluorescence and fluorescence microscopy (transitions, quantum yield, bleaching, lifetime etc.) and practical applications of fluorescence microscopy (confocal microscopy for optical sectioning, multiphoton microscopy, harmonic generation, FRET, FRAP, and fluorescence lifetime in the time and frequency domains). Course material will span theory, practical applications of microscopy and published literature. prereq: Graduate students in physical sciences (engineering, physics, chemistry etc.), or graduate students with an undergraduate degree in the physical sciences or mathematics, or consent of instructor. In addition to previous coursework in engineering and/or physics, a working understanding of microscopy is recommended. Although not required, concurrent or previous enrollment in BMEn 5421 (Biomedical Optics) is recommended.

BMEN 8431. Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models. (4 cr. ; A-F or Audit; Every Spring) Physical, chemical, physiological, mathematical principles underlying design of delivery systems for drugs. Small molecules, proteins, genes. Temporal controlled release. prereq; Differential equations course including partial differential equations or instr consent

BMEN 8444. FTE: Doctoral. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

BMEN 8501. Dynamical Systems in Biology. (3 cr. ; A-F or Audit; Every Fall) Nonlinear dynamics with specific emphasis on behavior of excitable systems (neurons/ cardiac myocytes). prereq: Grad student in engineering or physics or math or physiology or neuroscience

BMEN 8502. Physiological Control Systems. (3 cr. ; A-F only; Every Fall) Simulation, identification, and optimization of physiological control systems. Linear and non-linear systems analysis, stability analysis, system identification, and control design strategies, including constrained, adaptive, and intelligent control. Analysis and control of physiological system dynamics in normal and diseased states. prereq: 8101 or equiv

BMEN 8511. Systems and Synthetic Biology. (3 cr. ; A-F or Audit; Every Fall) Systems/synthetic biology methods used to characterize/engineer biological systems at molecular/cellular scales. Integration of quantitative experimental approaches/ mathematical modeling to elucidate biological design principles, create new molecular/cellular functions.

BMEN 8601. Biomedical Engineering Seminar. (1 cr. ; S-N or Audit; Every Fall) Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.

BMEN 8602. Biomedical Engineering Seminar. (1 cr. ; S-N or Audit; Every Spring) Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.

BMEN 8630. Biomedical Engineering Graduate Student Seminar. (1 cr. ; max 3 cr.) ; S-N or Audit; Periodic Fall) Student presentations of current thesis research or other areas of biomedical engineering. prereq: Grad BMEn major

BMEN 8666. Doctoral Pre-Thesis Credits. (1-6 cr. ; max 12 cr.) ; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BMEN 8710. Directed Research. (1-3 cr. ; Student Option; Every Fall, Spring & Summer) TBD

BMEN 8720. Internship in Biomedical Engineering. (1-3 cr. ; max 6 cr.) ; S-N or Audit; Every Fall, Spring & Summer)
Supervised lab or industrial experience unrelated to student's normal academic or employment experience. prereq: Grad BMEn major

BMEN 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

BMEN 8820. Plan B Project. (2-3 cr. ; Student Option; Every Fall, Spring & Summer) Project chosen by student and adviser to satisfy M.S. Plan B project requirement. Written report required, prereq: BMEN MS student

BMEN 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral, prereq: PhD student in biomedical engineering; max 14 cr per semester or summer; 24 cr required

BMEN 8900. Special Topics in Biomedical Engineering. (1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring) Topics in biomedical engineering.

BMEN 8910. Independent Study. (1-3 cr. ; Student Option; Every Fall, Spring & Summer) Research or study of a topic determined by interests of student in consultation with faculty supervisor. Requires approval by faculty supervisor and director of graduate studies. prereq: Grad BMEn major

Biomedical Science (BMSC)

BMSC 8990. Research: Biomedical Sciences. (1-7 cr. [max 42 cr.] ; S-N or Audit; Periodic Fall) Content determined by interest of student in consultation with staff. prereq: Enrollment in MD/PhD program

Bioproducts and Biosystems Eng (BBE)

BBE 1001. Bioproducts and Biosystems Engineering Orientation. (1 cr. ; S-N or Audit; Every Fall) Academic programs/careers related to bioproducts and biosystems engineering. Required field trip.

BBE 1002. Biorenewable Resources. (TS; 3 cr. ; A-F or Audit; Every Spring) Environmental/social impacts of materials used to make a product. Biorenewable resources, using wood and agriculture-based biomass. Environmental, technological, social, and economic implications of the use of these resources.

BBE 194W. Freshman Seminar. (TS;WI; 3 cr. ; Student Option; Periodic Fall) Issues/topics related to natural resources and the environment. Topics vary each semester. prereq: Fr

BBE 2001. Mechanics and Structural Design. (4 cr. ; A-F or Audit; Every Fall) Fundamental treatment of statics, dynamics, and principles of structural design. Techniques for individual components, including trusses, beams, and columns. Using conventional lumber products, engineered wood products, and steel. Lab. prereq: [MATH 1272 or MATH 1372], [PHYS 1101 or PHYS 1301]

BBE 2002. Introduction to Engineering Design. (3 cr. ; A-F only; Every Fall) Identify, formulate, develop/open-ended designs in bioproducts & biosystems engineering at the conceptual level; engineering economics principles, safety/health considerations, and ethics for design project. Written, graphical, and oral presentations. prereq: [MATH 1271 or MATH 1371], CHEM 1021, BBE lower div (soph) or upper div (jr), freshman writing req) or instr consent

BBE 2021. Renewable Energy and the Environment. (TS; 3 cr. ; Student Option; Every Fall, Spring & Summer) Tired of high energy bills? Should you be investing in solar energy? Are you wondering what the connection is between climate and energy? What is wrong with our current energy system? What really is "renewable energy"? Can algae really be used for fuel? These and so many more topics are part of the discussion in this course. Throughout the semester we will cover various elements of renewable energy such as the technologies, relevant policies, and the social, environmental, and economic effects of using renewable and non-renewable sources. This course is completely online. Please check out the course website for more information and to find out what students have to say about it. bbe2021.cfans.umn.edu

BBE 3012. Transport in Biological Processes I. (4 cr. ; A-F only; Every Fall) Introduction to fluid mechanics. Fluid statics/kinematics. Differential/finite control volume analysis with continuity, momentum, energy equations. Bernoulli/Euler Equation. Dimensional analysis. Potential flow. Non-Newtonian Fluids. Applications to biological fluids/biological systems. prereq: 2001, 3033, [MATH 2373 or equiv], [MATH 2374 or equiv], [PHYS 1302W or equiv] or instr consent

BBE 3013. Engineering Principles of Molecular and Cellular Processes. (3 cr. ; A-F or Audit; Every Fall) Applied engineering in biological processes. Classification of microbes of industrial importance. Parameters for cellular control. Modeling of cell growth/metabolism, enzymatic catalysis, bioreactor design, product recovery operations design. Case studies. prereq: BIOL 1009, [current registration is required (or allowed) in CHEM 1062 or allowed], [current registration is required (or allowed) in CHEM 1066 or equiv], [MATH 1372 or equiv], [BIOL 2011 or CHEM 2301], or instr consent

BBE 3023. Ecological Engineering Principles. (3 cr. ; Student Option; Every Fall) Physical, thermal, texture, strength, moisture properties of soil. Saturated/unsaturated moisture movement. Quantitative descriptions of mass/energy flux/storage in ecosystems.

Distribution of vegetation in landscapes. Engineering/manufacture impacts on soil-water-plant systems. prereq: BIOL 1009, [3012 or concurrent registration is required (or allowed) in 3012] or instr consent

BBE 3033. Material and Energy Balances in Biological Systems. (3 cr. ; A-F or Audit; Every Spring) Basic principles of materials and energy balances, their applications in biological systems. prereq: [CHEM 1062 or equiv], [CHEM 1066, or equiv], [MATH 1372 or equiv], [PHYS 1302W or equiv]

BBE 3043. Biological and Environmental Thermodynamics. (3 cr. ; A-F or Audit; Every Spring) Laws of thermodynamics for energy, environmental and biological sciences. First/second laws of thermodynamics in representing phase change, biochemical reactions, metabolic cycles, and photosynthesis. prereq: BIOL 1009, [CHEM 1061 or equiv], [CHEM 1065, or equiv], [MATH 1372 or equiv], [PHYS 1302 or equiv]

BBE 3093. Directed Studies. (1-5 cr. ; Student Option; Every Fall & Spring) Independent study of topic(s) involving physical principles as applied to agricultural production and land resources. prereq: instr consent

BBE 3101. Introductory Statics and Structures for Construction Management. (3 cr. ; A-F or Audit; Every Fall & Spring) Statics, engineering wood design principles, mechanical properties of wood. Design techniques for individual components. Trusses, beams, columns. Using conventional lumber products, engineered wood products, and steel. Simple structures explored through examples, assignments. prereq: Working knowledge of [trigonometry, geometry, algebra]

BBE 3201. Sustainability of Food Systems: A Life Cycle Perspective. (GP; 3 cr. ; A-F only; Every Fall & Spring) Consequences of global food system. Diversity in food systems. Current topics in food sustainability.

BBE 3393. Directed Study. (1-3 cr. ; max 12 cr.) ; Student Option; Every Fall & Spring) Opportunity to pursue projects not available through independent study or extra credit. In consultation with an adviser, students develop a prospectus and complete progress reports and a final report on the project. prereq: instr consent

BBE 3396. Industry Assignment. (1 cr. ; A-F or Audit; Every Fall & Spring) Students participating in industrial or experiential learning assignment. Evaluation based on formal final report; coordinated with faculty and industry advisor.

BBE 3480. Special Topics. (1-4 cr. ; max 12 cr.) ; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

BBE 4001. Chemistry of Biomass and Biomass Conversion to Fuels and Products. (ENV; 4 cr. ; A-F or Audit; Every Fall) Chemistry of biomass and its sustainable utilization for biofuels and bioproducts.
including bio-based materials. Chemicals/energy and their environmental implications within the context of chemical principles and associated reactions underlying the structure, properties, processing, and performance of plant materials. prereq: CHEM 2301 or instr consent

BBE 4013. Transport in Biological Processes II. (3 cr.; A-F or Audit; Every Spring)
Application of thermodynamics, fluid flow, heat/mass transfer to design problems. Biological processes/materials at cell, organism, system level. Agricultural, environmental, food, bioprocess applications. Solution of equations involving computer programming assignments. prereq: 3012, 3043, [upper div CSE or instr consent]

BBE 4023W. Process Control and Instrumentation. (WI; 3 cr.; A-F or Audit; Every Fall)
Measurement of motion, force, pressure, flow, temperature, size, shape, color, texture, rheology, moisture, water mobility, fat, and pH. Linking physical and biological control systems. prereq: Upper div CSE or grad student

BBE 4030. Applied Surface and Colloid Science. (3 cr.; Student Option; Every Fall)
Introduction to surface/colloid science concepts. Surface tension, wetting, adsorption, capillarity. Formation/stability of sols, emulsions, and foams. Water solubility. Partition coefficients of organic species. Properties of both surfactants and water soluble polymers. Focuses on interdisciplinary applications. prereq: 3043 or BMEN 2101 or CHEM 3101 or CHEM 4501 or instr consent

BBE 4401. Bioproducts Separation and Purification Processes. (3 cr.; A-F or Audit; Every Fall)
Unit operations of bioproducts engineering/manufacture; separations and purification processes.

BBE 4402. Bio-based Products Engineering Lab I. (1 cr.; A-F or Audit; Every Fall)
Lab exercises in bio-based products engineering. prereq: 3033 and CHEM 2301, [jr or sr or instr consent]

BBE 4403. Bio-based Products Engineering Lab II. (1 cr.; A-F or Audit; Every Fall)
Lab exercises in bio-based products engineering. prereq: CHEM 2301, [jr or sr or instr consent]

BBE 4404. Biopolymers and Biocomposites Engineering. (3 cr.; A-F or Audit; Every Fall)
Structure/properties of biopolymers. Engineering of composites from these biopolymers or plant-based materials. prereq: [BBE/CSE upper division] or instr consent

BBE 4412W. Biocomposites and Biomass Energy. (WI; 4 cr.; Student Option; Every Spring)
Manufacturing processes, end-use applications of bio-based products. prereq: 1002, upper div BP

BBE 4413. Systems Approach to Residential Construction. (4 cr.; Student Option; Every Spring)
Dynamic/interrelated issues of energy, moisture control, indoor air quality in residential bldgs. Design, construction, and operational aspects for energy efficient, durable structure/healthy living environment. Interaction between moisture and wood products within building system. prereq: Upper div or instr consent

BBE 4414. Advanced Residential Building Science. (4 cr.; Student Option; Every Fall)
Theory, advanced applications for residential buildings. Focuses on heat/mass transfer. prereq: 2001

BBE 4416. Building Testing and Diagnostics. (2 cr.; Student Option; Every Spring)
Theoretical basis for performance testing. Diagnostics applications for residential structures. Existing structures, retrofit/remedial applications. Digital differential pressure gauges, blower doors, airflow hoods/grids, duct pressure testing, infrared thermography. Hands-on equipment use, problem solving. prereq: 4413

BBE 4418. Advanced Building Science: Applications. (3 cr.; A-F or Audit; Every Spring)
A capstone applications course, where students will learn how to apply key building science principles (from BBE 4414/5414: Advanced Building Science: Fundamentals) to common building enclosure and mechanical system problems. Students will be guided to develop both qualitative and quantitative solutions for many common energy, moisture, and indoor air quality problems facing contemporary buildings. prereq: BBE 4414 or BBE 5414

BBE 4491. Senior Topics: Independent Study. (1-4 cr.; Student Option; Every Fall & Spring)
Independent study in student's area of interest. prereq: sr, instr consent

BBE 4502W. BBE Capstone Design. (WI; 4 cr.; A-F or Audit; Every Spring)
Students develop, select, formulate, and complete an open-ended, comprehensive engineering process/product design project. This course should be taken during the last spring semester before graduation. prereq: 2002, sr

BBE 4523. Ecological Engineering Design. (3 cr.; A-F or Audit; Every Spring)
Application of ecological engineering to design of remediation systems. Artificial ecosystems, ecosystem/wetland restoration, constructed wetlands. Biological engineering for slope stability. Waste treatment. Restoring ecological service of watersheds. prereq: [CHEM 1022 or [CHEM 1082 or CHEM 1086], 3012, upper div CSE] or instr consent

BBE 4533. Sustainable Waste Management Engineering. (3 cr.; A-F or Audit; Spring Odd Year)
Sources/characteristics of agricultural wastes. Livestock, food processing, domestic wastes. Physical, biological, chemical, rheological, microbiological properties. Effects on environment. Collection, storage, treatment (aerobic/anaerobic), use/disposal. Land application. prereq: 3023, upper div CSE

BBE 4534. Impaired Waters. (3 cr.; A-F only; Every Fall)
Assessing impaired waters and developing TMDL for conventional pollutants. Preparing/communicating legal, social, and policy aspects. TMDL analysis of real-world impaired waters problem. Field trip to impaired waters site. prereq: Upper division CSE or CFANS or CBS student or instr consent

BBE 4605. Environmental and Industrial Microbiology. (3 cr.; A-F only; Every Fall)
Use of organisms in remediation of waste and pollution problems related to bio-based product industries. Types, characteristics, identification of useful microorganisms. Applications of microbes to benefit industrial processes of wood and fiber. prereq: [BIOL 1001 or BIOL 1009], CHEM 1011

BBE 4713. Biological Process Engineering. (3 cr.; A-F or Audit; Every Spring)
BBE 4723. Food Process Engineering. (3 cr.; A-F or Audit; Every Spring)
Material/energy balance, fluid dynamics, heat/mass transfer in refrigeration, freezing, psychrometrics, dehydation, evaporation, non-thermal processing, and separation. Development control for production of food products, prereq: [4013 or concurrent registration is required (or allowed) in 4013], upper div CSE or instr consent

BBE 4733. Renewable Energy Technologies. (TS; 3 cr.; A-F or Audit; Every Spring)

BBE 4744. Engineering Principles for Biological Scientists. (4 cr.; A-F or Audit; Every Fall)
Material/energy balances applied to processing systems. Principles of fluid flow, thermodynamics, heat, mass transfer applied to food and bioproduct unit operations such as pumping, heat exchange, refrigeration/ freezing, drying, evaporation, and separation. prereq: [Math 1142 or Math 1271], Phys 1101; intended for non engineering students

BBE 4801H. Honors Research. (2 cr.; A-F or Audit; Every Fall & Spring)
First semester of independent research project supervised by faculty member. prereq: BBE upper div honors, instr consent

BBE 4802H. Honors Research. (2 cr.; A-F or Audit; Every Fall & Spring)
Complete honors thesis. Oral report. prereq: BBE upper div honors, instr consent

BBE 4900. Intern Reports. (2 cr. [max 4 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Students participating in industrial or experiential learning assignment. Evaluation based on formal final report; coordinated with faculty and industry advisor. prereq: [CSE or CFANS] student in BBE, instr consent

BBE 5001. Chemistry of Biomass and Biomass Conversion to Fuels and Products. (4 cr.; A-F or Audit; Every Fall)
Chemistry of biomass. Sustainable utilization for biofuels/bioproducts. Bio-based materials, chemicals, energy. Environmental implications. Chemical principles/reactions underlying the structure, properties, processing, and performance of plant materials. prereq: Grad student or instr consent

BBE 5023. Process Control and Instrumentation. (3 cr.; Student Option; Every Fall)
Fundamental principles in system dynamics/ control. Emphasizes process systems and problems faced by process engineers. prereq: Grad student or instr consent

BBE 5095. Special Problems. (1-5 cr.; Student Option; Every Fall, Spring & Summer)
Advanced individual-study project. Application of engineering principles to specific problem. prereq: instr consent

BBE 5301. Applied Surface and Colloid Science. (3 cr.; Student Option; Every Fall)

BBE 5302. Biodegradation of Bioproducts. (3 cr.; Student Option; Every Spring)
Organisms and their importance to bio-based products: deterioration, control, bioprocesses for benefit. prereq: Grad student or instr consent

BBE 5303. Introduction to Bio-based Materials Science. (3 cr.; Student Option; Every Spring)
Principles of materials science, their application to bio-based materials. Project required. prereq: Grad student or instr consent

BBE 5305. Pulp and Paper Technology. (3 cr.; Student Option; Every Fall)

BBE 5333. Off-road Vehicle Design. (4 cr.; A-F only; Every Spring)
Mechanics involved in designing/testing off-road vehicles. Vehicle mechanics, traction, performance. Complexity/modeling of vehicle interaction with soil, muskeg, snow. Case study or literature review. Develop paper for publication. prereq: [2001, 4303] or [AEM 2021, AEM 3031], 3012 or concurrent registration is required (or allowed) in 3012 or CEGE 3502 or concurrent registration is required (or allowed) in CEGE 3502, upper div CSE or instr consent

BBE 5401. Bioproducts Separation and Purification Processes. (3 cr.; A-F or Audit; Every Fall)
Unit operations of bioproducts engineering/manufacture. Project required. prereq: Grad student or instr consent

BBE 5402. Bio-based Products Engineering Lab I. (1 cr.; A-F or Audit; Every Spring)
Laboratory exercises in bio-based products engineering.

BBE 5403. Bio-based Products Engineering Lab II. (1 cr.; A-F or Audit; Every Fall)
Laboratory exercises in bio-based products engineering. prereq: Grad student or instr consent

BBE 5404. Biopolymers and Biocomposites Engineering. (3 cr.; A-F or Audit; Every Fall)
Structure/properties of biopolymers. Engineering of composites from biopolymers/plant-based materials. prereq: grad student or instr consent

BBE 5412. Biocomposites and Biomass Energy. (4 cr.; Student Option; Every Spring)
Unit operations of bioproducts engineering/manufacture. Project required. prereq: Grad student or instr consent

BBE 5413. A Systems Approach to Residential Construction. (4 cr.; Student Option; Every Spring)
Dynamic/interrelated issues of energy, moisture control, indoor air quality in residential blgdls. Emphasizes design, construction, and operational aspects to provide an energy efficient, durable structure, and healthy living environment. Interaction between moisture and wood products within building system. prereq: Grad student or instr consent

BBE 5414. Advanced Residential Building Science. (4 cr.; Student Option; Every Fall)
Building science theory, advanced applications for residential buildings. Focuses on heat/mass transfer. prereq: Grad student or instr consent

BBE 5416. Building Testing & Diagnostics. (2 cr.; Student Option; Every Spring)
Theoretical basis for performance testing. Diagnostics applications for residential structures. Focuses on existing structures and retrofit/remedial applications. Digital differential pressure gauges, blower doors, airflow hoods/grids, duct pressure testing, infrared thermography. Hands-on sessions for equipment use, problem solving. prereq: Grad student or instr consent

BBE 5418. Advanced Building Science Applications. (3 cr.; A-F or Audit; Every Spring)
This course is intended to be a capstone applications course, where students will learn how to apply key building science principles (from BBE 4414/5414: Advanced Building Science: Fundamentals) to common building enclosure and mechanical system problems. Students will be guided to develop both qualitative and quantitative solutions for many common energy, moisture, and indoor air quality problems facing contemporary buildings. prereq: BBE 4414 or BBE 5414

BBE 5480. Special Topics. (1-4 cr.; max 12 cr. ; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

BBE 5513. Watershed Engineering. (3 cr.; A-F or Audit; Every Fall)
Application of engineering principles to managing surface runoff from agricultural, range, and urban watersheds. Design of facilities and selection of land use practices for controlling surface runoff to mitigate problems of flooding and degradation of surface-water quality. prereq: 3023, upper div CSE

BBE 5523. Ecological Engineering Design. (3 cr.; A-F only; Every Spring)
Application of ecological engineering to design of remediation systems. Artificial ecosystems, ecosystem/wetland restoration, constructed

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
BEBE 5535. Assessment and Diagnosis of Impaired Waters. (; 3 cr.; A-F only; Every Fall)
Assessing impaired waters and developing TMDL for conventional pollutants. Preparing/communicating legal, social and policy aspects. TMDL analysis of real-world impaired waters problem. Field trip to impaired waters site. prereq: Grad student or instr consent

BEBE 5608. Environmental and Industrial Microbiolog. (; 3 cr.; A-F only; Every Fall)
Use of microbes/enzymes to detoxify contaminants in field or in containment facilities. Contaminants, sources, fate. Biological organisms, pathways, catalysts utilized in bioremediation. Site inspection practices, bioremediation technologies, application in real-world situations. prereq: [BIOL 1001 or BIOL 1009], CHEM 1011

BEBE 5713. Biological Process Engineering. (; 3 cr.; A-F only; Every Spring)
Material/energy balances. Homogeneous reactions of bioprocess engineering and biological systems. Fermentation engineering, reactor design fundamentals. Filtration, centrifugation, separation, absorption, extraction, chromatography. Biorefining. Conversion of biomass into bioenergy, biochemicals, and biomaterials. prereq: [3033, [4013 or concurrent registration is required (or allowed) in 4013], upper div CSE or grad student] or instr consent

BEBE 5723. Food Process Engineering. (3 cr.; A-F or Audit; Every Spring)
Food processing engineering. Applications of material balance, energy balance, fluid dynamics, and heat/mass transfer to refrigeration, freezing, psychrometrics, dehydration, evaporation, non-thermal processing, and separation. Development/ control for food products. prereq: [4013 or concurrent registration is required (or allowed) in 4013], upper div CSE or grad student] or instr consent

BEBE 5733. Renewable Energy Technologies. (3 cr.; A-F or Audit; Every Spring)
Energy security and its environmental, economic and societal impacts. Current and emerging technologies for production and use, characteristics of renewable energy, key methods for efficient production, current and probable future, and impact on sustainable development. prereq: Grad student or instr consent

BEBE 8001. Seminar I. (1 cr.; A-F only; Every Fall)
Presentation/discussions on current research topics, research philosophy/principles, proposal writing, professional presentations.

BEBE 8002. Seminar II. (1 cr. [max 2 cr.]; A-F only; Every Fall)
Organization/critique of seminars on new developments in biosystems and agricultural engineering. prereq: 8001 or concurrent registration is required (or allowed) in 8001 or equiv

BEBE 8003. Research Seminar II. (1 cr. [max 2 cr.]; S-N or Audit; Every Spring)
Moderate and critique seminars in biosystems and agricultural engineering. prereq: 8002 or equiv

BEBE 8005. Supervised Classroom or Extension Teaching Experience. (2 cr.; S-N or Audit; Every Fall & Spring)
Teaching experience is offered in the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

BEBE 8013. Parameter Estimation in Biosystems and Agricultural Engineering. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Procedures for estimating parameter values and parameter uncertainty from experimental data. Values and interpretation of linear and nonlinear models using ordinary and weighted least-square methods. Design of experiments. Application to biosystems and agricultural engineering problems. prereq: Stat 3021 or equiv, computer programming course

BEBE 8094. Advanced Problems and Research. (2-6 cr.; Student Option; Periodic Fall & Spring)
tbd prereq: 5095

BEBE 8300. Research Problems. (1-10 cr.; Student Option; Every Fall & Spring; independent research under faculty guidance. prereq: instr consent

BEBE 8303. Machinery Modeling. (3 cr.; Student Option; Periodic Fall & Spring)
Machinery systems modeling using multibody dynamics simulation software (MBS). Review models presented in literature. Report on limitations of modeling approaches used. Models developed in students’ areas of interest. prereq: [3012 or CEGE 3502], AEM 2021

BEBE 8304. Advanced Topics in Wood Drying. (2 cr.; Student Option; Every Fall)
Rheological behavior of first-dried solid wood. Significance of creep to stress-strain pattern, shrinkage, and degrade development in lumber drying. Interpretation/evaluation of schedules, processes, and primary/auxiliary equipment used in commercial drying processes. Energy consideration in drying processes. prereq: 4304

BEBE 8307. Advances and Methods in Forest Products Pathology and Preservation. (2 cr.; Student Option; Every Spring)
Principles of wood protection, methods of evaluating preservatives. Emphasizes international developments. prereq: 4303

BEBE 8311. Mechanics of Wood and Wood Composites. (2 cr.; Student Option; Every Spring)
Advanced topics on behavior of wood composites. prereq: instr consent

BEBE 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master’s student, adviser and DGS consent

BEBE 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer; Doctoral student, adviser and DGS consent

BEBE 8513. Hydrologic Modeling of Small Watersheds. (3 cr.; Student Option; Spring Even Year)
Study/representation of hydrologic processes by mathematical models. Stochastic meteorological variables, infiltration, overland flow, return flow, evapotranspiration, channel flows. Approaches for model calibration/evaluation. prereq: [3012 or CEGE 3502], hydrology course

BEBE 8523. Coupled Heat, Moisture, and Chemical Transport in Porous Media. (3 cr.; A-F or Audit; Periodic Fall)
Mathematical study of coupled heat, moisture, and chemical transport in porous media. Derivation of governing equations for coupled heat, moisture, and chemical transport. Derivation of numerical solution techniques to solve coupled equations. Comparison of numerical solutions to analytical solutions. prereq: [CEG 5301 or equiv], [Math 5512, Math 5513 or equiv], [Soil 5232 or equiv], computer programming

BEBE 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BEBE 8703. Managing Water in Food and Biological Systems. (3 cr.; Student Option; Periodic Fall)
Qualitative and quantitative analysis of water in foods and biological materials using NMR and MRI. Water and chemical reactivity, microbial activity, physiochemical properties and changes, and structural properties and changes in foods and biological materials. prereq: Chem 3501 or FScN 5451 or MatS 3011 or instr consent

BEBE 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer; Doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BEBE 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer; Doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

Business Administration (BA)

BA 999. Immersion Core. (12 cr.; A-F only; Every Fall & Spring)
Includes FINA 3001, MKTG 3001, SCO 3001, and MGMT 3004. Students enroll as a cohort during their sophomore or junior year, completing the four courses with same group of students. This is a signature experience for all Carlson School undergraduate students. prereq: Microecon, macroecon, calculus, accounting, statistics, Carlson School [soph or jr]

BA 1910W. Freshman Seminar, WL. (WI; 3 cr. [max 9 cr.]; A-F only; Every Fall & Spring) Topics vary. See Class Schedule.

BA 3000. Career Skills. (1 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Career planning. Use of Carlson School of Management's Business Career Center. Awareness, knowledge, skills associated with career/job search process. prereq: CSOM [soph or upper div] major, MACC, MBT

BA 3998. Independent Study. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Student-initiated project or independent study. prereq: CSOM upper div, instr consent

BA 3999. Internship Seminar. (1 cr. [max 3 cr.]; S-N only; Every Fall, Spring & Summer) This course helps students integrate internship experiences with relevant assignments to create helpful next steps toward their career learning and development. prereq: Approved internship, instr consent

BA 4501. Carlson Funds Enterprise: Growth. (1.5 cr. [max 9 cr.]; A-F only; Every Fall & Spring) Lectures, assignments, modules. Hands-on real-money experience through Golden Gopher Growth Fund. prereq: concurrent registration is required (or allowed) in MBA 6501, CSOM [jr or sr], approved application

BA 4502. Carlson Funds Enterprise: Fixed Income. (1.5 cr. [max 9 cr.]; A-F only; Every Fall & Spring) Lectures, assignments, modules. Hands-on real-money experience through Golden Gopher Growth Fund. prereq: concurrent registration is required (or allowed) in MBA 6501, CSOM [jr or sr], approved application

BA 4503. Carlson Ventures Enterprise. (2 cr. [max 6 cr.]; Student Option No Audit; Every Fall & Spring) Modeled after early stage venture capital funds. Due diligence process. Starting/growing high-growth ventures. University-based technologies, start-up companies, and experts. Business analysis/development. Assistance to non-University-based start-up companies seeking initial equity capital. prereq: concurrent registration is required (or allowed) in MBA 6503, CSOM [jr or sr], approved application

BA 4504. Carlson Consulting Enterprise. (3 cr. [max 6 cr.]; Student Option No Audit; Every Fall & Spring) Connects cutting-edge ideas/technologies from classroom to real problems presented by clients. Students work collaboratively with clients to integrate strategy/technology. How to lead complex change initiatives. prereq: concurrent registration is required (or allowed) in MBA 6504, CSOM [jr or sr], approved application

BA 4505. Brand Enterprise. (3 cr. [max 6 cr.]; Student Option No Audit; Every Fall & Spring) Students assist companies/organizations with marketing/brand challenges. Applying theory and industry best practices. Working collaboratively in real world environment. Critical thinking, applied marketing skills. prereq: concurrent registration is required (or allowed) in MBA 6505, CSOM [jr or sr], approved application

BA 4990H. Honors Thesis Seminar I. (2 cr.; A-F only; Every Spring) Conducting rigorous academic research. How to develop honors thesis from initial question of interest. Honors thesis proposal, research question, review of literature, study design. prereq: CSOM honors, 2nd sem jr

BA 4991H. Honors Thesis Seminar II. (2 cr.; A-F only; Every Spring) Students refine research methodology, develop results, and derive preliminary conclusions. Draft of honors thesis, with preliminary results and clear agenda for final analysis. prereq: 4990H, CSOM honors, sr

BA 4994H. Directed Research. (1-4 cr.; A-F only; Every Fall & Spring) Honors directed research. prereq: Honors

BA 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

BA 8666. Doctoral Pre-Thesis Credits. (3 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BA 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Business Law (BLAW)

BLAW 3058. The Law of Contracts and Agency. (4 cr.; A-F or Audit; Every Fall & Spring) Origin of law, its place in and effect on society; history and development of law; system of courts; legal procedure. Law of contracts as the basic law affecting business transaction. Laws affecting the sale of goods and contracts and the law of agency.


Carlson Executive MBA (CMBA)

CMBA 5554. International Residency. (1.5 cr.; A-F only; Every Spring) Students travel to an international location for nine days, engage in discussions with international colleagues, apply program concepts and develop broader sensitivity to cultural/social differences. Pre-trip preparation, on-site discussion, and trip assignment are also required. Held in late March.

CMBA 5625. Entrepreneurship and Innovation. (3 cr.; A-F only; Every Spring) Entrepreneurial role of employee/management in increasing organizational value through creation/formation of new businesses, products, or markets within entities ranging from early stage companies to social ventures to F500 corporations.

CMBA 5710. Leadership. (1.5 cr.; A-F only; Every Fall) Self-awareness/insight concerning personal leadership/core values. Increase capabilities to understand potential personal derailment patterns/create effective strategies to address challenges. Develop lifelong executive leadership practices/habits for high performance in demanding circumstances.

CMBA 5711. Negotiation. (3 cr.; A-F only; Every Fall) Securing agreements between two or more parties who are interdependent and are seeking to maximize their own outcomes. Negotiation in various settings. Simulations, role-playing, cases.

CMBA 5712. Information Technology. (1.5 cr.; A-F only; Every Fall) Course prepares you with an inside-out and an outside-in perspective of how information technology is disrupting a variety of industries, how to compete in such an environment and how to strategically manage the IT function within companies to have an efficiency-innovation duality. Key principles covered in the class are developing a state-of-the-art IT strategy, getting first-hand exposure to ERP systems and learning the organizational changes involved in implementing such systems, applying disruptive and big-bang theories of IT enables disruption and learning the nuances of platform competition and multi-sided markets to fight such disruption.

CMBA 5713. Managerial Accounting. (3 cr.; A-F only; Every Fall) How to analyze accounting for management decisions. Planning/control. Transfer pricing, performance measurements, cost behavior, cost allocation, activity-based costing, standard costs.

CMBA 5714. Advanced Marketing. (3 cr.; A-F only; Every Fall) Product markets in which organization should

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Coordinating marketing/business functions. Organizing/managing marketing process. Cases.

CMBA 5715. Advanced Financial Management. (3 cr.; A-F only; Every Fall) Executive-level corporate financial policy. Rigorous case-oriented approach. Students apply principles of finance on their own initiative.

CMBA 5721. Advanced Management Topics. (1.5 cr. [max 3 cr.]; A-F only; Every Spring) Topics reflect strengths, talents, and interests of class. Topics integrate different aspects of curriculum while not being limited by specific area/paradigm.


CMBA 5723. Ethics. (1.5 cr.; A-F only; Every Fall & Spring) Role of ethics in corporate strategy. Stakeholder management, individual/collective responsibility, international business ethics. Business’s responsibility to the environment. Truthful/tasteful advertising. Obligations to local community. Managing diverse workforce.

CMBA 5724. International Residency. (1.5 cr.; A-F only; Every Spring) Students travel to international location for 11 days. Discussions with international colleagues. Applying program concepts. Sensitivity to cultural/social differences. Pre-trip preparation, on-site discussion, trip assignment.

CMBA 5810. Introduction to Statistics and Business Analytics. (3 cr.; A-F only; Every Fall) This course focuses on the use of data to solve business problems and the development of skills necessary to (1) formulate a management problem as a statistical problem; (2) collect appropriate data and perform fundamental procedures of statistical analysis; and (3) to interpret, critically evaluate, and implement the results of the statistical analysis. In particular, the student should be able to: generate and use basic graphical and numerical descriptive methods; apply basic estimation and testing procedures; estimate and interpret the parameters of simple and multiple regression model; to test the utility of the model and to use it for estimation and prediction; think statistically about issues facing her/his organization; recognize when statistical methods are effective, and when they are not; and to translate, communicate, and critically evaluate the results of statistical analyses.

CMBA 5811. Financial Accounting. (3 cr.; A-F only; Every Fall) Students learn about the accounting system used by firms to measure and report their economic performance and financial position to external parties. Students analyze corporate financial reports to discover the impact of significant economic events. Discussions and cases focus on the role of financial reporting standards in informing financial intermediaries and contributing to the efficient allocation of capital in a modern economy.

CMBA 5812. Organizational Behavior. (3 cr.; A-F only; Every Fall) Course’s main purpose is to prepare you to successfully engage and lead people to achieve organizational goals. Effective managers must not only develop winning strategies, but they must also implement them. Doing so requires a thorough understanding of organizational behavior. Broadly speaking, organizational behavior is the systematic study of how people behave in organizational settings. This course is designed to develop your understanding of the complexity of orgs and how they affect behavior, build your self-knowledge and people-leadership skills, and help you learn and apply appropriate tactics and tools to improve organizational functioning and facilitate personal career success. Course topics include: organizational (e.g. structure and culture), interpersonal (e.g. power and influence, social networks, conflict), and individual (e.g. decision making, motivation) aspects of organizational behavior.

CMBA 5813. Competing In The Digital Age. (1.5 cr.; A-F only; Every Fall) Course prepares you with an inside-out and an outside-in perspective of how information technology is disrupting a variety of industries, how to compete in such an environment and how to strategically manage the IT function within companies to have an efficiency-innovation duality. Key principles covered in the class are developing a state-of-the-art IT strategy, getting first-hand exposure to ERP systems and learning the organizational changes involved in implementing such systems, applying disruptive and big-bang theories of IT enables disruption and learning the nuances of platform competition and multi-sided markets to fight such disruption.

CMBA 5814. Economics. (1.5 cr. [max 3 cr.]; A-F only; Every Fall) The goal is to improve corporate decision-making by developing better understanding of the economic environment. Emphasis is strategic, not theoretic (this is not a standard macro course.) We shall consider two primary kinds of economic phenomena (and models): i. long-run economic growth; ii. business cycles. Also and importantly, we will learn about what a central bank does and spend some time on the current world financial/macroeconomic mess. How could we do otherwise? Students will learn appropriate tools to analyze these phenomena and apply them to their own decision-making environs, both organizational and personal.

CMBA 5815. Marketing Management. (3 cr.; A-F only; Every Spring) This is a study of management of the marketing function. We strive for an understanding of foundational marketing concepts and of the skills needed for strategy development. We also consider the importance of integrating financial data, operational factors, and human resource issues along with marketing research pertaining to product offering decisions, distribution channels, pricing and communication.

CMBA 5816. Strategic Management. (3 cr.; A-F only; Every Spring) Course provides an integrated, top management viewpoint for business students. It frames the functional courses in the CMBA curriculum by providing a ‘total’ business perspective. The course objective is to develop analytic skills and deep understandings in identifying key issues and formulating and implementing appropriate strategies for creating and sustaining a competitive edge in complex business situations. The course will familiarize students with the most current theories, concepts, and techniques of strategic management using a combination of readings, case discussions, presentations and videos. Student progress will be assessed through class participation, an in-class exam, and a group project comparing the strategies of two competing firms.

CMBA 5817. Financial Management. (3 cr.; A-F only; Every Spring) Students apply concepts of risk, return, and valuation to decisions that a corporate financial officer or person in small business must make about sources/uses of funds during changing financial markets.

CMBA 5818. Supply Chain and Operations. (3 cr.; A-F only; Every Spring) A majority of the people and physical assets of a company are involved in operations. The operations function represents the physical core of every company. The systems and processes that generate the goods and services to be sold to customers. World-class operations can lead to a significant and enduring competitive advantage. Failing operations mean low productivity and bad press at best, and company failure at worst. Understanding operations means understanding processes and supply chains. This course is designed to develop a basic framework to comprehend key design decisions and trade-offs within that context. As such, the course encompasses both manufacturing and service operations. Course also highlights why successful supply chain and operations management has to be strategic in nature, and how the operations function relates to other business functions such as marketing or product development.

CMBA 5820. Negotiation Strategies: Creative Solutions for Difficult Problems. (3 cr.; A-F only; Every Fall) Negotiation is the art and science of securing agreements between two or more parties who are interdependent and who are seeking to maximize their own outcomes. As such, this course deals with understanding the behavior of individuals, groups, and organizations in the context of competitive situations. We focus on understanding both the theory and process of negotiation in a variety of settings. This course is designed to be relevant to the broad spectrum of negotiation problems that are faced by managers and...
professors. It is designed to complement the technical and diagnostic skills learned in other courses in the program. A basic premise of the course is that while a manager needs analytical skills to discover optimal solutions to problems, a broad array of negotiation skills are needed to get these solutions accepted and implemented. This course will allow participants the opportunity to develop these skills experientially and to understand negotiation in useful analytic frameworks. As such, considerable emphasis will be placed on simulations, role-playing, and cases.

CMBA 5821. Managerial Accounting. (3 cr. ; A-F only; Every Fall) This course presents the topic of management accounting in depth. The purpose of management accounting is to provide information to management for costing products and decision making as well as for planning, controlling, and evaluating business activities. The student who successfully completes this class will be able to identify a managerial issue and create a solution to the problem.

CMBA 5822. Leadership. (1.5 cr. ; A-F only; Every Fall) The course objectives are to: build stronger self-awareness and insight concerning personal leadership and core values, increase capabilities to understand potential personal derailment patterns and create effective strategies to address these challenges, better nurture and leverage strengths for executive leadership performance, effectively coach and motivate others as a key executive leadership attribute, and develop deeper lifelong executive leadership practices and habits for high performance in demanding circumstances.

CMBA 5823. Competing Globally. (3 cr. ; A-F only; Every Fall) In this course we explore the many faces of global competition. We challenge the assumptions that global strategy is a precursor to success by exploring a set of complex forces that drive firms to internationalize. The course places special emphasis on emerging markets, given that they are home to most of the global growth and population, as well as institutional voids. We focus on factors that determine strategic choices firms make as they build their international presence, by exploring how firms: build international presence by selecting countries, and modes of entry; benefit from national competitive advantage in developed and emerging markets; diagnose and address cultural challenges of working across borders, organize to share knowledge across borders; build and sustain their multifaceted global legitimacy; collaborate across borders; prepare their managers to address cultural, personal, and career challenges in expatriate roles and on global teams.

CMBA 5824. Corporate Responsibility & Ethics. (1.5 cr. ; A-F only; Every Fall) In this course we will explore both ethical challenges in the contemporary business environment as well as the strategic opportunities offered by corporate social responsibility. Students will conduct stakeholder analysis, apply ethical principles, consider alternatives, and recommend and defend an “ethical” final decision. We will seek to answer the question “can business do good, and also do well?”

CMBA 5830. Advanced Management Topic Elective. (; 1.5 cr. ; A-F only; Every Spring) Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas including entrepreneurship/innovation, strategy, IT, and others.

CMBA 5831. Advanced Management Topic Elective. (; 1.5 cr. ; A-F only; Every Spring) Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas from entrepreneurship/innovation, strategy, IT, and others.

CMBA 5832. Advanced Management Topic Elective. (; 1.5 cr. ; A-F only; Every Spring) Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas from entrepreneurship/innovation, strategy, IT, and others.

CMBA 5833. Advanced Management Topics Elective. (; 1.5 cr. ; A-F only; Every Spring) Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas from entrepreneurship/innovation, strategy, IT, and others.

Carlson School of Management (CSOM)

CSOM 8101. Methods and Topics in Applied Economics. (; 2-4 cr. ; Student Option; Every Spring) Intermediate methods/topics in business research.

Center for Allied Health Prog (CAHP)

CAHP 5110. Foundations of Interprofessional Communication and Collaboration. (; 1 cr. ; S-N only; Every Fall) Interprofessional approach to health care. Directed group activities in five two-hour sessions: personal/professional image, teamwork, self/peer assessment, health professions, professional identity/integrity, relationships between professions and those they serve. Includes online modules. prereq: Enrolled CLSP or OT student

Chemical Engineering (CHEN)

CHEN 1001. Advances in Chemical Engineering and Materials Science. (; 1 cr. [max 2 cr.]; S-N or Audit; Every Fall) Survey of important advances in chemical engineering, materials science/engineering. Design problems, career opportunities. Lectures, demonstrations, interactive exercises. prereq: Recommended for [chemical engineering, materials science/engineering] majors

CHEN 2001. Material and Energy Balances. (4 cr. ; A-F or Audit; Every Fall) Description/analysis of chemical engineering systems. Units/dimensions, materials balances on systems with/without chemical reactions, elementary phase equilibria/diagrams, energy balances. Elementary treatment of multistage steady-state equilibrium operations. prereq: concurrent registration is required (or allowed) in CHEN 2301 or equiv., concurrent registration is required (or allowed) in MATH 2374 or equiv., concurrent registration is required (or allowed) in PHYS 1302 or equiv., CSE student, C- or better in all pre-reqs

CHEN 2594. Directed Research Lower Division. (; 1-4 cr. [max 6 cr.]; Student Option No Audit; Every Fall, Spring & Summer) Independent lab research under faculty supervision for students not yet taking junior level ChEn courses, prereq: instr consent, DUGS consent

CHEN 3005. Transport Phenomena: Momentum and Heat. (4 cr. ; A-F only; Every Fall) Fluid statics/dynamics. Applications to chemical engineering systems, conduction, diffusion. Principles/applications of heat transfer in chemical engineering systems. prereq: [2001 or [transfer student, dept consent]], [Math 2373 or equiv.], upper div ChEn major, C- or better in all pre-reqs

CHEN 3006. Mass Transport and Separation Processes. (4 cr. ; A-F only; Every Spring) Introduction to principles of mass transfer. Mass transfer operations used in separation processes, unit operations, prereq: [2001 or 4001], [3005 or 4005], [3101 or 4101], [upper div ChEn major or dept consent], C- or better in all pre-reqs

CHEN 3041. Industrial Assignment I. (2 cr. ; A-F only; Every Fall, Spring & Summer) Industrial work assignment in engineering co-op program. Formal report on technical project related to industrial work. prereq: ChEn upper Div, completion of required courses in ChEn prog through fall sem of 3rd yr, GPA of at least 2.80, registered in co-op prog

CHEN 3045. Chemical Engineering Industrial Internship. (1 cr. [max 2 cr.]; A-F only; Every Fall, Spring & Summer) Industrial internship, three to eight months. Formal report on technical project related to industrial work. prereq: ChEn Upper Division. GPA of at least 2.8

CHEN 3101. Chemical Engineering Thermodynamics. (4 cr. ; A-F only; Every Fall) Applications of thermodynamics/chemical equilibrium to problems in chemical engineering. prereq: 2001, CHEN 4501, [Math 2373 or equiv.], [upper div ChEn major or dept consent], C- or better in all pre-reqs

CHEN 3102. Reaction Kinetics and Reactor Engineering. (4 cr. ; A-F only; Every Spring)
Chemical equilibrium/chemical kinetics applied to chemical engineering systems. Behavior/design of chemical reactors, interaction between chemical/physical rate processes. Mathematical modeling, design of reactors. prereq: [2001 or 4001], [3101 or 4101], [upper div ChEn major or dept consent]. C- or better in all pre-reqs

CHEN 3201. Numerical methods in ChEn applications. (3 cr.; A-F only; Every Spring) Numerical methods/applications in heat/mass transfer, advanced chemical engineering applications, prereq: [2001 or 4001], [3005 or 4005], [3006 or 4006 or concurrent registration is required (or allowed) in 3006 or concurrent registration is required (or allowed) in 4006], [upper div ChEn major or dept consent]. C- or better in all pre-reqs

CHEN 3401W. Junior Chemical Engineering Lab. (Wi; 2 cr.; A-F only; Every Spring) Efficient design, structure, measurement, planning, analysis, presentation of experiments/results. Energy balances, fluid flow, heat/mass transfer. Design of new systems using data obtained in lab. Oral/written presentations, prereq: Writ 1301 or eq., Chem 2121, 2311, ChEn 2001, 3005, 3101, and [pre-req or concurrent registration in 3201, 3102 3006]; upper div ChEn major (C-in all prerequisites)

CHEN 3701. Introduction to Biomolecular Engineering. (3 cr.; A-F or Audit; Every Fall) Fundamentals of biological systems, from biomolecules to interplays of biomolecules that give rise to processes of life. Students apply chemical engineering principles to analysis of living systems. prereq: 2001, [[ChEn 2302 or concurrent registration is required (or allowed) in Chem 2302] or equiv.], [Math 2373 or equiv.]; high school biology recommended; C- or better in all pre-reqs

CHEN 4041. Industrial Assignment II. (2 cr.; A-F only; Every Fall, Spring & Summer) Industrial assignment in engineering co-op program. Application of chemical engineering principles to engineering design problems related to industrial work. Formal written report and presentation. prereq: 3041, GPA of at least 2.80, registration in co-op prog

CHEN 4214. Polymers. (3 cr.; A-F or Audit; Every Spring) Polymer structure-property relations: structure/morphology of crystalline/amorphous states. Crystallization kinetics. Vitrification and the glass transition. Mechanical properties, failure, permeability, optical/electrical properties, polymer composites, effect of processing on properties. prereq: [[MATS 3011, 3101 or MATS 3001], [upper div MatS or ChEn]] or instr consent

CHEN 4223W. Polymer Laboratory. (Wi; 2 cr.; Student Option; Every Spring) Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization. prereq: 4214 or

CHEN 4214 or CHEM 4221 or MATS 4214 or instr consent

CHEN 4401W. Senior Chemical Engineering Lab. (WI; 3 cr.; A-F only; Every Fall) Principles/techniques of efficient design, structure, measurement, planning, analysis, presentation of experiments. Energy balances, fluid flow, heat transfer, mass transfer. Design of new systems using experimental data obtained in lab. Oral/written presentations, prereq: [3005 or 4005], [3006 or 4006], [3101 or 4011], [3102 or 4102], [2001 or 4001], [3201 or 4201], [3401, CHEM 2311], [2121 or CHEM 4212], [English composition requirement, upper div ChEn major] or dept consent, [C- or better in all pre-reqs]

CHEN 4501W. Chemical Engineering Design I. (WI; 3 cr.; Student Option; Every Fall) Engineering economics of process evaluation, including time/bases for cost estimation. Engineering design through group projects. Case studies. prereq: [2001, 3005, 3006, 3101, 3102, 3201, 3401W, Chem 2311, Chem 2121, fr writing requirement, upper div ChEn major] or dept consent, [C- or better in all pre-reqs]

CHEN 4502W. Chemical Engineering Design II. (WI; 2 cr.; A-F or Audit; Every Spring) Introduction to product design. Case studies, special topics. prereq: 4401W, 4501W, [upper div ChEn major or dept consent], [C- or better in all pre-reqs]

CHEN 4593. Directed study. (1-4 cr. [max 3 cr.]; Student Option No Audit; Every Fall, Spring & Summer) Directed study under faculty supervision. prereq: ChEn major upper division, instr consent

CHEN 4594. Directed Research. (1-4 cr. [max 6 cr.]; Student Option No Audit; Every Fall, Spring & Summer) Independent lab research under faculty supervision. prereq: Upper div ChEn

CHEN 4594H. Directed Research - Honors. (1-4 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Independent lab research under faculty supervision for upper division students wanting honors experience. prereq: instr and DUGS consent, upper div ChEn major

CHEN 4601. Process Control. (3 cr.; A-F only; Every Fall) Analysis of dynamic behavior/design of linear control systems for chemical processes. Dynamic response/stability of linear ODE systems, tuning of PID controllers, synthesis of feedback, feedforward/feedback controller. prereq: [3102 or 4102], [upper div ChEn major or dept consent], [C- or better in all pre-reqs]

CHEN 4701. Advanced Undergraduate Applied Math I: Linear Analysis. (3 cr.; A-F only; Every Fall) Integrated approach to solving linear mathematical problems (linear algebraic equations, linear ordinary/partial differential equations) using theoretical/numerical analysis based on linear operator theory. Undergraduate version of 8201. prereq: [3102 or 4102], ChEn major upper div

CHEN 4702. Advanced Undergraduate Rheology. (2 cr.; A-F only; Every Spring) Deformation/flow of non-Newtonian/viscoelastic fluids, plastic materials, perfectly elastic solids. Phenomenological/molecular interpretation of rheology of elastomers, polymer melts, polymer solutions. Application of rheology to polymer processing. prereq: [3005 or 4005], instr consent

CHEN 4704. Advanced Undergraduate Physical Rate Processes I: Transport. (3 cr.; A-F only; Every Fall & Spring) Mass transfer, dilute/concentrated diffusion, Brownian motion. Diffusion coefficients in polymers, of electrolytes, at critical points. Multicomponent diffusion. Correlations/predictions. Mass transfer, chemical reaction. prereq: [3005 or 4005], ChEn major upper div

CHEN 4707. Advanced Undergraduate Statistical Thermodynamics and Kinetics. (3 cr.; A-F only; Every Fall) Introduction to statistical mechanical description of equilibrium/non-equilibrium properties of matter. Emphasizes fluids, classical statistical mechanics. prereq: ChEn 3005 or 4005, 3101 or 4101, CHEM 3501, CHEM 3502, ChEn major upper div

CHEN 4708. Advanced Undergraduate Chemical Rate Processes: Analysis of Chemical Reactors. (3 cr.; A-F only; Every Fall) Design of reactors for heat management, with catalytic processes. Analysis of steady state, transient behavior. Polymerization, combustion, solids processing, environmental modeling. Design of multiphase reactors. prereq: [3102 or 4102], ChEn major upper div

CHEN 5531. Electrochemical Engineering and Renewable Energy. (3 cr.; A-F only; Every Fall) Fundamentals of electrochemical engineering. Electrochemical mass transfer, electrokinetics, thermodynamics of electrochemical cells, modern sensors. Formation of thin films and microstructured materials. Computer-based problems. prereq: [MATS 3011 or instr consent], [upper div CSE or grad student]

CHEN 5551. Survey of Renewable Energy Technologies. (3 cr.; A-F or Audit; Every Fall) Technologies to generate renewable energy/chemicals. Biomass, solar, wind, hydroelectric. Emphasizes biomass processing using chemical/biological methods. Renewable technologies compared with fossil fuel technologies. prereq: [Upper div or instr consent], basic knowledge of chemistry, thermodynamics

CHEN 5751. Biochemical Engineering. (3 cr.; A-F or Audit; Every Spring) Chemical engineering principles applied to analysis/design of complex cellular/enzyme processes. Quantitative framework for design of cells for production of proteins, synthesis of antibodies with mammalian cells, or degradation of toxic compounds in contaminated soil. prereq: [3005 or 4005], [concurrent registration is required (or allowed)
in 3006 or concurrent registration is required (or allowed in 4006), [concurrence registration is required (or allowed in) 3102 or concurrent registration is required (or allowed in) 4102]

CHEN 5753. Biological Transport Processes. (3-4 cr.; A-F or Audit; Every Spring)

CHEN 5771. Colloids and Dispersions. (3 cr.; A-F or Audit; Every Fall)
Preparation, stability, coagulation kinetics or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures. prereq: Physical chemistry

CHEN 8101. Fluid Mechanics I: Change, Deformation, Equations of Flow. (3 cr.; A-F or Audit; Every Fall)
Equations of change of mass, momentum, angular momentum. Kinematics of deformation, convective transport. Applications to fluid statics/dynamics of Newtonian fluids. Examples of exact solutions of Navier-Stokes equations, useful simplifications. prereq: Chemical engineering grad student or instr consent

CHEN 8102. Principles and Applications of Rheology. (2 cr.; A-F or Audit; Periodic Spring)
Deformation and flow of non-Newtonian and viscoelastic fluids, plastic materials, and perfectly elastic solids. Phenomenological and molecular interpretation of rheology of elastomers, polymer melts and polymer solutions, application of rheology to polymer processing. prereq: 8101

CHEN 8103. Fluid Mechanics III: Porous Media. (3 cr.; A-F or Audit; Periodic Fall)
Geometry/topology of porous materials. Fundamentals of flow, transport, and deformation. One-/two-phase Darcy flows, convective dispersion in microporous materials. Relations of macroscopic properties/behavior to underlying microscopic structures/mechanisms. Nanoporous materials. prereq: Chemical engineering grad student or instr consent

CHEN 8104. Coating Process Fundamentals. (2 cr.; A-F or Audit; Every Spring & Summer)

CHEN 8112. Rheology Laboratory Project. (1 cr.; A-F or Audit; Every Spring)
How to make rheological lab measurements. Students select/characterize rheologically interesting materials with help of instructor. Oral/report written. Half-semester course. prereq: 8101, [4702 or concurrent registration is required (or allowed in) 4702 or 8102 or concurrent registration is required (or allowed in) 8102]

CHEN 8115. Electron Microscopy of Soft Matter. (2 cr.; A-F or Audit; Periodic Fall)
Operation principles of transmission electron microscope (TEM) and scanning electron microscope (SEM). How these instruments are applied in study of soft materials (e.g., liquid, semi-liquid material systems). Unique specimen preparation techniques, low image contrast, electron-beam radiation-damage, and limited signal-to-noise ratio. TEM/SEM digital imaging, prereq: Chemical engineering or materials science/engineering grad major or instr consent

CHEN 8201. Applied Mathematics I: Linear Analysis. (3 cr.; A-F or Audit; Every Fall)
Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/numerical analysis based on linear operator theory, prereq: Chemical engineering grad student or instr consent

CHEN 8202. Applied Mathematics II: Nonlinear Analysis. (2 cr.; A-F or Audit; Every Spring)
Nonlinear mathematical problems. Nonlinear ordinary and partial differential equations using theoretical/numerical analysis, prereq: [Grad-level course in linear analysis, chemical engineering grad major] or instr consent

CHEN 8211. Physical Chemistry of Polymers. (3 cr.; A-F or Audit; Every Spring)

CHEN 8221. Synthetic Polymer Chemistry. (4 cr.; A-F or Audit; Every Fall)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties, prereq: [Undergrad organic chemistry course, undergrad physical chemistry course] or instr consent

CHEN 8301. Physical Rate Processes I: Transport. (3 cr.; A-F or Audit; Periodic Fall & Spring)

CHEN 8302. Physical Rate Processes II: Mass Transfer. (3 cr.; A-F or Audit; Periodic Fall)
Applications of mass transfer. Membranes, including gas separation and reverse osmosis. Controlled drug release. Dispersion, including examples of pollution modeling. Adsorption/chromatography. Coupled heat/mass transfer, including cooling towers. Double-diffusive effects. prereq: Chemical engineering grad student or instr consent

CHEN 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CHEN 8401. Physical and Chemical Thermodynamics. (3 cr.; A-F or Audit; Every Fall)
Principles of classical thermodynamics. Introduction to nonequilibrium thermodynamics, with applications in chemical engineering and materials science. prereq: [Undergraduate course or chemistry course in thermodynamics]. Chemical engineering grad student] or instr consent

CHEN 8402. Statistical Thermodynamics and Kinetics. (3 cr.; A-F or Audit; Every Spring)
Introduction to statistical mechanical description of equilibrium and non-equilibrium properties of matter. Emphasizes fluids, classical statistical mechanics. prereq: Chemical engineering grad student or instr consent

CHEN 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CHEN 8501. Chemical Rate Processes: Analysis of Chemical Reactors. (3 cr.; A-F or Audit; Every Spring)
Design of reactors for heat management and with catalytic processes. Steady state and transient behavior. Polymerization, combustion, solids processing, and environmental modeling. Design of multiphase reactors. prereq: [Course in chemical reactor engineering, chemical engineering grad student] or instr consent

CHEN 8502. Process Control. (3 cr.; A-F or Audit; Periodic Fall)
For linear systems: stability, controllability, observability, pole-placement via state feedback state observers, output feedback, and robustness of control systems. For nonlinear systems: solution properties, stability analysis, singular perturbations, feedback linearization via state feedback, and direct synthesis via output feedback. prereq: Chemical Engineering grad major or instr consent

CHEN 8503. Chemical Rate Processes: Homogeneous Reactions. (3 cr.; A-F or Audit; Periodic Fall)
Description/characterization of chemically reacting systems. Theories of elementary reactions. Experimental methods for investigating elementary reactions. Applications
of chemical kinetics to complex reactions, such as combustion, flames, and the atmosphere. prereq: Chemical engineering grad student or instr consent

CHEN 8555. Chemical Engineering Teaching Practicum. (1-6 cr. [max 24 cr.]; S-N only; Every Fall, Spring & Summer) Experience in instruction including grading of student work, holding of office hours, and in special cases, lecturing. Students will work with and receive feedback from a faculty member in CEMS. prereq: Grad ChEn major and DGS permission

CHEN 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr


CHEN 8754. Systems Analysis of Biological Processes. (3 cr.; Student Option; Every Spring) Relating biological processes at molecular level to physiological level of cells/organisms/populations. Methodology for analyzing data. Quantification of molecular interplays. prereq: Grad student in [life sciences or chemical/physical sciences or engineering]; ChEn students must take A/F

CHEN 8771. Interfaces and Colloids. (3 cr.; A-F or Audit; Every Fall) Interfacial tension/thermodynamics, capillarity, contact angle wettability, adsorption, preparation/stability of colloids, DLVO theory, electrokinetic phenomena, micelles, rheology of dispersions. prereq: Physical Chemistry

CHEN 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHEN 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

CHEN 8900. Seminar. (1 cr.; S-N or Audit; Every Fall) Presentation and discussion of papers concerning newer developments in chemical engineering, materials science, and related fields.

CHEN 8901. Seminar. (1 cr.; [max 9 cr.]; S-N only; Every Spring) Presentation and discussion of papers concerning the newer developments in chemical engineering.

CHEN 8902. Seminar: Finite Element Methods of Computer-aided Analysis. (1 cr.; A-F or Audit; Every Spring) Fundamentals of finite element method as applied mathematics. How to construct finite element codes and put them into operation. prereq: Chemical engineering grad student or instr consent

CHEN 8993. Directed Study. (1-12 cr.; Student Option; Every Fall, Spring & Summer) (No description) prereq: Chemical engineering grad student or instr consent

CHEN 8994. Directed Research. (1-12 cr.; Student Option; Every Fall, Spring & Summer) (No description) prereq: Chemical engineering grad student or instr consent

CHEN 8995. Special Topics. (1-4 cr.; Student Option; Every Fall, Spring & Summer) New or experimental courses offered by department or visiting faculty

Chemical Physics (CHPH)

CHPH 8081. M.S. Plan B Project I. (4 cr.; A-F only; Every Fall, Spring & Summer) Topic arranged by student adviser. Written report required. prereq: Grad chem phys major

CHPH 8082. M.S. Plan B Project II. (4 cr.; A-F only; Every Fall, Spring & Summer) Topic arranged by student adviser. Written report required. prereq: Grad chem phys major

CHPH 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

CHPH 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

CHPH 8601. Seminar: Modern Problems in Chemical Physics. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring) Topics in chemical physics. prereq: Grad chem physics major or instr consent

CHPH 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHPH 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHEM 1015. Introductory Chemistry: Laboratory. (PHYS; 1 cr.; A-F only; Every Fall, Spring & Summer) Organic chemistry. Matter/energy, atoms, compounds, solutions, chemical reactions, mole/chemical calculations, gases, liquids, solids, chemical bonding, atomic/molecular structure, acids, bases, equilibria. Physical/chemical properties of hydrocarbons and organic compounds. Problem solving.

CHEM 1017. Introductory Chemistry: Lecture. (PHYS; 3 cr.; Student Option; Every Fall, Spring & Summer) Lectures online, exams on campus. Matter/energy, atoms, compounds, solutions, chemical reactions, mole/chemical calculations, gases, liquids, solids, chemical bonding, atomic/molecular structure, acids, bases, equilibria. Physical/chemical properties of hydrocarbons and organic compounds. Problem solving.

CHEM 1061. Chemical Principles I. (PHYS; 3 cr.; Student Option; Every Fall, Spring & Summer) Atomic theory, periodic properties of elements. Thermochemistry, reaction stoichiometry. Behavior of gases, liquids, and solids. Molecular/ionic structure/bonding. Organic chemistry and polymers. energy sources, environmental issues related to energy use. prereq: Grade of at least C-in [1011 or 1015] or [placement exam, concurrent registration is required (or allowed) in 1065]; intended for science or engineering majors; concurrent registration is required (or allowed) in 1065; registration for 1065 must precede registration for 1061

CHEM 1065. Chemical Principles I Laboratory. (PHYS; 1 cr.; A-F only; Every Fall, Spring & Summer)
Basic laboratory skills while investigating physical and chemical phenomena closely linked to lecture material. Experimental design, data collection and treatment, discussion of errors, and proper treatment of hazardous wastes. Prereq: concurrent registration is required (or allowed) in 1061

CHEM 1066. Chemical Principles II Laboratory. (PHYS; 1 cr.; A-F only; Every Fall, Spring & Summer)
Basic laboratory skills while investigating physical and chemical phenomena closely linked to lecture material. Experimental design, data collection and treatment, discussion of errors, and proper treatment of hazardous wastes. Prereq: concurrent registration is required (or allowed) in 1062

CHEM 1071H. Honors Chemistry I. (PHYS; 3 cr.; A-F only; Every Fall)
Advanced introduction to atomic theory. Periodic properties of elements. Behavior of gases, liquids, and solids. Molecular/ionic structure, bonding. Aspects of organic chemistry, spectroscopy, and polymers. Mathematically demanding quantitative problems. Writing for scientific journals. Prereq: Honors student, permission of University Honors Program, concurrent registration is required (or allowed) in 1075H; registration for 1075H must precede registration for 1071H

CHEM 1072H. Honors Chemistry II. (PHYS; 3 cr.; A-F only; Every Spring)
Advanced introduction. Chemical kinetics/reaction mechanisms, chemical/physical equilibria, acids/bases, entropy/second law of thermodynamics, electrochemistry/corrosion; descriptive chemistry of elements; coordination chemistry; biochemistry. Prereq: 1071H, concurrent registration is required (or allowed) in 1076H, honors student, registration for 1076H must precede registration for 1072H

CHEM 1075H. Honors Chemistry I Laboratory. (PHYS; 1 cr.; A-F only; Every Fall)
Develop laboratory skills while investigating physical and chemical phenomena closely linked to lecture material. Experimental design, data collection and treatment, discussion of errors, and the proper treatment of hazardous wastes. Prereq: &1071H, honors student, permission of University Honors Program.

CHEM 1076H. Honors Chemistry II Laboratory. (PHYS; 1 cr.; A-F only; Every Spring)
Develop laboratory skills as experiments become increasingly complex. Data collection/treatment, discussion of errors, proper treatment of hazardous wastes, experiment design. Prereq: concurrent registration is required (or allowed) in 1072H

CHEM 1081. Chemistry for the Life Sciences I. (3 cr.; Student Option; Every Fall)
The topics of atomic theory, molecular structure, bonding and shape, energy and enthalpy, gases, properties of solutions, and equilibrium will be presented along with their application to biological systems. Intended to provide a strong chemistry background for students pursuing life science related majors or careers in life science related fields. Prereq: grade of a C- or better in CHEM 1015 or passing chemistry placement exam.

CHEM 1905. Freshman Seminar. (1-3 cr.; max 6 cr.; A-F or Audit; Every Fall)
Topics vary. See freshman seminar topics. Prereq: freshman

CHEM 1910W. Freshman Seminar: Writing Intensive. (WI; 1-3 cr.; max 4 cr.; A-F or Audit; Every Fall & Spring)
Topics vary. See freshman seminar topics.

CHEM 2094. Directed Research. (1-3 cr.; Student Option; Every Fall, Spring & Summer)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member. Prereq: instr consent

CHEM 2101. Introductory Analytical Chemistry Lecture. (3 cr.; Student Option; Every Fall & Summer)
Primarily for chemistry majors. Methods/concepts of measurement by chemical/instrumental analysis, including titrimetry, quantitative spectrophotometric analysis, chromatographic separations, equilibrium/rate methods. Prereq: 1022 or equiv

CHEM 2111. Introductory Analytical Chemistry Lab. (2 cr.; Student Option; Every Fall & Summer)
Lab for 2101. High precision methods, acimetry and complexometry, single and multicomponent analysis by spectrophotometry, analysis of mixtures by ion exchange and gas chromatography, enzymatic and rate methods. Prereq: 2101 or concurrent registration is required (or allowed) in 2101

CHEM 2121. Process Analytical Chemistry. (3 cr.; A-F or Audit; Every Spring)
Strategies/techniques for analysis. Use of modern instruments, including spectrophotometry, chromatography, and electrochemistry. Prereq: [2302 or concurrent registration is required (or allowed) in 2302], [4501 or concurrent registration is required (or allowed) in 4501]. CSE student

CHEM 2301. Organic Chemistry I. (3 cr.; Student Option; Every Fall, Spring & Summer)
Organic compounds, constitutional, configurations, conformations, reactions. Molecular structure. Chemical reactivity/properties. Spectroscopic characterization of organic molecules. Prereq: C- or better in 1062/1066 or 1072H/1076H or equiv or B or better in 1071H/1075H, 1072H/1076H

CHEM 2302. Organic Chemistry II. (3 cr.; Student Option; Every Fall, Spring & Summer)
Reactions, synthesis, and spectroscopic characterization of organic compounds, organic polymers, and biologically important classes of organic compounds such as lipids, carbohydrates, amino acids, peptides, proteins, and nucleic acids. Prereq: Grade of at least C-in 2301

CHEM 2304. Organic Chemistry II for the Life Sciences. (3 cr.; Student Option; Every Fall & Spring)
Conjugation, aromaticity, chemistry of carbonyls/amines, carbohydrates, amino acids, proteins. Enzyme mechanisms, lipids, nucleic acids. Focuses on biological significance of organic molecules/mechanisms. Prereq: Grade of at least C- in 2301; designed for life sciences majors

CHEM 2311. Organic Lab. (4 cr.; Student Option; Every Fall, Spring & Summer)
Lab techniques in synthesis, purification, and characterization of typical organic compounds. Prereq: Grade of at least C- in [2302, 2304] or [concurrent registration is required (or allowed) in 2302, concurrent registration is required (or allowed) in 2304]

CHEM 2312H. Honors Organic Lab. (5 cr.; A-F only; Every Fall)
Honors organic chemistry lab. Prereq: [2301 or concurrent registration is required (or allowed) in 2301], [Chem or ChemEng or BioC] major, instr consent

CHEM 2331H. Honors Elementary Organic Chemistry I. (3 cr.; A-F only; Every Fall)
Important classes of organic compounds, their constitutions, configurations, conformations, reactions. Relationships between molecular structure/chemical properties/reactivities. Spectroscopic methods/characterization of organic molecules. Prereq: At least B- in 1072H, UHP student

CHEM 2332H. Honors Elementary Organic Chemistry II. (3 cr.; A-F only; Every Spring)
Continuation of 2331H. Reactions, synthesis, and spectroscopic characterization of organic compounds, organic polymers, and their role in biologically important classes of organic molecules such as lipids, carbohydrates, amino acids, peptides, proteins, and nucleic acids. Prereq: At least C- in 2331H, UHP student

CHEM 2910. Special Topics in Chemistry. (1 cr.; max 6 cr.; S-N or Audit; Every Fall)
Topics in chemistry. Opportunities and current research. Prereq: 1 sem 1xxx chemistry or instr consent

CHEM 2910H. Special Topics in Chemistry. (1 cr.; max 6 cr.; S-N or Audit; Every Fall)
Topics in chemistry. Opportunities, current research. Prereq: One sem 1xxx chemistry or instr consent

CHEM 2920. Special Topics In Chemistry. (1 cr.; max 6 cr.; S-N or Audit; Every Spring)
Topics in chemistry. Opportunities and current research. Prereq: 1 sem 1xxx chemistry or instr consent

CHEM 2920H. Special Topics In Chemistry. (1 cr.; max 6 cr.; S-N or Audit; Every Spring)
Topics in chemistry. Opportunities, current research.

CHEM 4001. Chemistry of Biomass and Biomass Conversion to Fuels and Products. (4 cr.; A-F or Audit; Every Fall)
CHEM 4011. Mechanisms of Chemical Reactions. (3 cr.; Student Option; Every Fall)

CHEM 4021. Computational Chemistry. (3 cr.; Student Option; Every Spring)

CHEM 4066. Chemistry of Industry. (3 cr.; Student Option; Every Spring)
Industrial and polymer chemistry technology. Relation of basic properties to industrial utility. Economics, social problems, industrial environment. prereq: Chem sr or grad student or instr consent

CHEM 4094V. Directed Research. (WI; 1-5 cr. [max 75 cr.]; Student Option; Every Fall, Spring & Summer)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member.

CHEM 4094W. Directed Research. (WI; 1-5 cr. [max 75 cr.]; Student Option; Every Fall, Spring & Summer)
Learning experience in areas not covered by regular courses. Individually arranged with faculty member. prereq: Any 3xxx or 4xxx chem course, instr consent

CHEM 4101. Modern Instrumental Methods of Chemical Analysis. (3 cr.; A-F or Audit; Every Fall)
Basic electronic, optical, computer technologies in design of chemical instrumentation. Advanced topics in spectroscopy (e.g., FT-nmr, FT-IR, atomic absorption/emission). Electrochemistry. Mass spectrometry. prereq: 2101, 2111, 2311, 4501

CHEM 4111W. Modern Instrumental Methods of Chemical Analysis Lab. (WI; 2 cr.; A-F or Audit; Every Spring)
Instrumental techniques, including spectroscopic methods, electrochemical methods, and analysis based on separation. Use of computers in data collection and reduction. prereq: 4101, chemistry major

CHEM 4201. Materials Chemistry. (3 cr.; Student Option; Every Fall)
Crystal systems/unit cells, phase diagrams, defects/interfaces, optical/dielectric properties, electrical/thermal conductivity, X-ray diffraction, thin film analysis, electronic structure, polaronic/phonons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts. prereq: [4502 or equiv], 4701 or instr consent

CHEM 4214. Polymers. (3 cr.; A-F or Audit; Every Spring)
Structure/morphology of crystalline/amorphous states. Crystalization kinetics. Vitrification, glass transition. Mechanical properties, failure, permeability, optical/electrical properties, polymer composites, effect of processing. prereq: [MATS 3011, [CHEN 3101 or CHEN 4101 or MATS 4001], [upper div MatS or ChEn or CHEM]] or instr consent

CHEM 4221. Introduction to Polymer Chemistry. (3 cr.; Student Option; Every Fall)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties. prereq: [2302, 4501] or instr consent

CHEM 4223W. Polymer Laboratory. (WI; 2 cr.; Student Option; Every Spring)
Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization. prereq: 4221 or 4214 or CHEN 4214 or MATS 4214 or instr consent

CHEM 4301. Applied Surface and Colloid Science. (3 cr.; Student Option; Every Fall)
Introduction to surface/colloid science concepts. Surface tension, wetting, adsorption, capillarity. Formation/stability of sols, emulsions, and foams. Water solubility. Partition coefficients of organic species. Properties of both surfactants and water-in-oil and oil-in-water polymers. Focusses on interdisciplinary applications. prereq: 3043 or BMEN 2101 or CHEN 3101 or CHEM 4501 or instr consent

CHEM 4311W. Advanced Organic Chemistry Lab. (WI; 4 cr.; Student Option; Every Fall & Spring)
Reactions, techniques, and instrumental methods in synthetic organic chemistry. prereq: 2311

CHEM 4321. Organic Synthesis. (3 cr.; Student Option; Every Fall)
Fundamental concepts, reactions, reagents, structural/stereochemical issues, mechanistic skills for organic chemistry. prereq: [2302 or equiv], 4501, instr consent

CHEM 4322. Advanced Organic Chemistry. (3 cr.; Student Option; Every Spring)
Topics vary by instructor. Examples: natural products, heterocycles, asymmetric synthesis, organometallic chemistry, polymer chemistry. prereq: [2302 or equiv], 4501, instr consent

CHEM 4352. Physical Organic Chemistry. (3 cr.; Student Option; Every Spring)
Fundamental concepts and mechanistic tools for analysis of organic reaction mechanisms. Solvation, reactive intermediates, gas phase chemistry. Photochemistry/strained-ring chemistry. prereq: 4501. [4011 or 8011]

CHEM 4361. Interpretation of Organic Spectra. (3 cr.; Student Option; Every Fall)
Application of nuclear magnetic resonance, mass, ultraviolet, and infrared spectral analyses to organic structural problems. prereq: [2302 or equiv], 4501, instr consent

CHEM 4411. Introduction to Chemical Biology. (3 cr.; Student Option; Every Fall)
Chemistry of amino acids, peptides, proteins, lipids, carbohydrates, and nucleic acids. Structure, nomenclature, synthesis, reactivity. Techniques to characterize biomolecules. prereq: [2302 or equiv], 4501

CHEM 4412. Chemical Biology of Enzymes. (3 cr.; Student Option; Periodic Spring)
Enzyme classification with examples from current literature. Strategies to decipher enzyme mechanisms. Chemical approaches to control enzyme catalysis. prereq: [2302 or equiv], 4501

CHEM 4413. Nucleic Acids. (3 cr.; Student Option; Periodic Spring)
Chemistry/biology of nucleic acids. Structure, thermodynamics, reactivity, DNA repair, chemical oligonucleotide synthesis, antisense approaches, ribozymes. Techniques for nucleic acid research. Interactions with small molecules/proteins. prereq: 2302, [3501 or equiv]

CHEM 4423W. Foundations of Chemical Biology Laboratory. (WI; 2 cr.; Student Option; Every Fall & Spring)
Experimental techniques from all areas of chemistry applied to biological problems. Experiments to highlight techniques and concepts used in modern Chemical Biology research. Emphasis on connections between classroom/laboratory learning and experimental science, health, disease and medical research. prereq: [2302 or 2304], 2311, 2111

CHEM 4501. Introduction to Thermodynamics, Kinetics, and Statistical Mechanics. (3 cr.; A-F or Audit; Every Fall & Spring)
Physical chemistry as it relates to macroscopic descriptions of chemical systems. Chemical thermodynamics, phase equilibria, chemical equilibria. Statistical mechanics. Phenomenological reaction kinetics. Kinetic theory of gases. Collision, statistical theories of reaction rates. prereq: [1062/1066 or 1071H/1075H], [MATH 2263 or concurrent registration is required (or allowed) in MATH 2263 or MATH 2374 or current registration is required (or allowed) in MATH 2374], [PHYS 1302 or PHYS 1402V or PHYS 1502V]

CHEM 4502. Introduction to Quantum Mechanics and Spectroscopy. (3 cr.; A-F or Audit; Every Fall & Spring)
Microscopic descriptions of chemical systems. Quantum theory. Applications to atomic/molecular structure. Molecular spectroscopy. Quantum statistical mechanics. Discussion of solutions to several differential equations. prereq: [1062/1066 or 1072H/1076H], [MATH 2263 or concurrent registration is required]
CHEM 4511W. Advanced Physical Chemistry Lab. (WI; 3 cr; Student Option; Every Fall) Experiments illustrating principles and methods of thermodynamics, reaction kinetics, and quantum mechanics. Prereq: 4501, 4502, chemistry major

CHEM 4601. Green Chemistry. (ENV; 3 cr; Student Option; Every Spring) Survey key aspects of green chemistry in modern research and development both in academia and industry, as well as relevant implications for the environment, technology, and public policy. Prereq: [2302, 4501] or equiv

CHEM 4701. Inorganic Chemistry. (; 3 cr; Student Option; Every Fall & Spring) Periodic trends. Structure/bonding in compounds where s and p electrons are important. Descriptive chemistry of solids and transition metal compounds. Transition metal chemistry. Topics in main group and materials chemistry. Prereq: [2311 or concurrent registration is required (or allowed) in 4502 or equiv] or concurrent registration is required (or allowed) in MATH 1302 or PHYS 1402V or PHYS 1502V

CHEM 4711W. Advanced Inorganic Chemistry Lab. (WI; 3 cr; A-F or Audit; Every Spring) Lab experiments in inorganic/organometallic chemistry illustrating synthetic/spectroscopic techniques. Prereq: 4701, chem major

CHEM 4715. Physical Inorganic Chemistry. (; 3 cr; Student Option; Every Fall) Physical methods (e.g., IR, UV-VIS, ESR, Mossbauer and mass spectroscopy, magnetic measurements, X-ray diffraction) and concepts applied to inorganic and organometallic systems. Prereq: 4701 or equiv, chem major or instr consent

CHEM 4725. Organometallic Chemistry. (; 3 cr; Student Option; Periodic Fall) Synthesis, reactions, structures, and other properties of main group and transition metal organometallic compounds; electronic and structural theory, emphasizing their use as stoichiometric and homogeneous catalytic reagents in organic and inorganic systems. Prereq: 4701 or equiv, chem major or instr consent

CHEM 4735. Bioinorganic Chemistry. (; 3 cr; Student Option; Periodic Fall) Role of metal ions in biology. Emphasizes structure, function, and spectroscopy of metalloproteins and their synthetic analogs. Prereq: 4701 or equiv, chem grad or instr consent

CHEM 4745. Advanced Inorganic Chemistry. (; 3 cr; Student Option; Periodic Spring) Topics in main group and transition metal chemistry. Emphasizes synthesis, structure, physical properties, and chemical reactivity. Prereq: 4701, chem major, instr consent

CHEM 4894H. Senior Honors Thesis. (WI; 1-3 cr; max 6 cr; A-F only; Every Fall, Spring & Summer) Written thesis under direction of chemistry project advisor. Prereq: Honors student, instr consent

CHEM 5210. Materials Characterization. (; 4 cr; Student Option; Every Spring) Modern tools/techniques for both bulk- and thin-film characterization. Topics may include ion-solid interactions, Rutherford back scattering, secondary ion mass spectrometry, solid-state NMR, x-ray photoelectron spectroscopy, X-ray angle X-ray, structure scattering, transmission/scanning electron/ probe microscopy, near-field scanning optical microscopy, porosimetry, adsorption techniques, and ellipsometry. Prereq: grad student or instr consent

CHEM 5245. Introduction to Drug Design. (; 3 cr; A-F or Audit; Periodic Fall) Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design and mechanism of action drugs. Prereq: 2302 or equiv

CHEM 5755. X-Ray Crystallography. (; 4 cr; A-F or Audit; Every Spring) Essentials of crystallography as applied to modern, single crystal X-ray diffraction methods. Practical training in use of instrumentation in X-ray crystallography facility in Department of Chemistry. Date collection, correction/refinement, structure solution, generation of publication materials, use of Cambridge Crystallographic Structure Database. Prereq: Chem grad student or instr consent

CHEM 8011. Mechanisms of Chemical Reactions. (; 4 cr; Student Option; Every Fall) Reaction mechanisms and methods of study. Mechanistic concepts in chemistry. Gas phase reactions to mechanisms, "electron pushing" mechanisms in organic reactions, mechanism of enzymatic reactions. Kinetic schemes and other strategies to investigate mechanisms. Prereq: 2302 or equiv


CHEM 8066. Professional Conduct of Chemical Research. (; 1 cr; S-N or Audit; Every Fall & Spring) Builds sensitivity to ethical issues in chemical research. Readings/case studies, small-group/large-group discussion, summarizing comments from instructors/guests/panels having special expertise. Weekly seminar. Prereq: Chem grad student

CHEM 8081. M.S. Plan B Project I. (; 1-4 cr; A-F or Audit; Every Fall, Spring & Summer) Satisfies project requirement for Plan B master's degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional. Prereq: grad chem major

CHEM 8082. M.S. Plan B Project II. (; 1-4 cr; A-F or Audit; Every Fall, Spring & Summer) Satisfies project requirement for Plan B master's degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional. Prereq: grad chem major

CHEM 8151. Analytical Separations and Chemical Equilibria. (; 4 cr; Student Option; Every Fall & Spring) Advanced treatment of principles of analytical chemistry, chemical equilibria, and dynamics. Chromatographic and other modern analytical scale separation techniques. Emphasizes column dynamics and retention mechanisms. Prereq: instr consent

CHEM 8152. Analytical Spectroscopy. (; 4 cr; Student Option; Every Fall) Survey of analytical spectroscopic methods. Design/application of spectrosopic instruments, including signal generation, acquisition, and interpretation. May include nuclear magnetic resonance, electron paramagnetic resonance, infrared and ultraviolet/visible spectroscopy, and mass spectrometry. Prereq: grad chem major or instr consent

CHEM 8153. Extracting Signal From Noise. (; 5 cr; A-F or Audit; Every Spring) Use of analog/digital electronics and computational methods in experiments. Passive circuits, operational amplifiers, filters, oscillators and Laplace transform techniques in analysis, domain conversion for data acquisition/control, statistics, experimental design. Introduction to chemometrics, Fourier analysis, convolution/deconvolution, curve fitting. Prereq: [4101 or equiv], differential equations course

CHEM 8155. Advanced Electroanalytical Chemistry. (; 4 cr; Student Option; Every Spring) Thermodynamics/kinetics of electron/ ion transfer, electric double layer, mass transfer by diffusion/migration, ion-selective potentiometry, chronocampermetry, chronocoulometry, cyclic voltammetry, pulse voltammetry, ion-transfer voltammetry, impedance spectroscopy, bioelectroanalysis, rotating disk electrodes, microelectrodes, chemically modified electrodes. Scanning electrochemical microscopy. EC-STM, quartz crystal microbalance.

CHEM 8157. Bioanalytical Chemistry. (; 4 cr; A-F or Audit; Periodic Spring) Theory and practical aspects of analytical methods used in determination/characterization
of biologically important materials. Enzymatic/kinetic methods in study of proteins, carbohydrates, lipids, and nucleic acids.

CHEM 8159. Nuclear Magnetic Resonance Spectroscopy. (4 cr.; Student Option; Periodic Fall) Detailed understanding of relaxation processes, chemical exchange, quadrupolar effects, NOW, 2D NMR, NMR hardware, and solid state NMR. NMR imaging and Pulsed Field Gradient (PFG) NMR are discussed. prereq: Sem of organic chem

CHEM 8180. Special Topics in Analytical Chemistry. (2-4 cr.; Student Option; Periodic Fall) Topics (and availability) vary by year depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8201. Materials Chemistry. (4 cr.; A-F or Audit; Every Fall) Crystal systems/unit cells, phase diagrams, defects/interfaces, optical/dielectric properties, electrical/thermal conductivity, X-ray diffraction, thin film analysis, electronic structure, polaron/phonons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts. prereq: [4701, 3502] or instr consent


CHEM 8221. Synthetic Polymer Chemistry. (4 cr.; Student Option; Every Fall) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties. prereq: [Undergrad organic chemistry course, undergrad physical chemistry course] or instr consent

CHEM 8280. Special Topics in Materials Chemistry. (2-4 cr.; Student Option; Periodic Fall & Spring) Topics (and availability) vary by year depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8321. Organic Synthesis. (4 cr.; Student Option; Every Fall) Core course; fundamental concepts, reactions, reagents, structural and stereochemical issues, and mechanistic skills necessary for understanding organic chemistry. prereq: 2302 or equiv

CHEM 8322. Advanced Organic Chemistry. (4 cr.; Student Option; Every Spring) Modern studies. Topics, which vary by year, include natural products, heterocycles, asymmetric synthesis, organometallic chemistry, and polymer chemistry. prereq: 2302 or equiv

CHEM 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

CHEM 8352. Physical Organic Chemistry. (4 cr.; Student Option; Every Spring) Fundamental concepts, mechanistic tools for analyzing organic reaction mechanisms. Solvation, reactive intermediates, gas phase chemistry, photochemistry, strained-ring chemistry. prereq: 4011 or 8011

CHEM 8361. Interpretation of Organic Spectra. (4 cr.; Student Option; Every Fall) Practical application of nuclear magnetic resonance, mass, ultraviolet, and infrared spectral analyses to solution of organic structural problems. prereq: 2302 or equiv

CHEM 8380. Special Topics in Organic Chemistry. (1-4 cr.; Student Option; Periodic Spring) Topics (and availability) vary by year depending on instructor and development of the field. prereq: grad chem major or instr consent

CHEM 8411. Introduction to Chemical Biology. (4 cr.; Student Option; Every Fall) Chemistry of amino acids, peptides, proteins, lipids, carbohydrates, and nucleic acids. Structure, nomenclature, synthesis, and reactivity. Overview of techniques used to characterize these biomolecules. prereq: 2302 or equiv

CHEM 8412. Chemical Biology of Enzymes. (4 cr.; Student Option; Periodic Spring) Enzyme classification with representative examples from current literature. Strategies used to decipher enzyme mechanisms. Chemical approaches for control of enzyme catalysis. prereq: 2302 or equiv

CHEM 8413. Nucleic Acids. (4 cr.; Student Option; Periodic Fall) Chemistry and biology of nucleic acids: structure, thermodynamics, reactivity, DNA repair, chemical oligonucleotide synthesis, antisense approaches, ribozymes, overview of techniques used in nucleic acid research, interactions with small molecules and proteins. prereq: 2302 or equiv

CHEM 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

CHEM 8480. Special Topics in Biological Chemistry. (2-4 cr.; Student Option; Periodic Spring) Topics (and availability) vary by year, depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8541. Dynamics. (4 cr.; Student Option; Periodic Fall) Mathematical methods for physical chemistry. Classical mechanics/dynamics, normal modes of vibration. Special topics such as rotational motion, Langevin equation, Brownian motion, time correlation functions, collision theory, cross sections, energy transfer, molecular forces, potential energy surfaces, classical electrostatics, Shannon entropy. prereq: Undergrad physical chem course

CHEM 8551. Quantum Mechanics I. (4 cr.; Student Option; Every Fall) Review of classical mechanics. Postulates of quantum mechanics with applications to determination of single particle bound state energies and scattering cross-sections in central field potentials. Density operator formalism with applications to description of two level systems, two particle systems, entanglement, and Bell inequality. prereq: undergrad physical chem course


CHEM 8561. Thermodynamics, Statistical Mechanics, and Reaction Dynamics I. (4 cr.; Student Option; Every Fall) Two-part sequence. Thermodynamics, equilibrium statistical mechanics, ensemble theory, partition functions. Applications, including ideal gases/crystals. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint. prereq: undergrad physical chem course

CHEM 8562. Thermodynamics, Statistical Mechanics, and Reaction Dynamics II. (4 cr.; Student Option; Every Spring) Two-part sequence. Thermodynamics, equilibrium statistical mechanics, ensemble theory, partition functions. Applications, including ideal gases/crystals. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint. prereq: 8561

CHEM 8563. Molecular Simulations. (2 cr.; Student Option; Every Spring) Principles of Monte Carlo/molecular dynamics simulations. Algorithms, simulation set-up/analysis, applications to chemical systems. Hands-on computational project that requires writing of computer code. prereq: grad chem major or instr consent

CHEM 8564. Laser Spectroscopy. (2 cr.; Student Option; Every Spring) Fundamentals of light-molecule interactions/manifestation in spectroscopic observables. Time correlation functions, spectroscopic lineshapes, linear/nonlinear material responses, material sensitivities. Role of
CHEM 8565. Chemical Reaction Dynamics. (2 cr.; Student Option; Periodic Spring) Fundamentals of chemical reaction dynamics including theories of molecular collisions, intermolecular potentials, potential energy surfaces, transition state theory, molecular energy transfer, electron transfer, and dynamics of reactions in solution including the influence of solvation and Kramers' theory.

CHEM 8580. Special Topics in Physical Chemistry. (2-4 cr. [max 8 cr.]; Student Option; Periodic Spring) Topics (and availability) vary depending on instructor and development of the field. prereq: grad chem major or instr consent

CHEM 8601. Seminar: Modern Problems in Chemistry. (1 cr.; S-N or Audit; Every Fall & Spring) Weekly seminar series on modern chemical topics, prereq: grad chem major or instr consent

CHEM 8602. Seminar Presentation: Modern Problems in Chemistry. (1 cr.; A-F or Audit; Every Fall & Spring) Weekly seminar series on modern chemical topics presented by students. prereq: grad chem major or instr consent

CHEM 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHEM 8700. Advanced Concepts in Medicinal Chemistry: Combinatorial Methods in Chemical Biology. (2 cr.; A-F or Audit; Periodic Fall) Principles of current combinatorial methods for generation of biological/chemical libraries. Emphasizes utility in biology and in drug design. Material is drawn from primary literature. prereq: [2302 or equiv.], [BioC 4331 or equiv]

CHEM 8715. Physical Inorganic Chemistry. (4 cr.; Student Option; Every Fall) Physical methods and concepts applied to inorganic and organometallic systems, including many of the following methods: NMR, IR, UV-VIS, ESR, M[?]s NMR, mass spectroscopy, magnetic measurements, X-ray diffraction. prereq: 4701 or equiv, grad chem major or instr consent

CHEM 8725. Organometallic Chemistry. (4 cr.; Student Option; Periodic Fall) Synthesis, reactions, structures, and other important properties of main group and transition metal organometallic compounds; treatment in terms of modern electronic and structural theory; emphasis on their use as stoichiometric and homogeneous catalytic reagents in organic and inorganic systems. prereq: 4701 or equiv, grad chem major or instr consent

CHEM 8735. Bioinorganic Chemistry. (; 4 cr.; Student Option; Periodic Fall) Survey of role of metal ions in biology; emphasizes structure, function, and spectroscopy of metalloproteins and their synthetic analogs. prereq: 4701 or equiv, grad chem major or instr consent

CHEM 8745. Advanced Inorganic Chemistry. (; 4 cr.; Student Option; Periodic Spring) Survey of topics in main group and transition metal chemistry; emphasizes synthesis, structure, physical properties, and chemical reactivity. prereq: 8715, grad chem major or instr consent

CHEM 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHEM 8780. Special Topics in Inorganic Chemistry. (2-4 cr.; Student Option; Periodic Fall) Topics (and availability) vary by year depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8880. Special Topics in Chemistry. (2-4 cr.; Student Option; Every Spring) Topics (and availability) vary depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Chicano Studies (CHIC)

CHIC 1102. Latinos in the United States: Culture and Citizenship. (DSJ, HIS; 3 cr.; Student Option; Every Fall) Historical/cultural knowledge on the complex/multi-layered relationship that Latinos have to the U.S., their country of origin. Influence of social, cultural, and political dynamics on Latino identity, politics, and sense of belonging in the U.S. Cultural citizenship.

CHIC 1102H. Honors: Latinos in the United States: Culture and Citizenship. (DSJ, HIS; 3 cr.; A-F only; Every Fall) Historical/cultural knowledge on the complex/multi-layered relationship that Latinos have to the U.S., their country of origin. Influence of social, cultural, and political dynamics on Latino identity, politics, and sense of belonging in the U.S. Cultural citizenship.

CHIC 1112. Introduction to Chicana/o Studies: Critical Paradigms. (DSJ; 3 cr.; Student Option; Every Spring) Prevailing paradigms of analysis, methodologies of research, and guiding theoretical concepts that have shaped Chicano studies. Chicano history, culture, and meanings, including migration, repatriation, community formation, Chicano movement. Contemporary trends in art and culture.

CHIC 1201. Racial Formation and Transformation in the United States. (DSJ, SOCS; 3 cr.; Student Option; Every Fall) How aggrieved racialized groups struggle over identity, culture, place, and meaning. Histories of racialization. Strategies toward rectification of historical injustices from dispossession, slavery, exploitation, and exclusion.

CHIC 1275. Service Learning in the Chicano/Latino Community. (CIV; 3 cr.; A-F only; Every Fall & Summer) Normative/applied ethics used to reflect on personal/societal responsibilities and to analyze U.S. educational systems. Institutional/social constraints on equitable educational opportunities for Chicano/Latino students. Models of inclusive/just education. Students tutor/mentor Chicanos/Latinos, dialogue with Chicano/Latino educators.

CHIC 1902. Freshman Seminar. (DSJ; 3 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule.

CHIC 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

CHIC 3208. Mexico On My Mind. (AH, GP; 3 cr.; Student Option; Every Fall & Spring) Images of art from Pre-Columbian cultures to modern Mexico/Chicano art in United States. How Mexico/its people have represented themselves/been represented by others. Role images play in community, national, international politics through history.

CHIC 3212. Chicana Studies: La Chicana in Contemporary Society. (AH, DSJ; 3 cr.; Student Option; Every Fall & Spring) Scholarly/creative work of Chicanas or politically defined women of Mexican American community. Interdisciplinary. Historical context, cultural process, and autoethnography.

CHIC 3213. Chicano Music and Art. (AH, DSJ; 3 cr.; A-F or Audit; Every Spring) Survey of diverse forms of cultural expressiveness in Mexican American music/art. History of various types of artistic production and musical forms in their regional specificity. Social/economic implications of several genres, styles, and traditions.

CHIC 3221. Introduction to Chicana/o Cultural Studies: Barrio Culture and the Aesthetics of Everyday Life. (AH, DSJ; 3 cr.; Student Option; Every Spring) Cultural studies approach to investigating aesthetic dimensions of experience that inform and are informed by dynamic relationship between culture, class, ethnicity, and power.

CHIC 3223. Chicana/o and Latina/o Representation in Film. (AH, DSJ; 3 cr.; Student Option; Every Spring) Introduction to Chicana/o and Latina/o visual representation. Depiction of Latina/o experience, history, and culture in film. Analyzing independent/commercial films as
texts that illuminate deeply held beliefs around race, class, ethnicity, gender, and national origin.

**CHIC 3275. Service Learning in the Chicano/ Latino Community.** (CIV; 3 cr.; A-F only; Every Fall & Spring) Normative/applied ethics used to reflect on personal/social responsibilities and to analyze U.S. educational systems. Institutional/social constraints on equitable educational opportunities for Chicano/Latino students. Models of inclusive/just education. Students tutor/mentor Chicanos/Latinos, dialogue with Chicano/Latino educators.

**CHIC 3352. Transnational Chicana/o Theory: Global Views/Borderland Spaces.** (3 cr.; Student Option; Fall Even Year) Demographic realities, political/economic shifts, cultural exchanges that characterize U.S.-Mexico borderland spaces in global economy. Historically contextualized, transnational approach to cultures, politics, and economics of U.S.-Mexico Borderlands. Dynamics of borderland spaces.

**CHIC 3374. Migrant Farmworkers in the United States: Families, Work, and Advocacy.** (CIV; 4 cr.; Student Option; Every Spring) Social, economic, legal realities of migrant farmworkers. Demographic shifts/movements. How organizing, advocacy, consumer influence act as change agents ethical dilemma of consuming cheap food. Significant work completed outside classroom, including trip to migrant camp.

**CHIC 3375. Folklore of Greater Mexico.** (DSJ; 3 cr.; Student Option; Every Fall & Spring) Scholarly survey and exploration of the sociocultural function of various types of folklore in Greater Mexico. Ways in which folklore constructs and maintains community, as well as resists and engenders cultural shifts.

**CHIC 3423. Central American Revolutions.** (DSJ; 3 cr.; A-F or Audit; Every Fall & Spring) Students often do preliminary readings and research in conjunction with plans for education abroad programs. prereq: instr consent

**CHIC 3446. Chicana/o History II: WWII, El Movimiento, and the New Millennium.** (DSJ,HIS; 3 cr.; Student Option; Every Spring) Experiences of people of Mexican descent in the U.S. Notions of citizenship from WWII. Chicano civil rights movement. Impact of immigration patterns/legislation. Cultural wars, changing demographics. Social, economic, and political changes that influenced day-to-day life of Mexican Americans. Meaning of racialized “Mexican” identity. How different groups of Mexicans have understood their relationships to other Americans and other Latino groups.

**CHIC 3452. Xicana/Indigena Studies: History, Culture, and Politics.** (DSJ; 3 cr.; Student Option; Every Spring) Historical, cultural, and political processes impacting Chicanas/os and their understanding of being indigenous to the North American continent. History, culture, and identity formation as dynamic processes intimately related to present and future constructions of Mexican American identities and sociopolitical perspectives.

**CHIC 3507W. Introduction to Chicana/o Literature.** (DSJ,WLLTR; 3 cr.; Student Option; Every Fall & Spring) Cultural, intellectual, and sociopolitical traditions of Mexican Americans as they are represented in creative literature. Genres/forms of creative cultural expression and their significance as representations of social, cultural, and political life in the United States. Novels, short stories, creative non-fiction, drama, essay, poetry, and hybrid forms of literature.

**CHIC 3672. Chicana/o Experience in the Midwest.** (DSJ; 3 cr.; Student Option; Every Spring) Experiences of people generally defined as Chicano or Latino, living in the Midwest. Individual/group identity. Focuses on construction of Chicano-Latino experience. How identity affirmation, migration stories, immigration status, historical memory, and cultural traditions are impacted by being in the Midwest.

**CHIC 3752. Chicanas and Chicanos in Contemporary Society.** (DSJ; 3 cr.; Student Option; Every Spring) Introduction to sociological analysis of theoretical/methodological approaches to Chicana/a and Latina/o communities. Socioeconomic conditions, education, cultural change, the family, gender relations, political experiences. Theories, issues, methods of sociological research. Debates regarding qualitative/quantitative research methods.

**CHIC 3771. Latino Social Power and Social Movements in the U.S..** (DSJ; 3 cr.; Student Option; Periodic Fall) How Latinos have collectively resisted social domination. Theories of social power/movements. Resistance by Latinos during 60s/70s. Current organized efforts to curb immigration, establish English as official language, and limit immigrant rights.

**CHIC 3852. Chica/o Políticas.** (DSJ,SOCS; 3 cr.; Student Option; Every Fall & Spring) Theory/practice of Chicana/o politics through an analysis of Mexican American experience, social agency, and response to larger political systems and behaviors using social science methods of inquiry. Unequal power relations, social justice, and the political economy.

**CHIC 3888. Immigration and the U.S. Latina/o Experience: Diaspora, Identity, and Community.** (DSJ,HIS; 3 cr.; Student Option; Every Fall) Experiences of migrants from Latin America to the United States in 20th/21st century. Migrant engagements with US society. Pre-existing Latina/o and other ethnic communities. experiences within political, economic, and social aspects of life at local/global level.

**CHIC 3900. Topics in Chicano Studies.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Topics vary by section of course.

**CHIC 3993. Directed Studies.** (1-9 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading, research, and study. Students often do preliminary readings and research in conjunction with plans for education abroad programs. prerequisite: instr consent

**CHIC 4231. Color of Public Policy: African Americans, American Indians, Asian Americans & Chicanos in the U.S..** (3 cr.; Student Option; Periodic Fall) Examination of the structural or institutional conditions through which people of color have been marginalized in public policy. Critical evaluation of social theory in addressing the problem of contemporaneous communities of color in the United States.

**CHIC 4232. Chica/o - Latina/o Gender and Sexuality Studies.** (AH,DSJ; 3 cr.; Student Option; Fall Odd, Spring Even Year) Critical thinking of Chicanas/os and Latinas/os around construction of gender. Politics of sexual identity. How the self is gendered in relationship to sexual, racial, class, and national identities under different social structural conditions. Way in which the “borders” that define/confine sexual norms shift over time.

**CHIC 4275. Theory in Action: Community Engagement in a Social Justice Framework.** (CIV; 3 cr.; Student Option; Every Fall) Theoretical frameworks of social justice and community engagement for work outside classroom with/in Latina/o community. Worker issues/organizing. Placements in unions, worker organizations. Policy initiatives on labor issues. Students reflect on their own identity development, social location, and position of power/privilege.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
CHIC 4401. Chicana/Latina Cultural Studies. (AH,DSJ; 3 cr.; Student Option; Fall Even Year)
Readings in Chicana/Latina cultural studies. TV, film, art, music, dance, theatre, literature. Identity/sexuality. Production of culture/theory.

CHIC 4901W. Senior Paper. (WI; 3 cr.; A-F only; Every Spring)
Capstone experience. Students produce original research paper or creative project on a topic determined in consultation with a faculty adviser.

CHIC 5374. Migrant Farmworkers in the U.S.: Families, Work, and Advocacy. (CIV; 4 cr.; Student Option; Every Spring)
Socioeconomic/political forces that impact migrant farmworkers. Effects of the laws and policies on everyday life. Theoretical assumptions/strategies of unions and advocacy groups. Role/power of consumer. How consuming cheap food occurs at expense of farmworkers.

CHIC 5920. Topics in Chicana(o) Studies. (; 3 cr.; Student Option; Every Fall & Spring)
Multidisciplinary themes in Chicana(o) studies. Issues of current interest.

CHIC 5993. Directed Studies. (; 1-3 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer)
Guided individual reading, research, and study for completion of the requirements for a senior paper or honors thesis. prereq: instr consent

Child & Adolescent Psychiatry (CAPY)

CAPY 5660. ADHD Throughout the Life Span: Perspectives on Diagnosis, Assessment, and Developmental Course. (; 1-2 cr.; Student Option; Every Fall & Summer)
ADHD, from its earliest presentation to its later adult manifestations. Clinical depression, diagnostic criteria. Disorders that commonly coexist with ADHD. Standard assessment procedures for making a diagnosis. Developmental changes in clinical procedures. prereq: Upper div

CAPY 5672. Children's Exposure to Domestic Violence: Effects on Child Functioning, Treatment Implications. (; 1 cr.; Student Option; Periodic Spring)
Effects of exposure to domestic violence in context of development, from infancy to late adolescence. Assessment strategies, best practices in intervention/prevention for vulnerable children and adolescents. Multidisciplinary approaches to working with children exposed to violence (e.g., judicial, medical, law enforcement partnerships).

CAPY 7201. Diagnostic Practicum in Child and Adolescent Psychiatry. (; 1-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Multidisciplinary evaluations of children, adolescents, and their families are presented for discussion, dynamic and diagnostic formulations, and disposition planning in a conference setting. Consultation to schools, residential treatment centers, and community agencies may be included. prereq: instr consent

CAPY 7203. Child and Adolescent Psychiatry for Primary Care Physicians. (Fairview-University Medical Center. (; 1-6 cr.; O-N or Audit; Every Fall, Spring & Summer)
Assessment/therapeutic interventions with children, adolescents, and families in child/adolescent psychiatric settings. prereq: instr consent

CAPY 7521. Outpatient Clinical Child and Adolescent Psychiatry for Primary Care Physicians. (; 2-12 cr.; O-N or Audit; Every Fall, Spring & Summer)
Supervised diagnostic and therapeutic experiences in an outpatient setting. Consultation to schools, residential treatment centers, and community agencies may be included. prereq: cr ar, reg med

CAPY 7602. Introductory Readings and Research Methods in Child, Adolescent, and Family Psychiatry. (; 2-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Child development, diagnostic/therapeutic techniques, psychopathology. Readings/discussions with faculty. prereq: Med student, instr consent

CAPY 7603. Inpatient Clinical Child Psychiatry for Primary Care Physicians. (; 2-12 cr.; H-N or Audit; Every Fall, Spring & Summer)
Supervised diagnostic and therapeutic experiences in an inpatient, multidisciplinary child psychiatric unit with emphasis on group and milieu therapies.

CAPY 7604. Outpatient Elective in Child and Adolescent Psychiatry. (; 1-6 cr.; H-N only; Every Fall, Spring & Summer)
Students rotate through various clinical sites and work with general psychiatry residents, child/adolescent psychiatry fellows, and staff psychiatrists. Diagnosis/treatment of psychopathology seen in children/adolescents.

CAPY 7609. Directed Study. Anesthesia Project: Clinical. (; 2-12 cr.; H-N or Audit; Every Fall, Spring & Summer)
tbd

Child Psychology (CPSY)

CPSY 1334. Global Issues on Children and Youth in Society. (CIV; 3 cr.; A-F or Audit; Every Fall & Spring)
Provides an introduction to science, ethics, and ramifications in civic life of controversial issues concerning child or youth development in contemporary societies. Examines topics of ethical and civic concern and interest to parents, society, and young people and how developmental science informs these issues and policies as well as the decisions and actions of citizens in society. Students gain a basic understanding of how developmental research and theory inform policy and practices of societies as well as the individual decisions of parents, teachers, community members, and other citizens that influence the lives of children and youth. This course also examines how social issues influence science and its translation to action. Students will be exposed to a wide range of issues about children and youth that currently confront many societies around the world, and the state of the research evidence pertinent to these issues. Students will also learn how research is translated and disseminated so that it can inform policy and practice.

CPSY 1904. Freshman Seminar: Global Perspectives. (GP; 3 cr.; A-F or Audit; Every Fall)
Interdisciplinary seminar. Topics specified in Class Schedule.

CPSY 1905. Freshman Seminar. (; 1-3 cr. [max 6 cr.]; Student Option; Every Spring)
Interdisciplinary seminar. Topics specified in Class Schedule.

CPSY 2301. Introduction to Child Psychology. (; 4 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to the science of child behavior; review of theory and research.

CPSY 2310. Special Topics in Child Development - Child Life. (; 1-4 cr.; A-F or Audit; Periodic Fall & Spring)
Topics vary by semester.

CPSY 3301. Introduction to Child Psychology for Social Sciences. (4 cr.; Student Option; Every Fall & Spring)
The science of child behavior; review of theory and research. Designed for majors in psychology, sociology, and related disciplines; not suggested for child psychology majors.

CPSY 3308W. Introduction to Research Methods in Child Psychology. (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Techniques used in the study of child development; emphasis on collection, organization, and analysis of data. prereq: 2301, Psy 1001

CPSY 3360H. Child Psychology Honors Seminar. (; 2 cr.; A-F or Audit; Every Fall)
Acquaints students with the various research projects and activities in the Institute for Child Development and in related departments. Faculty are invited to discuss their research projects with seminar participants. prereq: CPSy honors student

CPSY 4302. Infant Development. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Perceptual, motor, emotional, social, and cognitive development during the first two years of life; the developing infant in his or her social and physical environment. prereq: 2301 or instr consent

CPSY 4303. Adolescent Psychology. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Overview of development in the second decade of life. Interactions of adolescents with family, school, and society. prereq: Psy 1001

CPSY 4310. Special Topics in Child Development. (; 1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
CPSY 4311. Behavioral and Emotional Problems of Children. (3 cr.; A-F or Audit; Every Fall) Behavioral and emotional problems of children and adolescents; psychopathology contrasted to normal development; symptoms, causes, course, and prevention of common disorders, excluding physical and sensory handicaps. prereq: 2301 or equiv


CPSY 4329. Biological Foundations of Development. (3 cr.; A-F or Audit; Every Spring) Evolutionary theory and behavioral genetics applied to understanding of development of human behavior; formation of species-typical adaptive behavior and individual differences in infancy, childhood, and adolescence. This course is only offered Fall semesters. prereq: 2301 or equiv

CPSY 4331. Social and Personality Development. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Development of social relations and personality; research, methodology, and contrasting theoretical perspectives. Survey of findings on interpersonal relationships, the concept of self, prosocial and antisocial behavior, and acquisition of social roles. prereq: 2301, Psy 1001

CPSY 4334W. Children, Youth in Society. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Child development principles relative to social policy decision making. Issues in applying theories, findings to problems (e.g., media influences, mainstreaming, day care, child abuse, effects of peers). prereq: 2301

CPSY 4336. Development and Interpersonal Relationships. (3 cr.; A-F or Audit; Periodic Fall) Processes and functions of interactions with personal relationships across the lifespan; analysis of theory and research on developmental changes and influences.

CPSY 4341. Perceptual Development. (3 cr.; Student Option; Every Fall) Perceptual learning and the development of sensory and perceptual processes. prereq: 2301

CPSY 4343. Cognitive Development. (3 cr.; A-F or Audit; Every Fall & Spring) Cognitive processes; relevant theory, research literature, and methodology. prereq: 2301

CPSY 4345. Language Development and Communication. (3 cr.; A-F or Audit; Every Spring) Structure and function of language; factors influencing development; methodological problems, language scales, theories. prereq: 2301

CPSY 4347W. Senior Project. (WI; 2 cr.; A-F or Audit; Every Fall & Spring) Current literature on self-selected developmental topic. Students write a literature review. prereq: CPSy sr

CPSY 4993. Directed Experiences in Early Childhood Education. (3 cr.; A-F only; Every Fall, Spring & Summer) Issues and techniques involved in the systematic observation of children. Record what is happening within the classroom. Interpret/analyze research information in all developmental domains to increase understanding of child behavior. prereq: ECE student

CPSY 4994. Directed Research in Child Psychology. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Individual empirical investigation. Students help plan/implement scientific studies, gain experience/expertise in methodology of research. prereq: 4 cr in CPSy, instr consent, dept consent

CPSY 4994V. Directed Research in Child Psychology (Honors Thesis). (WI; 1-6 cr.; Student Option; Every Fall, Spring & Summer) Individual empirical investigation. Students help plan/implement scientific studies while gaining experience/expertise in research methodology. prereq: 4 cr in CPSy, CPSy honors, instr consent, dept consent

CPSY 4996. Field Study in Child Psychology. (1-4 cr. [max 32 cr.]; Student Option; Every Fall, Spring & Summer) Independent reading. Varies depending on student's specific area of interest. Students receive credit while interning in metropolitan area. prereq: 4 cr CPSy, instr consent

CPSY 5187. Capstone Project: Improvement of Teaching in Early Childhood Education. (2-4 cr.; Student Option No Audit; Every Fall, Spring & Summer) This is the capstone for teaching candidates in the M.Ed. in Early Childhood Education. Students will complete an in-depth reflective teaching portfolio and parallel assignments. The course requires demonstration of the linking of child development theory, knowledge of developmentally appropriate teaching, and reflective practice. prereq: Completion of all requirements for Early Childhood Teacher Licensure, other than CI 5181, which is taken concurrently.

CPSY 5187W. Senior Project. (2 cr.; A-F or Audit; Every Fall & Spring) Issues and techniques involved in the systematic observation of children. Record what is happening within the classroom. Interpret/analyze research information in all developmental domains to increase understanding of child behavior. prereq: ECE student

CPSY 5187W. Senior Project. (2 cr.; A-F or Audit; Every Fall & Spring) Issues and techniques involved in the systematic observation of children. Record what is happening within the classroom. Interpret/analyze research information in all developmental domains to increase understanding of child behavior. prereq: ECE student

CPSY 5252. Facilitating Cognitive and Language Learning in Early Childhood Education. (3 cr.; A-F only; Every Fall) Overview of cognitive and language characteristics of children ages 0-8 years and of how teachers can plan curriculum to facilitate children's development in these areas. prereq: Student in ECE or ECSE

CPSY 5254. Facilitating Creative and Motor Learning in Early Childhood Education. (2 cr.; A-F only; Every Spring) Unique divergent qualities across characteristics children possess while progressing through universal sequence of physical growth/development and creative development. Students engage in inquiry, research/planning, and reflection as they complete the action-oriented and applied assignments with small groups of children. prereq: Student in ECE or ECSE

CPSY 5281. Student Teaching in Early Childhood Education. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer) Application of theory/research relating to teaching preschool children. For individuals obtaining ECE licensure. prereq: MEd student in early childhood ed or early childhood special ed

CPSY 5301. Advanced Developmental Psychology. (3 cr.; A-F only; Every Fall) Overview of theories/research regarding human development. Contexts that shape development. Theoretical frameworks that are applied to study of human development, cognitive, social, emotional development. Research methods in developmental psychology.

CPSY 5413. Early Childhood and Public Policy. (3 cr.; Student Option; Every Fall) State, federal, and international policies and legislative activity touching first five years of a child's life. Family, community, and institutional roles in promoting children's social, cognitive, and emotional development. Issues related to health, mental health, poverty, developmental delays, and special needs.

CPSY 5414. Individualized Learning Experience in Early Childhood and Public Policy. (1-3 cr.; Student Option; Periodic Spring) Individualized, applied learning experience. Focuses on early childhood policy development, research, or evaluation. Students attend an early childhood policy lecture series and participate in small discussion groups and follow-up activities. prereq: Early Childhood Policy Certificate student, instr consent

CPSY 5501. Foundations in Infant and Early Childhood Mental Health I. (3 cr.; A-F only; Fall Odd Year) History, theory, research, concepts, and issues in infant mental health. Issues pertinent to difficulties in development. Readings, visual material. Expert guest lectures. prereq:

CPSY 5506. Infant Observation Seminar I. (1 cr.; S-N only; Spring Odd Year) How an infant develops in context of family relationships over a 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations.

CPSY 5508. Infant Observation Seminar II. (1 cr.; S-N only; Summer Odd Year) How an infant develops in context of family relationships over a nine- to twelve-month period. Students observe an infant for one hour a week, write a narrative, and discuss observations.

CPSY 5511. Infant Observation Seminar III. (1 cr.; S-N only; Fall Even Year) How an infant develops in context of family relationships over 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations.

CPSY 5513. Assessment in Infant and Early Childhood Mental Health: DC 0-3R. (2 cr.; A-F only; Summer Odd Year) Infant Mental Health diagnostic manual DC 0-3R: Assessment using the manual. Lectures, discussions, cooperative learning, class exercises, case studies. Prereq: Baccalaureate degree in early-childhood-related field from accredited U.S. institution or documented equiv. [experience in early childhood research or practice]

CPSY 5515. Assessment in Infant and Early Childhood Mental Health: NCAST. (2 cr.; S-N only; Summer Odd Year) Achieving reliability in two observational measures of parent-child interaction: (1) nursing child assessment feeding (2) teaching Scales. Discussion, lecture, videotapes, listening/observation tasks. Prereq: Baccalaureate degree in early-childhood-related field from accredited U.S. institution or documented equiv. [experience in early childhood research or practice]

CPSY 5518. Prevention and Intervention in Infant and Early Childhood Mental Health I. (3 cr.; A-F only; Fall Even Year) Students design prevention/intervention programs and apply evidence-based strategies in workplace/practicum settings. Readings, in-class reflective practice groups. Prereq: 5501, 5503, 5506, 5508

CPSY 5521. Prevention and Intervention in Infant and Early Childhood Mental Health II. (3 cr.; A-F only; Spring Odd Year) Students design prevention/intervention programs and apply evidence-based strategies in workplace/practicum settings. Readings, in-class reflective practice groups.

CPSY 5523. Reflective Supervision in Infant and Early Childhood Mental Health: Community-based. (1 cr.; S-N only; Spring Even Year) Principles/strategies of reflective supervision/consultation. Discussion, final assignment designated by instructor.

CPSY 5525. Reflective Supervision in Infant and Early Childhood Mental Health: Clinical. (1 cr.; S-N only; Spring Even Year) Principles and strategies of reflective supervision/consultation. Discussion, final assignment designated by instructor.

CPSY 5596. Field Experience in Child Development. (1-12 cr.; S-N only; Periodic Fall, Spring & Summer) Emphasizes field experiences focusing on the development of children as individuals or members of groups; may include interactions with children in natural settings, or research on applied topics or with atypical populations.

CPSY 8101. Graduate Fellowship Proposal Writing Seminar. (1 cr.; S-N only; Every Fall) The primary purpose of this course is to prepare students to submit a competitive NSF Graduate Research Fellowship proposal. Students submitting to other organizations are welcome to join the course, but all of the assignments and focus will be on increasing NSF and predoctoral fellowship competitiveness. This course is intended primarily for doctoral students in their first or second year of study.

CPSY 8102. Writing Developmental Psych Grants for NIH and NSF. (1-3 cr.; max 4 cr.; A-F only; Spring Odd Year) Research/identify potential funding sources at NIH/NSF, create right fit between proposals/agency program goals, address guideline of proposals, write effective key elements of proposal, understand review criteria, complete grant review, interpret feedback from reviews. Prereq: Doctoral students in second year of study or beyond

CPSY 8301. Developmental Psychology: Cognitive Processes. (4 cr.; Student Option; Every Fall) Perceptual, motor, cognitive, and language development, and biological bases of each. Prereq: CPsy doctoral student or instr consent


CPSY 8304. Developmental Research Methods. (3 cr.; Student Option; Every Spring) Review of research strategies and designs for conducting research in developmental psychology, as well as strengths and weaknesses of each. Students will learn to

(a) communicate about empirical research, (b) critically review methods used in empirical studies, and (c) design research to maximize knowledge gained, while recognizing its limitations.

CPSY 8307. Prelim Seminar. (1 cr.; S-N only; Every Spring) Prepare for written preliminary examination during summer of second year of doctoral study. Critically discuss issues/themes in field using key readings suggested by faculty/past readings from core child development doctoral courses. Prereq: Child psychology PhD student in second year of study.

CPSY 8311. Landmark Issues and Great Controversies in Child Development. (2 cr.; S-N or Audit; Every Fall) History of developmental psychology and child development movement in context of conceptual/theoretical controversies. Presentations by students/instructor. Prereq: CPsy doctoral student or instr consent

CPSY 8321. Seminar in Teaching Developmental Psychology. (1 cr.; Student Option; Every Fall) Apprentices attend weekly seminar meetings covering all aspects of university teaching. Planning course coverage, teaching techniques, developing learning activities and etc. Preparation for CPSY 8322. Prereq: CPsy doctoral student or instr consent

CPSY 8322. Apprenticeship in Teaching Developmental Psychology. (1-3 cr.; S-N only; Every Spring) Co-instruct a section of a CPSY undergraduate course. Plan syllabus, prepare/deliver lectures, devise active learning activities, prepare exams/assignments, and grade. Meet with apprenticeship supervisor to discuss teaching progress/issues. Prereq: Child psychology doctoral student

CPSY 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) Prereq: Master's student, adviser and DGS consent

CPSY 8360. Special Topics in Developmental Psychology. (1-3 cr. [max 21 cr.]; Student Option; Every Fall & Spring) Intensive study in specialized areas of developmental psychology. Topics/credits vary. Prereq: Doctoral student

CPSY 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) Prereq: Doctoral student, adviser and DGS consent

CPSY 8606. Advanced Developmental Psychopathology. (3 cr.; Student Option; Every Fall) Alternative formulation of childhood disorders, emphasizing competency training rather than medical nosology. Prereq: Doctoral student or instr consent

CPSY 8607. Developmental Neurobiology of Stress and Emotion. (3 cr.; Student Option; Periodic Fall)
Maladaptive responses to stress are components of both the etiology and expression of many psychiatric disorders. In addition, individuals differ in their stress vulnerability, with some seeming to thrive despite the odds, and others succumbing to even relatively mild adversity. These individual differences are likely the interactions of genes and experiences; early experiences may be particularly noteworthy.

CPSY 8608. Clinical Intervention with Children. (3 cr.; Student Option; Periodic Spring)

This course is a graduate seminar designed to introduce students to child treatment theory and techniques. The course has two objectives: (1) to introduce students to current clinical theory and research, relevant to clinical practice with children, and (2) to teach students basic clinical skills and interventions that will prepare them for their first child psychotherapy case during their clinical practicum. The course will cover a variety of topics, including the therapeutic relationship and the therapeutic process, an introduction to different modalities of child psychotherapy (with a focus on cognitive-behavioral and behavioral interventions), and ?real life? clinical practice issues (working with minority populations, working in a managed care environment, and broader children?s mental health issues).

CPSY 8660. Advanced Developmental Psychology. (1-4 cr. [max 21 cr.]; Student Option; Periodic Fall & Spring)

Intensive study in advanced areas of developmental psychology. Topics/credits vary. prereq: Doctoral student.

CPSY 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)

tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CPSY 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)

No description. prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CPSY 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)

No description. prereq: Max 18 cr per semester or summer; 24 cr required

CPSY 8980. Research Seminar in Child Psychology. (1-3 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)

Participation in organized research group in developmental psychology. prereq: Doctoral student

CPSY 8993. Directed Study in Child Psychology. (1-4 cr.; Student Option; Every Fall & Spring)

tbd prereq: Doctoral student or instr consent

CPSY 8994. Research Problems in Child Psychology. (1-6 cr. [max 24 cr.]; Student Option; Every Fall & Spring)

Individual empirical investigation. prereq: Doctoral student or instr consent

CPSY 8996. Directed Field Experiences in Child Psychology. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)

Emphasizes field experiences focusing on intellectual and/or social development of children as individuals or members of groups; may include interactions with children in natural settings, or research on applied topics or with atypical populations. prereq: Doctoral student, instr consent

China Executive MBA (CHMB)

CHMB 5800. Organizational Behavior. (3 cr.; A-F only; Every Fall)

Theories/frameworks for analyzing behavior of individuals, groups, and the organization itself. Emphasizes making decisions and developing action plans that enable managers to provide effective leadership. Personnel selection, reward/compensation systems, collective bargaining.

CHMB 5801. Financial Accounting. (3 cr.; A-F only; Every Fall)

External accounting system used by firms to measure their economic performance and financial position. Students analyze corporate financial reports to discover impact of significant economic events. Rise of financial reporting standards and financial intermediaries in efficient allocation of capital in a modern economy. Discussions, cases.

CHMB 5802. Statistics and Decision Making. (3 cr.; A-F only; Every Fall)

Exploratory data analysis, basic inferential procedures, statistical process control, regression analysis.

CHMB 5803. Operations Management. (3 cr.; A-F only; Every Fall)

How to manage operations function in manufacturing/service organizations. Emphasizes strategic impact of operations decisions. Operations strategy, process design, productivity improvement, quality management, business process re-engineering, service quality, forecasting, demand management, inventory management, production planning, project management, scheduling, supply chain management, international operations management.

CHMB 5804. Managerial Accounting. (3 cr.; A-F only; Every Spring)

How to analyze accounting for use in management decisions. Planning and control. Transfer pricing, performance measurements, cost behavior, cost allocation, activity based costing, standard costs.

CHMB 5805. Financial Management. (3 cr.; A-F only; Every Spring)

Theory/practice of finance from analytical approach. Students apply basic financial concepts of risk, return, and valuation to decisions that a corporate financial officer or person engaged in small business must make about sources/sources of funds during changing financial markets.

CHMB 5806. Marketing Management. (3 cr.; A-F only; Every Spring)

Developing/implementing most appropriate combination of variables to carry out a firm's strategy in its target markets. Applying analytic perspectives, concepts, and decision tools of marketing to decisions in product offering, distribution, pricing, and communication.

CHMB 5807. Business Strategy. (3 cr.; A-F only; Every Spring)


CHMB 5808. Strategic Marketing. (3 cr.; A-F only;)

Product markets in which an organization should compete. Sustainable competitive advantage that should be developed. Matching marketing strategy with the environment. Coordination between marketing and other business functions. Organization/management of marketing. Case studies.

CHMB 5809. Advanced Financial Management. (3 cr.; A-F only;)

Executive level corporate financial policy. Students are challenged to apply basic principles of finance on their own initiative. Rigorous case-oriented approach.

CHMB 5810. International Environment. (1.5 cr.; A-F only; Every Fall)

How to develop an integrative framework for dealing with international activities of a newly exporting company or a full-fledged multinational. How international environment constrains decision-making, how currency prices are determined, and how to manage exchange risk in coordination with strategic choices of the firm. prereq: China Executive MBA student

CHMB 5811. Information Technology Management. (3 cr.; A-F only;)

Managing information resources/technology. Students gain exposure to various information technologies, examine their applications, explore competitive advantages associated with information technology, and address organizational/managerial implications.

CHMB 5813. Ethics and Leadership. (3 cr.; A-F only; Every Fall & Spring)

Role that ethics can play in corporate strategy. Key concepts include stakeholder management, individual/collective responsibility, and international business ethics. Theoretical considerations applied to issues such as a business's responsibility to the environment, truthful/tasteful advertising, obligations to local community, and managing a diverse workforce.

CHMB 5815. International Human Resources Management. (3 cr.; A-F only; Every Spring)
Chinese (CHN)

CHN 1011. Beginning Modern Chinese I. (6 cr.; Student Option; Every Fall & Summer)
Speaking/reading modern standard Chinese through structured practice.

CHN 1012. Beginning Modern Chinese II. (6 cr.; Student Option; Every Spring & Summer)
Speaking/reading modern standard Chinese through structured practice. prereq: 1011 or equiv or instr consent

CHN 1015. Accelerated Beginning Modern Chinese. (; 5 cr.; Student Option; Every Fall)
Reading, writing, standard pronunciation. Meets with 4005. prereq: Oral/aural skills or speaker of other Chinese dialect recommended

CHN 1016. Accelerated Intermediate Modern Chinese. (; 5 cr.; Student Option; Every Spring)
Continuation of CHN 1015. Mandarin Chinese course designed primarily for students with oral/aural skills but with little or no exposure to reading and writing. Also for speakers of other Chinese dialects and others with prior experience. Concentration on reading, writing, and standard pronunciation. Equivalent to two semesters, Chinese 3021-3022. Upon completion, student may enter Advanced Modern Chinese, Chinese 3031. prereq: 1012 or 1015; oral/aural skills or speaker of other Chinese dialect recommended

CHN 3021. Intermediate Modern Chinese I. (5 cr.; Student Option; Every Fall)
Modern standard Chinese skills developed further through conversations, writing, reading. prereq: 1012 or 1015 or equiv or instr consent

CHN 3022. Intermediate Modern Chinese II. (5 cr.; Student Option; Every Spring)
Modern standard Chinese skills developed further through conversations/writing, reading. prereq: 3021

CHN 3031. Advanced Modern Chinese I. (4 cr.; Student Option; Every Fall)
Reading/analysis of 20th-century texts. prereq: 3022 or equiv or instr consent

CHN 3032. Advanced Modern Chinese II. (4 cr.; Student Option; Every Spring)
Reading/analysis of 20th-century texts. prereq: 3031 or equiv or instr consent

CHN 3201. Chinese Calligraphy. (; 2 cr.; Student Option; Every Fall & Spring)
Appreciation and execution of Chinese calligraphy through guided practice.

CHN 3202. Intermediate Chinese Calligraphy. (; 2 cr.; Student Option; Every Spring)
Advanced techniques of composing Chinese characters using regular style of Chinese calligraphy. prereq: 3201 or equiv or instr consent

CHN 3290. Chinese Language Teaching Tutorial. (; 1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
Students tutor beginning students of Chinese and are part of department's Chinese language team. prereq: Grade of A in 3032

CHN 3920. Topics in Chinese Culture. (; 1 cr. [max 3 cr.]; S-N only; Every Fall, Spring & Summer)
Selected topics in Chinese culture. Topics specified in the Class Schedule.

CHN 3993. Directed Studies. (1-5 cr. [max 15 cr.]; Student Option No Audit; Every Fall & Spring)
Guided individual study of Chinese language or linguistics. prereq: instr consent, dept consent, college consent

CHN 4001. Beginning Modern Chinese I for Graduate Student Research. (6 cr.; Student Option; Every Fall)

CHN 4002. Beginning Modern Chinese II for Graduate Student Research. (6 cr.; Student Option; Every Spring)
Speaking/reading modern standard Chinese through structured practice. Meets with 1012. prereq: 4001

CHN 4003. Intermediate Modern Chinese I for Graduate Student Research. (5 cr.; Student Option; Every Fall)
Modern standard Chinese skills developed through conversations, writing, reading. Meets with 3021. prereq: 4002

CHN 4004. Intermediate Modern Chinese II for Graduate Student Research. (5 cr.; Student Option; Every Spring)
Modern standard Chinese skills developed through conversations/writing, reading. Meets with 3022. prereq: 4003

CHN 4005. Accelerated Beginning Modern Chinese for Graduate Student Research. (5 cr.; Student Option; Every Fall)
Mandarin Chinese. Reading, writing, standard pronunciation. prereq: Grad student, instr consent; oral/aural skills or other Chinese dialect recommended

CHN 4006. Accelerated Intermediate Modern Chinese for Graduate Student Research. (5 cr.; Student Option; Every Spring)
Continuation of 1015. Mandarin Chinese. Reading, writing, standard pronunciation. prereq: 1012 or 1015; oral/aural skills or other Chinese dialect recommended

CHN 4007. Advanced Modern Chinese I for Graduate Student Research. (4 cr.; Student Option; Every Fall)
Reading and analysis of 20th-century texts. Meets with 3031. prereq: 4004

CHN 4008. Advanced Modern Chinese II for Graduate Student Research. (4 cr.; Student Option; Every Spring)
Reading and analysis of 20th-century texts. Meets with 3032. prereq: 4007

CHN 4041. Advanced Readings in Modern Chinese I. (4 cr.; Student Option; Every Fall)
Readings of different styles. Short stories/essays written since 1949 that reflect Chinese society. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or its equivalent or instr consent

CHN 4042. Advanced Readings in Modern Chinese II. (4 cr.; Student Option; Every Spring)
Readings of different styles. Short stories/essays written since 1949 that reflect Chinese society. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or its equivalent or instr consent

CHN 5011. Research Methods. (4 cr.; Student Option; Periodic Fall)
Introduction to the sources and approaches of research in language and literature. prereq: 3032 or 3112

CHN 5040. Readings in Chinese Texts. (3 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring)
Students read authentic materials of various types to increase reading/speaking ability. Topics specified in Class Schedule. prereq: 4042 or equiv or instr consent

CHN 5120. Topics in Chinese Linguistics. (; 4 cr. [max 8 cr.]; Student Option; Periodic Fall)
Studies of the structure and change in the Chinese language. prereq: 4121 or 4125

CHN 5211. Introductory Classical Chinese I. (3 cr.; Student Option; Periodic Fall)
Reading excerpts from canonical Chinese texts. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or its equivalent or instr consent

CHN 5212. Introductory Classical Chinese II. (3 cr.; Student Option; Periodic Spring)
Reading excerpts from canonical Chinese texts. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or its equivalent or instr consent

CHN 5393. Directed Study. (1-5 cr. [max 18 cr.]; Student Option; Every Fall & Spring)

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

CHN 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

CHN 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

CHN 8494. Directed Research. (1-5 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Individual study/research with guidance of a faculty member.

CHN 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHN 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHN 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Civil, Environ, and Geo-Engin (CEGE)

CEGE 5. Refresher Course for Civil Engineers. (0 cr.; S-N or Audit; Every Spring) Review of civil engineering fundamentals required to pass the Minnesota Professional Engineering Examination in civil engineering. prereq: BCE or equivalent degree or completion of Parts I and II of the State Board Examination

CEGE 1101. Orientation to Civil, Environmental, and Geo-Engineering. (1 cr.; A-F or Audit; Every Fall) Introduction to civil, environmental, geo-engineering practice. Presentations made by faculty members/professional engineers, followed by discussion on topics related to future challenges. prereq: Lower div


CEGE 3102. Uncertainty and Decision Analysis in Civil Engineering. (3 cr.; A-F or Audit; Every Fall & Spring) Stochastic models, their usefulness in reasoning about uncertainty in civil engineering. Techniques for identifying, fitting, validating models using data samples. Testing hypotheses about, bounding uncertainty attached to, engineering parameters. Branches of civil engineering. prereq: MATH 1372 or equiv

CEGE 3111. ADD for Civil Engineers. (2 cr.; A-F only; Every Fall & Spring) Introduction to AutoCAD and land development desktop software. Students complete all tasks to design two-lane roadway using civil engineering design software, including topography, plan/profile, contours, cross sections, and quantity calculations. prereq: 3201

CEGE 3201. Transportation Engineering. (3 cr.; Student Option; Every Fall & Spring) Applying laws of motion to vehicle performance, determining constraints for highway designs. Traffic flow principles, their relation to capacity and level of service. Geometric design, pavement design, transportation planning. prereq: PHYS 1301, 3101, 3102

CEGE 3202. Surveying and Mapping. (2 cr.; A-F or Audit; Every Fall & Summer) Theory of precision measurements of distance, elevation, angle, and direction of points/lines above, on, or beneath earth’s surface. Establishing such points/lines. Elements of coordinate systems, datum planes, and maps. prereq: MATH 1271, MATH 1272), [CSE or Construction Mgmt]


CEGE 3401. Linear Structural Analysis. (3 cr.; A-F or Audit; Every Fall & Spring) Analysis of determinate/indeterminate trusses and frames and of deformation by virtual work. Application of energy, slope-deflection, and moment distribution methods to indeterminate structures. Influence lines. Design. prereq: Grade of at least C- in AEM 3031, CSE

CEGE 3402W. Civil Engineering Materials. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Concepts of behavior mechanisms for civil engineering materials such as concrete, metals, asphalt, plastics, and wood. Standard specifications for material properties. Techniques for testing. prereq: Grade of at least C- in [AEM 3031 or BBE 3001], IT

CEGE 3501. Environmental Engineering. (ENV; 3 cr.; A-F or Audit; Every Fall & Spring) Introduction to environmental engineering. Quantitative approach to environmental problems. Scientific background for understanding roles of engineers and scientists. prereq: Chem 1022, Phys 1302


CEGE 3541. Environmental Engineering Laboratory. (3 cr.; A-F only; Every Fall) Experiments focused on physical, chemical, microbiological measurements used in analysis of air, water, solid samples. Applications to water treatment, waste water treatment, hazardous waste treatment/remediation, air pollution, environmental sensing. prereq: 3501

CEGE 4000H. Honors Research Seminar. (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Research seminars in civil and geological engineering given by faculty members and visiting scholars. prereq: Upper div CE

CEGE 4011. Special Topics. (1-4 cr. [max 12 cr.]; A-F only; Periodic Fall & Spring) Topics/credits vary. prereq: Upper div CSE

CEGE 4092H. Honors Selected Reading. (1 cr. [max 2 cr.]; A-F only; Every Fall) Selected readings, student presentations. prereq: Upper div CE, honors

CEGE 4094H. Senior Honors Thesis. (2 cr.; A-F only; Every Fall) Writing thesis under direction of CE faculty member. prereq: Upper div CE

CEGE 4102W. Capstone Design for Civil Engineering. (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Teams formulate/solve civil engineering problems. From conceptual stage through preliminary planning, public hearings, design, environmental impact statements, to preparation of final plans/specifications, and award of contracts. prereq: 4301, 4401, 4501, 4502

CEGE 4104W. Capstone Design for Geoengeering. (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Team participation in formulation/solution of open-ended civil engineering problems, from conceptual stage through preliminary planning, public hearings, design, and environmental impact statements, to preparation of final plans/specifications and award of contracts. prereq: CE 4121, CE 4311, CE 4351, ESCI 4501

CEGE 4121. Computer Applications in Civil Engineering II. (3 cr.; A-F or Audit; Periodic Spring) Advanced application of computer tools/methods in solving ordinary/partial differential equations from civil engineering problems. Spreadsheet, Matlab programming. Methods may include finite differences, boundary element, finite element, and control volume finite element. prereq: 3101, MATH 2243, MATH 2263, [CE or upper div GeoE]

CEGE 4170. Independent Study I. (1-4 cr.; Student Option; Every Fall) Special studies in planning, designing, or analyzing civil engineering systems. Lab
problems, literature studies, or reports supervised by staff. prereq: instr consent

CEGE 4180. Independent Study II. (; 1-4 cr.; A-F; Student Option; Every Spring & Summer)
Special studies in the planning, design, or analysis of civil engineering systems. Individual lab research problems, literature studies, reports. Supervised by staff. prereq: instr consent

CEGE 4190. Engineering Co-op Assignment. (; 2-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Formal written report of work during six-month professional assignment. prereq: Upper div CE, approval of department co-op director

CEGE 4194H. Senior Honors Thesis. (; 2 cr.; A-F only; Every Fall)
Writing thesis under direction of CE faculty member. prereq: Upper div CE

CEGE 4201. Highway Design. (; 3 cr.; A-F or Audit; Every Spring)
Vertical and horizontal alignment, earthwork computations, highway capacity, forecast of traffic volume demand, impact of vehicle type on geometric design, intersection design, prereq: CE or upper div GeoE or grad, 3202, 3201 or instr consent

CEGE 4211. Traffic Engineering. (; 3 cr.; Student Option; Periodic Spring)
Principles of vehicle/driver performance as they apply to safe/efficient operations of highways. Design/use of traffic control devices. Capacity/level of service. Trip generation, traffic impact analysis. Safety/traffic studies. prereq: 3201 or Stat 3201 or equiv

CEGE 4251. Pavement Analysis, Design, and Rehabilitation. (; 4 cr.; Student Option; Every Fall)
Concepts/principles in rigid/flexible pavement design. Traffic loads, soil considerations, material characteristics for highway/airport pavement design. Rehabilitation flexible/rigid pavement systems. prereq: [3201, 3301, 3402, upper div CE] or grad student or instr consent

CEGE 4253. Pavement Engineering and Management. (; 3 cr.; Student Option; Every Spring)

CEGE 4301. Soil Mechanics II. (; 3 cr.; A-F or Audit; Every Fall & Spring)

CEGE 4311. Rock Mechanics. (; 4 cr.; A-F or Audit; Every Fall)

CEGE 4351. Groundwater Mechanics. (; 3 cr.; A-F or Audit; Every Fall)
Shallow confined, unconfined, and semi-confined flows. Flow in two coupled aquifers separated by leaky layers. Transient flow. Flow toward wells. Streamlines/pathlines in two/three dimensions. Contaminant transport. Elementary computer modeling. prereq: [3502, [upper div CSE or grad student]] or instr consent

CEGE 4352. Groundwater Modeling. (; 3 cr.; A-F or Audit; Periodic Spring)
Analytic element method. Mathematical/computer modeling of single/multiple aquifer systems. Groundwater recovery. Field problems. Theory/application of simple contaminant transport models, including capture zone analysis. prereq: [4351, GEOE 4351, [upper div CSE or grad student]] or instr consent

CEGE 4401. Steel and Reinforced Concrete Design. (; 4 cr.; A-F or Audit; Every Fall & Spring)
Limit-states design. Steel: tension, compression, flexure, combined compression/ flexure, connections. Concrete: beams in flexure/shear, one-way slabs, T-beams, development length, serviceability. prereq: Grade of at least C- in 3401, concurrent registration is required (or allowed) in 3402, [upper div CSE or grad student]

CEGE 4411. Matrix Structural Analysis. (; 3 cr.; A-F or Audit; Every Spring)
Analysis of linear structural systems by matrix methods, stiffness, and flexibility methods. Introduction to computerized structural analysis of trusses/frames, including coding in programming language. prereq: Grade of at least C- in 3101, 3401 or in a CSci programming course, [upper div CSE or grad student] or instr consent

CEGE 4412. Reinforced Concrete Design II. (; 3 cr.; A-F or Audit; Every Spring)
Advanced design of reinforced concrete structures: footings, retaining walls, columns with slenderness effects and biaxial loading, torsion, continuous systems, two-way floor systems. prereq: [Grade of at least C- in 4401, [upper div CSE or grad student]] or instr consent; 4411 recommended

CEGE 4413. Steel Design II. (; 3 cr.; A-F or Audit; Every Fall)
Design of steel and composite steel/concrete structures, including multistory frames and plate-girders bridges. Beam-columns, torsion, connections, frames. prereq: [Grade of at least C- in 4401, [upper div CSE or grad student]] or instr consent; 4411 recommended

CEGE 4501. Hydrologic Design. (; 4 cr.; A-F or Audit; Every Fall & Spring)
Hydrologic cycle; precipitation, evaporation, infiltration runoff. Flood routing through rivers and reservoirs. Statistical analysis of hydrologic data and estimation of design flows. Open channel flow, flow through controls. Detention basin design, hydraulic structure sizing, estimation of risk of flooding. prereq: 3502

CEGE 4502. Water and Wastewater Treatment. (; 3 cr.; A-F or Audit; Every Fall & Spring)

CEGE 4511. Hydraulic Structures. (; 3 cr.; A-F or Audit; Periodic Fall)
Hydraulic design procedures for culverts, dams, spillways, outlet works, and river control works. Drop structures, water intakes, bridge crossings. Offered alt yrs. prereq: 4501

CEGE 4512. Open Channel Hydraulics. (; 4 cr.; A-F or Audit; Periodic Fall & Spring)
Theories of flow in open channels, including gradually varied and rapidly varied flows, steady and unsteady flows. Computational methods for unsteady open channel flows, applications to flood routing. Introduction to movable bed mechanics. prereq: CSE or grad, 3502 or instr consent

CEGE 4522. Review of Introductory Fluid Mechanics for Graduate Students. (3 cr.; A-F or Audit; Every Fall & Spring)

CEGE 4561. Solid Hazardous Wastes. (; 3 cr.; Student Option; Every Spring)
Solid and hazardous waste characterization; regulatory legislation; waste minimization; resource recovery; chemical, physical, and biological treatment; thermal processes; disposal practices. Analysis and design of systems for treatment and disposal. prereq: CSE or grad, Chem 1022, 3501 or instr consent

CEGE 4562. Environmental Remediation Technology. (; 3 cr.; A-F or Audit; Periodic Spring)
Technologies designed for removal of pollutants from groundwater and soils. Advances in technological design. Emerging technologies such as in situ bioremediation, phyto remediation. Role of environmental biotechnology in pollution abatement. prereq: [3501, 4501] or instr consent

CEGE 5094. Civil Engineering Research. (; 1-4 cr.; Student Option; Every Fall & Spring)
Research or independent study in concrete, structural steel, soils, hydraulics, hydrology/municipal, environmental, or transportation problems. Investigations, reports, tests, designs. prereq: instr consent

CEGE 5180. Special Topics. (; 1-4 cr.; A-F or Audit; Periodic Fall & Spring)
Topics vary depending on faculty and student interests. preq: instr consent

CEGE 5211. Traffic Engineering. (3 cr.; Student Option; Periodic Spring)
Principles of vehicle and driver performance as they apply to the safe and efficient operation of highways. Design and use of traffic control devices. Capacity and level of service. Trip generation and traffic impact analysis. Safety and traffic studies. preq: 3201, Stat 3021 or equiv

CEGE 5212. Transportation Policy, Planning, and Deployment. (4 cr.; Student Option; Every Fall)
Techniques of analysis and planning for transportation services. Demand-supply interactions. Evaluating transportation alternatives. Travel demand forecasting. Integrated model systems. Citizen participation in decision-making. preq: 3201 or equiv

CEGE 5213. Transit Planning and Management. (3 cr.; A-F only; Every Fall)

CEGE 5214. Transportation Systems Analysis. (4 cr.; Student Option; Every Fall)
Systems approach, its application to transportation engineering/planning. Prediction of flows and level of service. Production functions, cost optimization, utility theory, demand modeling, transportation network analysis, equilibrium assignment, decision analysis, multidimensional evaluation of transportation projects. preq: 3201

CEGE 5253. Asphalt and Portland Cement Concrete Materials. (4 cr.; Student Option; Periodic Spring)

CEGE 5341. Wave Methods for Nondestructive Testing. (4 cr.; A-F or Audit; Periodic Fall)
Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical sites). Imaging technologies based on propagation of elastic waves such as ultrasonic/resonant frequency methods, seismic surveys, and acoustic emission monitoring. Lecture, lab. preq: [AEM 2021, AEM 3031] or instr consent

CEGE 5351. Advanced Mathematics for Civil Engineers. (3 cr.; A-F or Audit; Periodic Fall)
Emphasizes skills relevant for civil engineers. Mathematical principles explained in an engineering setting. Applications from various areas in civil engineering. preq: [[Math 2263 or Math 2374 or equiv], [or grad student] in civil engineering] or instr consent

CEGE 5411. Applied Structural Mechanics. (3 cr.; A-F or Audit; Every Fall)
Principles of structural mechanics important for the design of structures. Stress and strain theories. Analysis of flexural members. Lecture, laboratory. preq: Math 2263 and Math 2374 or equiv.

CEGE 5414. Prestressed Concrete Design. (3 cr.; A-F or Audit; Every Fall)
Introduction to prestressed concrete. Design of prestressed concrete structures. Time dependent effects, behavior, fatigue, shear, torsion, deflections, continuous systems. preq: [Grade of at least C- in 4401, upper div CSE or grad student] or instr consent

CEGE 5415. Masonry Structures. (3 cr.; A-F or Audit; Periodic Fall)
Masonry materials and their production. Mortars, grouts. Design of unreinforced, reinforced, and prestressed masonry structural systems. Walls, columns, lintels, arches. Codes/specifications, testing, inspection. preq: [Grade of at least C- in 3401, upper div CSE or grad student] or instr consent

CEGE 5511. Urban Hydrology and Water Quality. (4 cr.; A-F or Audit; Every Fall)
Urban hydrology for small watersheds and the management of storm water quality and quantity. preq: CE 4501

CEGE 5541. Environmental Water Chemistry. (3 cr. [max 4 cr.]; A-F or Audit; Every Fall)
Introduction to water chemistry. Physical chemical principles, geochemical processes controlling chemical composition of waters, behavior of contaminants that affect the suitability of water for beneficial uses. preq: 3501, Chem 1021, Chem 1022

CEGE 5542. Experimental Methods in Environmental Engineering. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Tools necessary to conduct research in environmental engineering and chemistry.

CEGE 5543. Introductory Environmental Fluid Mechanics. (4 cr.; A-F or Audit; Fall Odd Year)
Divergence theorem, Convective flux, Mass conservation, Biological reactions, Random walk and diffusive flux, Receptors and channels, Momentum conservation, Navier-Stokes equations, Boundary layer, Chemotaxis, Phototaxis, Shear dispersion, Turbulent flows. preq: 3502 or AEM 4201 or ChEn 3005

CEGE 5551. Environmental Microbiology. (3 cr.; A-F or Audit; Every Fall)
Role of microorganisms in environmental bioremediation, pollution control, water/wastewater treatment, biogeochemistry, and human health. Lecture. preq: [Upper div or grad] student

CEGE 5552. Environmental Microbiology Laboratory. (1 cr.; A-F only; Every Fall)
Basic microbiological techniques: isolation, identification/enumeration of bacteria, BOD, biodegradable kinetics, disinfection. Lab. preq: 5551 or concurrent registration is required (or allowed) in 5551

CEGE 5561. Air Quality Engineering. (3 cr.; A-F only; Every Spring)
Introduction to air pollution problems/solutions, local to global. Quantitative analysis of chemistry and physics of atmospheric pollutants. Sources, sinks, and controls; atmospheric transport and transformation; air quality management and regulation; health impacts; global issues. preq: Grad student in engineering or instr consent

CEGE 5570. Design for Sustainable Development: Discovery. (3-9 cr.; A-F only; Every Fall)
Intensive, experiential learning opportunity on infrastructure, development, environment issues in Delhi, India. preq: Juniors or seniors with minimum 3.0 GPA or grad student

CEGE 5571. Acara Global Venture Design: Grand Challenges. (GP; 3-4 cr. [max 8 cr.]; A-F only; Every Fall & Spring)
Project-based course focused on designing venture solutions to global grand challenges related to environment, health, development. Identify specific social-environmental problem. Design financially-viable venture solution. Collaborate with professional mentors/technical experts. Create venture plan, may pitch for funding. Course is part of Acara program. preq: instr consent

CEGE 5572. Acara Social Venture Launchpad: Ideas to Impact. (1-2 cr. [max 4 cr.]; A-F only; Every Spring)
Project-based Acara entrepreneurship course in which students refine existing venture solutions to social-environmental challenges. Students work on business model/develop effective pitch. Teams interact with entrepreneurs, investors/Acara staff. preq: instr consent

CEGE 5573. Design for Sustainable Development: Create II. (1-5 cr. [max 10 cr.]; S-N only; Every Spring)
Weekly discussion on social or environmental venture.

CEGE 5601. Experiential Education Abroad. (1-5 cr. [max 495 cr.]; S-N only; Every Fall, Spring & Summer)
Special engineering studies abroad. Studies/reports supervised by staff.

CEGE 8022. Numerical Methods for Free and Moving Boundary Problems. (3 cr.; A-F or Audit; Periodic Fall)
Examples of free and moving boundary problems: metal solidification, filling, polymer molding, flow in porous media, ground freezing. Solutions: analytical, fixed finite difference, fixed finite element, front tracking schemes.
CEGE 8094. Civil Engineering Research. (; 1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Research or independent study in concrete, structural steel, soils, hydraulics, hydrology, and municipal, environmental, or transportation problems. Investigations, reports, tests, or designs. prereq: instr consent

CEGE 8200. Seminar: Transportation. (; 1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring) Content depends on instructor and student. Sample topics: traffic safety, traffic flow theory, transportation materials, transportation planning, transportation economics.

CEGE 8202. Networks and Places: Transportation, Land Use, and Design. (4 cr.; A-F or Audit; Every Spring) Relationship between land use and transportation. Developing synthetic design skills for linking land use transportation in urban/regional settlements. Economic, political, legal, institutional frameworks for planning. Parallel computer lab, practicum assignment.


CEGE 8212. Advanced Travel Demand Modeling and Supply Analysis. (3 cr.; Student Option; Fall Odd, Spring Even Year) Application of random utility theory to model travel demand; deterministic and stochastic trip assignment; network design problems; transportation planning software. prereq: 5211 or equiv, Stat 3021

CEGE 8213. Advanced Transportation Technologies Seminar. (1 cr.; S-N or Audit; Periodic Fall & Spring) Advantaged technologies specifically related to transportation. Topics drawn from core science/technology areas of human factors, intelligent vehicles, traffic modeling/management, sensing, communications, and controls.


CEGE 8215. Transportation Data Analysis. (3 cr.; Student Option; Spring Even Year) Maximum likelihood methods for generalized linear models, with logit/probit models. Linear regression as special cases. Applications to gap acceptance, discrete choice, speed/headway distributions, accident modeling.

CEGE 8216. Urban Traffic Operations. (3 cr.; Student Option) Capacity analysis techniques for urban streets, optimal traffic signal timing, coordination, real time control. Traffic signal hardware, including detectors/controllers. Operational techniques for traffic management. Use of computer program packages in traffic engineering practice. Freeway operations/control.


CEGE 8231. Advanced Pavement Engineering. (3 cr.; Student Option; Periodic Fall) Advanced concepts in pavement analysis and design; computation of stresses and strains in flexible and rigid pavement systems; review of Boussinesq theory, Burmeister model, and Westergaard model; load transfer in rigid pavements; temperature induced stresses; mechanics of drainage. prereq: 4231 or instr consent

CEGE 8233. Advanced Bituminous Materials Characterization. (3 cr.; Student Option; Periodic Fall) Applications of viscoelasticity, rheology, elasticity, and fracture mechanics to bituminous materials characterization. Lectures, discussions of advanced research reading assignments, laboratory assignments. prereq: [3402, grad student] or instr consent

CEGE 8300. Seminar: Geomechanics. (1-3 cr.; Student Option; S-N or Audit; Every Fall & Spring) Presentations on various topics.


CEGE 8311. Advanced Rock Mechanics. (3 cr.; A-F or Audit; Periodic Fall) Stress transformations; principal stresses and directions. Friction and behavior of rock joints; stability of frictional sliding. Elastic waves; acoustic emission and seismic measurements. Fragmentation and rock breakage. prereq: CSE grad student, 4311 or GeoE 4311 or instr consent


CEGE 8322. Storage and Flow of Granular Materials. (3 cr.; A-F or Audit; Periodic Fall) Plasticity of granular media. Static and dynamic method of slices. Storage and flow of granular materials in bins and hoppers. Stress concentrations, arching, piping. Experiments on granular material properties and flow. prereq: CSE grad student, 4301 or instr consent


CEGE 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

CEGE 8336. Boundary Element Methods I. (3 cr.; A-F or Audit; Fall Even Year) Introduction to boundary element methods for elastostatics; stress discontinuity, displacement discontinuity, and direct boundary integral methods. Derivation of basic mathematical solutions from the theory of elasticity. Applications in geomechanics. prereq: CSE grad student

CEGE 8337. Boundary Element Methods II. (3 cr.; A-F or Audit; Periodic Fall) Transient and nonlinear problems. prereq: 8336, GeoE 8336 or instr consent


CxEE 8352. Advanced Groundwater Mechanics II. (3 cr.; A-F or Audit; Periodic Fall) Applying complex methods, including conformal mapping, in groundwater mechanics; solving problems with free boundaries using the hodograph method; drains in aquifers with free boundaries; superposition of solutions with drains; singular Cauchy integrals; boundary elements. prereq: 4351, CSE grad student or instr consent

CxEE 8361. Engineering Model Fitting. (3 cr.; A-F or Audit; Fall) Parameter estimation and inverse modeling for civil and geological engineering. Formulating engineering model fitting problems; comparing and selecting various fit criteria; implementing numerical algorithms; analyzing and interpreting results using both statistical and qualitative tools; designing future measurement plans. prereq: CSE grad student or instr consent

CxEE 8400. Seminar: Structures. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring) Content depends on instructor and student. Sample topics: theory of elasticity, optimization, reliability, wave propagation, soil dynamics, experimental equipment, wind forces on structures, structural failures, modern construction practices.

CxEE 8401. Fundamentals of Finite Element Method. (3 cr.; A-F or Audit; Every Spring) Elements of calculus of variations; weak and strong formulations of linear continuum and structural problems. Isoparametric elements and numerical integration. Basic concepts of error analysis and convergence. Analysis of plates and shells. Introduction to mixed methods and time dependent problems. prereq: 4411 or instr consent

CxEE 8402. Nonlinear Finite Element Analysis. (3 cr.; A-F or Audit; Periodic Fall) Large strains and work conjugate stresses. Equilibrium and principle of virtual work for nonlinear problems. Nonlinear elasticity and plasticity. Finite element discretization and nonlinear algebraic equations. Linearization and solution algorithms for nonlinear problems. Structural stability. prereq: 8401 or instr consent; offered alt yrs

CxEE 8411. Plate Structures. (3 cr.; A-F or Audit; Periodic Fall) Analysis of plate structures based on the small-deflection elastic Kirchhoff-Love theory. Classical and numerical analysis methods. Skew and orthotropic plate structures.
CEGE 8503. Environmental Mass Transport. (4 cr.; A-F or Audit; Periodic Fall)
Principles of intraphase and interfacial chemical transport and fate in the environment, specifically carbon and nutrient diffusion, dispersion, and convection. Application to surface water and atmospheric mixing, dispersion in groundwater, and transport between these media. prereq: 3502, 3501 or equiv or instr consent

CEGE 8504. Theory of Unit Operations. (4 cr.; A-F or Audit; Periodic Fall & Spring)
Theoretical basis, design, operation of chemical/physical processes used in treating/controlling water quality. Adsorption, ion exchange, sedimentation, thickening, filtration, gas transfer, coagulation, flocculation, membrane processes, disinfection. prereq: 5541

CEGE 8505. Biological Processes. (3 cr.; A-F or Audit; Every Spring)
Theoretical principles underlying chemical and biological wastewater treatment processes, including aerobic and anaerobic treatment for organic carbon and nutrient removal. Mathematical models of microbial growth kinetics and mass transport in suspended growth and attached film applications are developed. prereq: 4502, 4501 or instr consent

CEGE 8506. Stochastic Hydrology. (4 cr.; A-F or Audit; Periodic Fall)
Analysis and synthesis of hydrologic series and systems; derived distributions; uncertainty and risk analysis; flood frequency analysis; multivariate time series analysis; correlation and spectral analysis; series of long-range dependence; linear estimation; geostatistics; sampling networks; hydrologic forecasting. prereq: Stat 3021 or equiv or instr consent

CEGE 8507. Advanced Methods in Hydrology. (4 cr.; A-F or Audit; Periodic Fall)
Notions of scale-invariance, scaling, and multiscaling in geophysical processes; methods of multiscale analysis; wavelet transforms; time-frequency-scale analysis and fractal analysis. Applications in atmospheric, hydrologic, and geomorphic processes. prereq: 8506

CEGE 8508. Ecological Fluid Mechanics. (4 cr.; A-F or Audit; Every Fall)
Fluid mechanics of microbial processes in lakes, rivers, and wetlands. Small-scale fluid motion, nutrient uptake, growth kinetics, ecosystem metabolism, scaling, lab/field microstructure measurements. prereq: 3502 or equiv

CEGE 8511. Mechanics of Sediment Transport. (3 cr.; A-F or Audit; Every Fall)
Particle motion in fluids. Criteria for incipient motion. Formulations for bedload and suspended load. Bedform mechanics and hydraulic resistance relations. Channel stability, aggradation and degradation, alluvial stream morphology, prereq: 3502 and 4501 or instr consent

CEGE 8521. The Atmospheric Boundary Layer. (4 cr.; A-F or Audit; Periodic Summer)
Land-atmosphere interactions and turbulent transport in the atmospheric boundary layer (ABL), the lowest part of the atmosphere. ABL development and dynamics. Turbulence, surface energy balance, spectral analysis, similarity theory. Flow over homogeneous and heterogeneous surfaces. Atmospheric stability, measurement, simulation of turbulent fluxes. prereq: CSE or COAFES grad student or instr consent

CEGE 8541. Aquatic Chemistry. (3 cr.; A-F or Audit; Periodic Spring)
Advanced course on water chemistry; physical chemical principles and geochemical processes controlling the chemical composition of natural waters, soil- and sediment-water interactions. Emphasizes behavior of inorganic contaminants in natural waters and engineered systems and dissolved natural organic matter. prereq: 4541 or instr consent

CEGE 8542. Chemistry of Organic Pollutants in Environmental Systems. (3 cr.; A-F or Audit; Periodic Fall)
Structural characteristics and physico-chemical properties of organic contaminants in aquatic systems. Emphasizes PCBs, PAHs, dioxins, insecticides, herbicides, and chlorinated solvents. Factors affecting their transport/ transformation. Structure- and property-activity relationships, their use in predicting organic chemical behavior. prereq: [4541, 5541] or instr consent

CEGE 8551. Environmental Microbiology: Molecular Theory and Methods. (4 cr.; A-F or Audit; Fall Even Year)
Introduction to microbial genetics and molecular phylogeny. Application of nucleic-acid techniques in environmental microbiology and microbial ecology.

CEGE 8552. Groundwater Microbiology: Laboratory. (4 cr.; A-F or Audit; Periodic Fall)
Subsurface microbial ecology, biogeochemical cycling, metabolic classification of subsurface bacteria, modeling bacterial transport, diagnosis of microbial induced fouling (MIF) events, bioremediation of contaminated aquifers. Lectures and four lab hours per week. prereq: grad CE major or instr consent, exposure to basic environ engr and microbiol

CEGE 8553. Biofilms. (3 cr.; A-F or Audit; Periodic Fall)
Science/engineering concepts to investigate formation/function of biofilms. Properties/ composition of biofilms, transport/ transformation processes in biofilms, communication in biofilms, mathematical modeling. Applications in environmental engineering. prereq: 4551 or instr consent

CEGE 8561. Analysis and Modeling of Aquatic Environments I. (3 cr.; A-F or Audit; Every Spring)

CEGE 8562. Analysis and Modeling of Aquatic Environments II. (3 cr.; [max 6 cr.]; Student Option; Periodic Fall & Spring)
Models for transport/transformation of pollutants, nutrients, particulates, ecosystems, etc., from recently completed theses, articles, or research in progress. Students review assigned recent papers, make presentations, and analyze a topic of their choice. prereq: One sem grad work or instr consent

CEGE 8563. Industrial Waste Treatment. (3 cr.; A-F or Audit; Periodic Fall)
Introduction to industrial waste treatment. Individual industries, emphasizing constituents of the waste-stream and how best to recycle, recover, or reduce wastes. Cost concerns and regulations. Field trips to various industries to gain first-hand knowledge of processes involved in treatment. prereq: 3501, 4502, or equiv or instr consent

CEGE 8571. Hydraulic Measurements. (3 cr.; A-F or Audit; Periodic Fall)
Lab and field methods and instruments for measuring hydraulic pressure, velocity, and discharge. prereq: 3502 or instr consent

CEGE 8572. Computational Environmental Fluid Dynamics. (4 cr.; A-F or Audit; Periodic Spring)
Finite difference methods, their application to solution of one-/two-dimensional problems in environmental fluid dynamics. Stability, convergence, consistency, and accuracy of numerical schemes. Navier-Stokes equations, their physical meaning, solution. prereq: One sem grad work or instr consent

CEGE 8581. Research and Professional Ethics in Water Resources and Environmental Science. (0.5 cr.; S-N or Audit; Every Spring)
Ethics of water resources science and environmental engineering research/practice. Societal responsibility, plagiarism, recording, authorship, confidentiality, conflicts of interest, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester. prereq: [Environmental engineering or water resource science] grad student or instr consent

CEGE 8601. Introduction to Stream Restoration. (3 cr.; A-F or Audit; Every Fall)
Background material required to participate in a stream restoration project. How to assimilate geologic, hydrologic, and ecological data at watershed and reach scales to plan a restoration project and evaluate/critique existing stream restoration projects.

CEGE 8602. Stream Restoration Practice. (2 cr.; S-N only; Every Summer)
Field experience, group design project. Students provide a stream restoration context for each other’s elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site. prereq: 8601 or Geo 8601
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

CEGE 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.); No Grade Associated; Every Fall, Spring & Summer)
TBD prerequisite: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CEGE 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.); No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Max 18 cr per semester or summer; 10 cr total required; Plan A only.

CEGE 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.); No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Max 18 cr per semester or summer; 24 cr required

Classical Civilization (CLCV)

CLCV 3993. Directed Studies in Classical Civilization. (1-4 cr.; Student Option; Every Fall & Spring)
Directed Studies in Classical Civilization prerequisite: instr consent

CLCV 3994. Directed Research in Classical Civilization. (1-4 cr.; Student Option; Every Fall & Spring)
* prerequisite: instr consent

CLCV 3996. Directed Instruction in Classical Civilization. (1-4 cr.; Student Option; Every Fall & Spring)
Directed Instruction in Classical Civilization prerequisite: instr consent

Classical and Near Eastern Std (CNES)

CNES 1001. World of the Bible: Religions, Empires, and Discourses of Power. (AH; 3 cr.; Student Option; Every Fall & Spring)

CNES 1002. World of Greece. (HIS; 3 cr.; Student Option; Every Fall & Spring)
Ancient Greek civilization, from second millennium BCE to Roman period. Art, archaeology, philosophy, science, literature, social/political institutions. Focuses on connections with contemporary cultures corresponding to Ancient Near East.

CNES 1003. World of Rome. (HIS; 3 cr.; Student Option; Every Spring)
Roman civilization, from Etruscan origins to late antiquity. Cultural diversity of Mediterranean civilization. Ways of life, social, and political institutions as evidenced by literature, art, architecture, history, and material culture.

CNES 1042. Greek and Roman Mythology. (AH; 4 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to stories/study of Greek/Roman mythology.

CNES 1042H. Honors Course: Greek and Roman Mythology. (AH; 4 cr.; A-F only; Every Fall & Spring)
Introduction to stories/study of Greek/Roman mythology.

CNES 1046. Technical Terminology for the Health Professions. (3 cr.; Student Option; Periodic Fall, Spring & Summer)
Greek/Latin prefixes, suffixes, roots basic to vocabulary of health professions. Taught through computer-assisted instruction.

CNES 1082. Jesus in History. (HIS; 3 cr.; Student Option; Every Spring)
Who was Jesus? How can we recover what he said and did? Why was he killed and who did it? Was there agreement about the life and words of Jesus in the earliest stages of Christianity, or were there major disagreements even then? How were the early writers about Jesus influenced by their social, political, and religious contexts? And why was it reported in the news recently that Jesus was married? In this course we examine the earliest attempts to describe Jesus and his significance in the gospel literature of the first and second centuries and beyond. We ask how historians may claim to "know" the "facts" of Jesus's life and meaning in light of these various portraits. We seek to understand how the different literary presentations of Jesus reflect their authors' social, religious, and political situations. We aim to understand in more detail the diversity of perspectives about Jesus from the earliest stage of the development of Christianity. Intended as a course of interest to all undergraduates on the Twin Cities campus. Students of any, all, or no religious background are welcome.

CNES 1082H. Honors Course: Jesus in History. (HIS; 3 cr.; A-F only; Every Spring)
Who was Jesus? How can we recover what he said and did? Why was he killed and who did it? Was there agreement about the life and words of Jesus in the earliest stages of Christianity, or were there major disagreements even then? How were the early writers about Jesus influenced by their social, political, and religious contexts? And why was it reported in the news recently that Jesus was married? In this course we examine the earliest attempts to describe Jesus and his significance in the gospel literature of the first and second centuries and beyond. We ask how historians may claim to "know" the "facts" of Jesus's life and meaning in light of these various portraits. We seek to understand how the different literary presentations of Jesus reflect their authors' social, religious, and political situations. We aim to understand in more detail the diversity of perspectives about Jesus from the earliest stage of the development of Christianity. Intended as a course of interest to all undergraduates on the Twin Cities campus. Students of any, all, or no religious background are welcome. prerequisite: Honors

CNES 1083. John in History. (HIS; 3 cr.; Student Option; Every Winter)
John the Apostle. His writings; development of Johannine tradition; modern approaches to the Gospel of John.

CNES 1201. The Bible: Context and Interpretation. (LITR; 3 cr.; Student Option; Every Fall & Spring)

CNES 1903. Freshman Seminar. (CIV; 3 cr.; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

CNES 1905. Freshman Seminar. (3 cr.; Student Option; Periodic Spring)
Topics specified in Class Schedule, prerequisite: French, Spanish, or Russian 1001.

CNES 3042. Myths, Legends, and Literature of the Ancient Near East and Egypt. (AH; 3 cr.; Student Option; Spring Odd Year)
Poetry, dialogues, tales of gods/men from ancient Sumer, Akkad, Egypt, Anatolia, Levant. Themes of mortality/transcendence, cosmic/political power, subjectivity, doubt.

CNES 3051. "Bread and Circuses": Spectacles and Mass Culture in Antiquity. (CIV,HIS; 3 cr.; Student Option; Fall Odd, Spring Even Year)
Development of large-scale public entertainments in ancient Mediterranean world, from athletic contests of Olympia and dramatic festivals of Athens to chariot races and gladiatorial games of Roman Empire. Wider significance of these spectacles in their impact on political, social, and economic life of the societies that supported them.

CNES 3071. Greek and Hellenistic Religions. (HIS; 3 cr.; Student Option; Fall Even Year)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and Olympian deities, ritual performance, prayer/sacrifice, temple architecture, death and the afterlife, mystery cults, philosophical religion. Near Eastern salvation religions.

CNES 3072. The New Testament. (3 cr.; Student Option; Periodic Fall & Spring)

CNES 3073. Roman Religion and Early Christianity. (3 cr.; Student Option; Periodic Spring)

CNES 3076. Apostle Paul: Life, Letters, and Legacy. (3 cr.; Student Option; Fall Odd, Spring Even Year)
How/what can we know about Paul. What his message was. What he was fighting. How he was later understood by friends/foes.

**CNES 3081W. Classical Epic in Translation.** (LITR, WI; 3 cr.; Student Option; Fall Odd, Spring Even Year)


**CNES 3082W. Greek Tragedy in Translation.** (LITR, WI; 3 cr.; Student Option; Fall Even, Spring Odd Year)


**CNES 3083W. Ancient Comedy.** (WI; 3 cr.; Student Option; Periodic Fall)

Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

**CNES 3101. Ancient Greece: Poet and Hero in the Age of Homer.** (3 cr.; Student Option; Periodic Spring)

Homer and his epic poetry. Trojan war. Greek lyric poets (Sappho, Pindar). Early Greek philosophy.

**CNES 3102. Ancient Greece: The Golden Age of Athens.** (3 cr.; Student Option; Periodic Fall)

Emergence of democracy in shadows of two brutal wars: one foreign, one civil. Democracy, war, empire through lens of tragedy, comedy, art from fifth-century Athens.

**CNES 3103. Ancient Greece: Alexander and the East.** (HIS; 3 cr.; Student Option; Spring Even Year)

Achievements of Alexander the Great, their effect on Greek-speaking world. Greek colonization of Egypt. Hellenistic art, literature, philosophy.

**CNES 3104. Ancient Rome: Kings and Consuls.** (3 cr.; Student Option; Spring Even Year)

Roman Republic from origins to Caesar's death.

**CNES 3105. Ancient Rome: The Age of Augustus.** (3 cr.; Student Option; Periodic Fall)


**CNES 3106. Ancient Rome: The Age of Nero.** (3 cr.; Student Option; Periodic Fall)

The Roman Empire, "silver age" of Latin literature, rise of Christianity. Art/architecture.

**CNES 3107. Age of Constantine the Great.** (3 cr.; Student Option; Periodic Fall)


**CNES 3108. Age of St. Augustine of Hippo.** (3 cr.; Student Option; Spring Odd Year)

Cultural diversity A.D. 363 to circa 500 A.D. Replacement of Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople as capital in East. Literature, art, thought resulting from new dominance of Christianity, particularly Augustine of Hippo.

**CNES 3109. The Age of Justinian and Muhammad (c.500-c.700 A.D.).** (3 cr.; Student Option; Periodic Spring)

Uses sources written between 500 and 700 A.D. to consider history, art, religion, and architecture of Golden Age of Byzantium, its superpower relations with Persian Empire. Way that Arab invasions from mid-7th century altered configuration of Mediterranean world and Near East.

**CNES 3152. Art and Archaeology of Ancient Greece.** (HIS; 3 cr.; Student Option; Periodic Fall & Spring)

Civilization of ancient Greece as revealed through art/material culture. Case studies of selected monuments/sites.

**CNES 3162. Roman Art and Archaeology.** (HIS; 3 cr.; Student Option; Fall Odd Year)

Introduction to art and material culture of Roman world: origin, change, continuity. Progress/decay in later empire, its legacy to modern world.

**CNES 3182. Egypt and Western Asia: Art and Archaeology of Ancient Egypt and Western Asia.** (AH, GP; 3 cr.; Student Option; Every Fall & Spring)

Art, architecture, and archaeology of Egypt, East Africa, Asia Minor, Mesopotamia, Iran, and Central Asia from the Neolithic through Late Antiquity (ca. 7,000 B.C.E.-650 C.E.). Relationship between the visual material and the social, intellectual, political, and religious contexts. Evolution of, and exchanges and differences among, the visual cultures of these time periods and regions.

**CNES 3201. The Bible: Context and Interpretation.** (LITR; 3 cr.; Student Option; Every Fall & Spring)

Introduction to the modern academic study of the Old Testament/Hebrew Bible in the historical context of literature from ancient Mesopotamia. Read Babylonian Epic of Creation, Epic of Gilgamesh, Hammurabi, Genesis, Exodus, Psalms, Stories of creation, law, epic conflict, and conquest. Other: Knowledge of Hebrew required

**CNES 3202. Prophecy in Ancient Israel.** (3 cr.; Student Option; Spring Odd Year)


**CNES 3203. The Bible: Wisdom, Poetry, and Apocalyptic.** (3 cr.; Student Option; Periodic Fall)


**CNES 3204. The Dead Sea Scrolls.** (3 cr.; Student Option; Periodic Spring)

Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for understanding development of the Bible. Background of Judaism and Christianity. Archaeological site of Qumran.

**CNES 3205. Women, Gender, and the Hebrew Bible.** (AH; 3 cr.; Student Option; Spring Odd Year)

How men, woman, gender, sexuality is portrayed in Hebrew Bible. Social/religious roles/status of women in ancient Israel. Reading biblical texts from academic point of view.

**CNES 3502. Ancient Israel: From Conquest to Exile.** (3 cr.; Student Option; Periodic Fall)

Israelite history in context of what is known from Egyptian, Canaanite, Mesopotamian sources. Issues raised by archaeological data related to Israelite conquest of Canaan.

**CNES 3504. Ancient Jewish Culture and Identity.** (3 cr.; Student Option; Periodic Fall)

Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (second century CE). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

**CNES 3525. Death and the Afterlife in the Ancient World.** (AH; 3 cr.; Student Option; Fall Odd Year)

Beliefs, attitudes, and behaviors related to death and the afterlife found in the cultures of the ancient Mediterranean and Near East. Literature, funerary art/epitaphs. Archæological evidence for burial practices and care of dead.

**CNES 3601. Sexuality and Gender in Ancient Greece and Rome.** (AH; 3 cr.; Student Option; Spring Odd Year)

What we know (or think we know) about ancient Greek and Roman ideas about sexuality and gender roles. Evidence/methodologies by which it is analyzed.

**CNES 3950. Aspects of Ancient Culture.** (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)

Selected topics in the cultural history of antiquity (e.g., women in antiquity, Roman diplomacy, slavery, education). Topics specified in Class Schedule.

**CNES 3951W. Major Project.** (WI; 4 cr.; Student Option; Every Fall & Spring)

Research project pertaining to ancient world, using documents or primary sources along with secondary sources. Students select project in consultation with faculty member. Other: Three 3xxx ANE courses, major in ANE or CNEA or ReIS, instr consent

**CNES 3993. Directed Studies.** (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer)

Guided individual reading or study. Other: instr consent

**CNES 5013. Introduction to Roman Law.** (3 cr.; Student Option; Periodic Fall & Spring)

Survey of Roman law from social and historical perspectives. Basic concepts of Roman private
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
will be available to study various time frames (beginning of the first millennium BCE to 500 CE), specific local cultures (determined by geographical regions), and ethnic/religious groups (Israelites, Jews, Romans, Greeks, Christians, Egyptians, etc.). Students will be heavily involved in the weekly presentation of topics and discussion, and PhD students will be expected to produce research that will be headed toward use in their dissertations or a suitable for future publication. Topics specified in class schedule.

CNES 8570. Readings in Religious Texts. (; 3 cr. [max 12 cr.]; A-F only; Periodic Fall & Spring)
Close reading of selected literary or epigraphical texts of importance for the history of ancient Mediterranean religions, along with critical discussion of trends in recent scholarship. The texts may be read in the original languages (such as Greek, Latin, Hebrew, etc.) but may also be accessed in translation where appropriate.

CNES 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
To be determined prerequisite: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.

CNES 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall & Spring)
No description prerequisite: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

CNES 8794. Practicum for Future Faculty in Classics. (; 1 cr.; S-N only; Every Spring)
Workshop in professional development. Developing the dissertation. Preparing a portfolio to document/reflect on teaching the ancient world and its languages. Readings, workshops, peer teaching, reflective writing. prerequisite: Doctoral [major or minor] in Classical/Near Eastern studies

CNES 8888. Thesis Credits: Doctoral. (; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall & Spring)
No description prerequisite: Max 18 cr per semester or summer; 24 cr required

CNES 8950. Topics in Classical & Near Eastern Studies. (; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)
Topics such as slavery, women in antiquity, pagans and Jews, the taboo, and modern study of myth.

Clinical Laboratory Sci Prog (CLSP)

CLSP 4092. Honors Program: Laboratory Methods. (; 3 cr.; Student Option; Every Fall & Spring)
Individual assignment to special projects or research in one of the clinical areas of chemistry, hematology, immunohematology, or microbiology. prerequisite: instr consent

Clinical Laboratory Science (CLS)

CLS 5090. Special Laboratory Methods. (; 1-2 cr.; A-F or Audit; Every Fall & Spring)
Assignment on an individual basis to one of a variety of special areas of experience in the clinical lab. prerequisite: instr consent

CLS 5100. Virology, Mycology, and Parasitology for Medical Technologists. (; 2 cr.; A-F or Audit; Every Spring)
Lab diagnosis of viral, fungal, and parasitic infections. Lecture. prerequisite: microbiology course with lab, biochem course

CLS 5120. Seminar: Clinical Laboratory Science. (; 1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)
Current literature. Presentation/discussion of research. prerequisite: instr consent

CLS 5121. Journal Presentations. (; 1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Critical analysis, evaluation, discussion of current journal articles in student's specialty area. prerequisite: 1st yr CLS grad student

CLS 5125. Practicum Teaching. (; 1-2 cr.; A-F or Audit; Every Fall & Spring)
Supervised teaching experience, develop skills using instructional materials, tests, and measurements. prerequisite: instr consent

CLS 5129. Elements of Laboratory Administration. (; 2 cr.; A-F or Audit; Every Fall & Spring)
Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, lab safety, labor relations, government regulations. prerequisite: instr consent

CLS 5130. Practicum in Laboratory Administration. (; 2 cr.; A-F or Audit; Every Fall & Spring)
Supervised experience and assignment of specific problems related to lab service and management in health care institutions. prerequisite: instr consent

CLS 5140. Techniques for Teaching. (; 2 cr.; A-F or Audit; Every Fall & Spring)
Developing objectives, classroom activities, and evaluation criteria for medical technology education. prerequisite: instr consent

CLS 5165. Advanced Clinical Immunohematology. (; 3 cr.; A-F or Audit; Every Fall & Spring)
Observation, study, and practice in special problems, advanced techniques, and methodology. prerequisite: instr consent

CLS 5402. Molecular Diagnostics. (; 1 cr.; A-F only; Every Fall)
Basic theory/application of molecular diagnostics in clinical lab. Lecture, lab. prerequisite: instr consent

CLS 5768. Advanced Hematology. (; 5-10 cr. [max 30 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Practical experience collecting bone marrow from patients. Diagnosing hematological diseases by evaluating and interpreting cells from clinical specimens of bone marrow, peripheral blood, and, if applicable, lymph nodes. prerequisite: instr consent

CLS 5864. Research Seminar. (; 1 cr. [max 10 cr.]; S-N or Audit; Every Fall & Spring)
Departmental research seminar series. prerequisite: instr consent

CLS 5865. Departmental Seminar. (; 1 cr. [max 10 cr.]; S-N or Audit; Every Fall & Spring)
Departmental clinical lab research seminar series. prerequisite: instr consent

CLS 8193. Advanced Topics in Clinical Chemistry. (; 2 cr.; Student Option; Every Fall, Spring & Summer)
Includes use of molecular approaches to diagnosis and risk assessment of selected diseases. prerequisite: instr consent

CLS 8194. Research on Clinical Laboratory Problems. (; 1-3 cr.; Student Option; Every Fall, Spring & Summer)
Individual research project in a selected area. prerequisite: instr consent

CLS 8293. Educational Administration in Medical Technology. (; 2 cr.; Student Option; Every Fall, Spring & Summer)
Responsibilities of administration to students, faculty, and educational community. Curriculum planning, accreditation, staffing, student selection, finances. Sample administrative problems and decisions used as practice vehicles. prerequisite: instr consent

CLS 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Master's student, adviser and DGS consent

CLS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

Clinical Physiol, Movement Sci (CPMS)

CPMS 5101. Introduction to Clinical Physiology and Movement Science. (; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall)
Overview of clinical physiology and clinical movement science. For students in such diverse fields as bioengineering, kinesiology, neuroscience, physical therapy, physiology, psychology, public health, occupational therapy.

CPMS 5201. Colloquium in Clinical Physiology and Movement Science. (; 1 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring)
Interdisciplinary course meets 1st and 3rd week of the month. Current research areas, scientific methods, and interpretation of results in the areas of clinical movement science and clinical physiology. prerequisite: Undergrad level in basic anatomy and physiology is highly recommended
CPMS 8201. Seminar in Clinical Physiology and Movement Science. (1 cr. [max 4 cr.]; S-N or Audit; Every Spring)
Meet 1st and 3rd week of the month. Current research areas, scientific methods, and the interpretation of results in the areas of clinical movement science and clinical physiology.

Cognitive Science (CGSC)

CGSC 8000. Seminar: Philosophy of the Cognitive Sciences. (3 cr. [max 6 cr.]; Student Option; Spring Odd Year)
Philosophical framework for analyzing cognitive sciences. Recent developments in metaphysics and epistemology. Nature of scientific theories, methodologies of cognitive sciences, relations among cognitive sciences, relation of cognitive science to epistemology and various philosophical problems. prerequisite: Grad cog sci minor or instr consent

CGSC 8001. Proseminar in Cognitive Science. (2 cr.; S-N or Audit; Periodic Fall)
Survey of major topics, including theoretical assumptions, methods, and samples of current research. prerequisite: Grad cog sci minor or instr consent

CGSC 8041. Cognitive Neuroscience. (4 cr.; A-F or Audit; Spring Even Year)

CGSC 8360. Seminar: Topics in Cognitive Science. (1-4 cr. [max 24 cr.]; Student Option; Periodic Fall & Spring)
Lectures and in-depth discussion on a topic.

CGSC 8410. Perspectives in Learning, Perception, and Cognition. (2 cr.; max 24 cr.; S-N only; Every Fall & Spring)
Lectures/discussions in cognitive sciences by local/visiting faculty.

CGSC 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
Tbd prerequisite: Doctoral student, adviser consent, DGS consent

CGSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Tbd prerequisite: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CGSC 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prerequisite: Max 18 cr per semester or summer, 24 cr required

CGSC 8991. Independent Study. (1-4 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)
Independent study. prerequisite: instr consent

Col of Food, Agr & Nat Res Sci (CFAN)

CFAN 1101. Dean's Engaged Leaders Seminar. (3 cr.; A-F only; Every Fall)
Students explore their role in building inclusive community spaces. Development of leadership skills in academic, social, and public service contexts. Hands-on learning/real-world applications in culturally diverse communities. Field trips, guest speakers, and discussions. prerequisite: Incoming 1st yr CFANS students only

CFAN 1201. Discovering Majors and Careers. (1 cr.; A-F only; Every Fall)
Five stages in the career discovery process: self-assessment, exploration, decision making, experiencing, and implementing. Determining next steps in academic/career process.

CFAN 1501. Biotechnology, People, and the Environment. (15 cr.; A-F or Audit; Every Fall & Spring)
Basic concepts in genetic engineering as a foundation for studying the impact of biotechnology on agriculture, medicine, industry, and the environment. Controversial aspects of biotechnology related to public policy issues are discussed.

CFAN 1901. Topics: Freshman Seminar. (ENV; 3 cr.; A-F or Audit; Every Fall & Spring)
Interdisciplinary seminar. Topics specified in Class Schedule.

CFAN 1902. Topics: Freshman Seminar. (DSJ; 3 cr.; Student Option; Every Fall)
Interdisciplinary seminar. Topics specified in Class Schedule.

CFAN 1903. Topics: Freshman Seminar. (CIV; 3 cr.; A-F or Audit; Every Fall)
Interdisciplinary seminar. Topics specified in Class Schedule. prerequisite: freshman

CFAN 1904. Topics: Freshman Seminar. (3 cr.; A-F or Audit; Every Fall)
Interdisciplinary seminar. Topics specified in Class Schedule.

CFAN 1905. Topics: Freshman Seminar. (1-3 cr.; A-F or Audit; Every Fall & Spring)
Topics vary. prerequisite: Fr

CFAN 2201. Secure & Succeed in Internships. (2 cr.; A-F only; Every Spring)
This is an intensive internship course, which includes planning, preparing, applying and completing an internship. Students will receive coaching to help them seek an internship through resume & cover letter writing, job searching, networking, and interviewing. At the end of the spring, students are required to have an internship lined up and complete online reflections about the experience over the summer to finish the course. Not recommended for students who have previously taken CFAN 3201 as course content may be repetitive. Email if you have questions.

CFAN 2333. Insects, Microbes and Plants. (TS; 3 cr.; A-F only; Every Fall)
Fundamental concepts of ecology/evolution to address challenges in managing insects/microbes. Grapple with real problems/debate current controversies.

CFAN 3000. Directed Studies in International Agriculture. (2-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Oral presentations, discussion of students’ research papers. Literature review of selected topics. Discussions with students/staff about their experiences in international agriculture. prerequisite: instr consent

CFAN 3001. Pests and Crop Protection. (3 cr.; A-F or Audit; Every Spring)
Introduction to biology/identification of insects, weeds, and diseases that affect agricultural crops. Management of these organisms based on principles of integrated pest management. prerequisite: Biol 1009 or equiv or instr consent

CFAN 3002. Transfer Student Seminar. (1 cr.; A-F only; Every Fall)
This course introduces new transfer students to the College of Food, Agricultural and Natural Resource Sciences (CFANS) and to the UMN. This course will introduce students to opportunities provided to them by both CFANS and the University. It will help connect students to faculty and staff, as well as to other transfer students. By introducing transfer student theories, diversity & equity topics, leadership skills and career information, transfer students will become immersed in the CFANS environment and will be provided with a foundation of knowledge that will help students continue to be successful during their remaining time at the University of Minnesota. The course will be held once a week.

CFAN 3096. Making the Most of your Internship. (1 cr.; A-F only; Every Spring)
Enhance quality internship experience. Insight about self, world of work, individual learning styles. Communicate skills/learning. prerequisite: Secured internship, instr consent

CFAN 3201. Career and Internship Preparation. (1 cr.; A-F only; Every Fall & Spring)
Self exploration, networking, industry research, job/internship search, resumes, cover letters, interviewing, salary negotiation, goal setting. prerequisite: Soph or jr or sr or grad student

CFAN 3301. Grad & Prof School:Success Strategies for Prep,Adm. (1 cr.; Student Option; Every Fall & Spring)
Intended for junior/seniors of all majors with interests in career exploration/pursuit of either graduate or professional school education. Addresses needs of multicultural students, those from diverse backgrounds, those who may be first generation college students.

CFAN 3480. Topics in CFANS. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

CFAN 3500. International Field Studies Seminar. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer) Interface of agriculture with various natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in other countries or regions of world, providing global perspective. Active learning, lectures, discussion tutorials, field trips, reports, exams. prereq: instr consent

CFAN 3501. Costa Rica--Sustainable Development. (GP; 3 cr.; A-F or Audit; Every Spring) Costa Rica's development strategy. Agriculture, tourism, energy, and urbanization show synergies and tension between economic, social, and environmental impacts. Sustainability and how organizations maximize benefits associated with sustainable development. prereq: instr consent


CFAN 3503. Switzerland--Mountain Agriculture. (GP; 3 cr.; A-F or Audit; Every Spring & Summer) Spring-time agriculture in a mountain ecosystem; management of farm enterprises to be productive in the context of Europe; how Switzerland has developed agro-tourism; interact with farmers, researchers, professionals and government officials who share expertise and interest in agricultural issues. prereq: instr consent

CFAN 3504. Vertebrate Research Design and Field Survey Techniques. (GP; 3 cr.; A-F or Audit; Every Spring & Summer) Thai culture and conservation challenges. Two-day barge trip learning culture before traveling to Thailand's premier conservation research site. Camera-trapping techniques, prey assessment methods, and radio telemetry approaches to the study of large mammals. prereq: instr consent


CFAN 3506. Iceland: Landscapes, Natural Resources, and Environmental Management. (3 cr.; A-F only; Every Summer) Landscapes and natural resources shape ways countries view and manage environmental resources. We will study landscapes and natural resources of Iceland, including Thingvellir (=???ingvellir) National Park, the historical seat of Icelandic Parliament (or Al?=???ing). We will learn how the national park and other natural resources are sustainably managed, and their significance as environmental and cultural shrines. Students will compile a journal with daily entries, including photographs or digital images, and participate in field exercise and cultural/social activities providing insight into Icelander landscapes and society. prereq: But must be at least end-of-year freshmen in good academic standing with a minimum GPA of 2.5 or instr consent

CFAN 3507. Ecuador: Sustainability of its peoples, lands, and waters. (ENV; 3 cr.; A-F only; Every Spring) This multi-disciplinary course (Indigenous Environmental Knowledge and Water Resource Management) explores the remote areas of the Northern Andean Highlands, cosmopolitan area of Quito, and the unspoiled tropical jungles of the Amazon Basin.

CFAN 3510. From Rainforest to Reef: Wildlife Medicine and Conservation in Belize. (3 cr.; A-F only; Every Spring) Introduction to key topics in wildlife medicine. Students will learn medical issues and approaches, the role of the veterinarian in wildlife conservation, zoo medicine, and wildlife rescue & rehabilitation. This program is held at the Belize Wildlife & Referral Clinic’s (BWR) teaching facility with BWRCA’s founder and wildlife veterinarian, Dr. Isabelle Paquet-Durand. Labs include distance immobilization, suture, spay & neuter, necropsy, comparative anatomy, radiography, parasitology and blood analysis. Field visits are conducted with Dr. Isabelle to the Belize Zoo and to avian, reptile, primate, and manatee centers. Students are introduced to preventative medicine and common diseases for many of these species. A spay & neuter lab reviews theory and suture practice, this is followed by a spay & neuter clinic organized in the field or at BWR. Students also have the opportunity to observe, and when possible, assist the BWR veterinary staff during their daily operations.


CFAN 3513. The Natural History of Norway. (GP; 3 cr.; A-F only; Spring & Summer Odd Year) Students travel to the Nord Trøndelag region of central Norway. Physical geography, ecology, and management of natural resources, flora, and fauna. Region's rich history and its close ties to Minnesota.

CFAN 3514. Machu Picchu: Biodiversity & Climate Change in Peru. (ENV; 3 cr.; A-F only; Every Summer) Students travel to the Nord Trøndelag region of central Norway. Physical geography, ecology, and management of natural resources, flora, and fauna. Region's rich history and its close ties to Minnesota.

CFAN 3515. Sustainable Food Systems of Italy. (3 cr.; A-F only; Every Spring & Summer) This course examines the concepts of sustainability in relation to food production and culture in a country and place where food is a fundamental component of the regional and national culture. The course incorporates intercultural development concepts to introduce students to past and present, Italian culture through the cultural importance of food systems, the ethics of food consumption and production and the concepts of sustainability.

CFAN 3500. International Field Studies Seminar. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer) Interface of agriculture with various natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in various countries/regions. Active learning, lectures, discussion tutorials, field trips, reports, exams. prereq: instr consent

CFAN 5500. International Field Studies Seminar. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring) Interface of agriculture with natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in various countries/regions. Active learning, lectures, discussion tutorials, field trips, reports, exams. prereq: instr consent

CFAN 5501. Costa Rica--Sustainable Development. (3 cr.; A-F only; Every Spring) Costa Rica's development strategy. Agriculture, tourism, energy, urbanization. Synergies/tension between economic, social, environmental impacts. How organizations maximize benefits associated with sustainable
software tools, hands-on design-and-build project. Students work in teams.

CSE 1411. Exploring Careers in Science and Engineering. (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring)
Assess interests, values, skills, strengths, personality preferences to determine careers/work environments. Become familiar about fields in engineering, science, or other industries through informational interviewing/industry guest speakers. Techniques for gaining experience in chosen field.

CSE 1413. Preparing for Careers in Science and Engineering. (1 cr.; Student Option; Every Fall & Spring)
Research companies, industries, careers related to major. Gain experience related to career objective. Discover resources for finding internships/full-time job opportunities. Gain interviewing skills. Develop resume/clover letter.

CSE 1511. PLTW: Introduction to Engineering Design. (3 cr.; S-N only; Every Fall, Spring & Summer)
History, career opportunities, portfolios, visualization, geometry, modeling, construction, analysis, and documentation. Part of Project Lead the Way curriculum.

CSE 1512. PLTW: Principles of Engineering. (3 cr.; S-N only; Every Fall, Spring & Summer)
Communication and documentation, design process, engineering systems, strength of materials, testing, reliability, statics/dynamics. Part of Project Lead the Way curriculum.

CSE 1513. PLTW: Digital Electronics. (3 cr.; S-N only; Every Fall, Spring & Summer)
Fundamentals of digital electronics, number systems, gates, Boolean algebra, circuit design, adding, flip-flops, shift registers and counters, families and specifications, microprocessors, design topics. Part of Project Lead the Way curriculum.

CSE 1514. PLTW: Computer Integrated Manufacturing. (3 cr.; S-N only; Every Fall, Spring & Summer)
Computer modeling, rapid prototyping, CNC machining, precision measurements. CAM software, robotics, control systems, rationale for CIM, components of CIM systems. Part of Project Lead the Way curriculum.

CSE 1515. PLTW: Overview of Civil Engineering and Architecture. (3 cr.; S-N only; Every Fall, Spring & Summer)
Introduction to civil engineering and architecture, project planning, site planning, structural engineering, and student presentations. Part of Project Lead the Way curriculum.

CSE 1905. Freshman Seminar. (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring)
Topics vary. See class schedule. prereq: freshman

CSE 2096. Field Study; Internship, Industrial Assignment. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
Provide students participating in academic-related experience, limiting ability to enroll for full-time status during semester, ability to maintain active student status with University.

CSE 4096. Field Study; Internship, Industrial Assignment. (1 cr. [max 2 cr.]; S-N only; Every Fall, Spring & Summer)
Provide students participating in academic-related experience, limiting ability to enroll for full-time status during semester, ability to maintain active student status with University.

CSE 5101. Introduction to Engineering Design for Teachers. (3 cr.; Student Option No Audit; Every Summer)
History, career opportunities, portfolios, visualization, geometry, modeling, construction, analysis, documentation. Part of Project Lead the Way curriculum. Prereq-college consent.

CSE 5102. Principles of Engineering for Teachers. (3 cr.; Student Option No Audit; Every Summer)
Communication/documentation, design process, engineering systems, strength of materials, testing, reliability, statics/dynamics. Part of Project Lead the Way curriculum. Prereq-college consent.

CSE 5104. Civil Engineering and Architecture. (3 cr.; Student Option No Audit; Every Summer)
Overview of civil engineering and architecture, their interrelationship/dependence on each other. Students use software to solve real world problems. Project/site planning. Project documentation/presentation. Part of Project Lead the Way. Prereq-college consent.

CLA 1001. CLA First-Year Experience I. (1 cr.; S-N only; Every Fall)
In-class/out-of-class learning experiences/reflection. Charting educational path on basis of strengths, values, life goals. prereq: CLA

CLA 1002. CLA First-Year Experience II. (1 cr.; S-N only; Every Spring)
In-class/out-of-class learning experiences/reflection. Charting educational path on basis of strengths, values, life goals. prereq: CLA

CLA 1005. Introduction to Liberal Arts Learning. (3 cr.; A-F only; Every Fall)
History of liberal arts, higher education, U of M, and CLA. Contexts/values that define a college-educated person. Key skills for academic success. Students participate in campus engagement opportunities. prereq: CLA ATS fr

CLA 1007. CLA First-Year Experience: Independent Study. (1 cr. [max 2 cr.]; S-N only; Every Fall, Spring & Summer)
Independent study version of CLA 1001/1002. By permission number only.
CLA 1011. CLA First-Year Experience Abroad. (2 cr.; A-F only; Every Spring) Optional companion course to CLA 1002. Ten-day abroad experience during spring break. Locations vary by year. prereq: CLA and FRFY

CLA 1051. CLA Freshman Research. (0 cr.; No Grade Associated; Every Spring) Freshman research or creative opportunity with faculty. Prereq: Available only to CLA freshmen receiving a CLA Research Opportunity.

CLA 1052. CLA Freshman Research. (1-2 cr.; Student Option; Every Spring) Freshman research or creative opportunity with faculty. Prereq: Available only to CLA freshmen receiving a CLA Research Opportunity.

CLA 1200. Topics. (1-5 cr.; max 20 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule.

CLA 1902. Topics: Freshman Seminar. (DSJ; 3 cr.; A-F or Audit; Periodic Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule. prereq: freshman

CLA 1904. Topics: Freshman Seminar. (GP; 3 cr.; A-F or Audit; Periodic Fall & Spring) Freshman seminar. Topics specified in Class Schedule. prereq: Fr

CLA 1905. Topics: Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring) Freshman seminar. Topics specified in Class Schedule. prereq: freshman

CLA 1908W. Topics: Freshman Seminar. (CIV; Wi; 3 cr.; A-F or Audit; Periodic Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule. prereq: freshman

CLA 1910W. Topics: Freshman Seminar. (Wi; 3 cr.; max 6 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: freshman


CLA 3001. CLA Transfer Semester Experience. (1 cr.; S-N only; Every Fall & Spring) As a large urban research institution, the University of Minnesota presents students with a vast array of opportunities. The College of Liberal Arts is well-positioned to assist transfer students in developing their pathway to academic and career success. Through this course, students will learn about the resources and engagement opportunities available at the U. Majors and courses will be explored along with academic success strategies. Students will also begin their post-graduate preparation in the context of their academic, career, and life goals.

CLA 3500. Topics. (1-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

CLA 3600. The Renaissance. (3 cr.; Student Option; Periodic Spring) Relationships between the visual arts, literature, science, philosophy, and politics in Europe from about 1300-1600. Works of artists, writers and intellectuals (e.g., Michelangelo Buonarotti, Niccolo Machiavelli, Michel de Montaigne), different artistic and literary forms (e.g., the portrait, the sonnet, the essay), and broad thematic issues that include the individual, antiquity, the state, and discovery. Team taught.

CLA 3901. Community Engagement Scholars Program Integrative Capstone Seminar. (1 cr.; A-F only; Every Fall & Spring) Complements Integrative Community Engagement Project. Guidance, support, and structure to complete ICEP. Students reflect on previous academic/community work and prepare for next phase of their life. prereq: dept consent, Community Engagement Scholars coordinator approval

COMM 3993. Directed Study for Community Engagement. (1-4 cr.; A-F only; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent, dept consent, college consent.

Communication Studies (COMM)

COMM 1101. Introduction to Public Speaking. (CIV; 3 cr.; Student Option; Every Fall, Spring & Summer) Public communication processes, elements, and ethics. Criticism of and response to public discourse. Practice in individual speaking designed to encourage civic participation.

COMM 1101H. Honors: Introduction to Public Speaking. (CIV; 3 cr.; A-F only; Every Fall & Spring) Public communication processes, elements, and ethics. Criticism of and response to public discourse. Practice in individual speaking designed to encourage civic participation. prereq: Honors

COMM 1313W. Analysis of Argument. (WI; 3 cr.; Student Option; Every Fall & Spring) Strategies for analyzing, evaluating, generating arguments. Problems in listening/responding to argument.

COMM 1901. Freshman Seminar. (ENV; 3 cr.; Student Option; Every Fall & Spring) Topics specified in Class Schedule. prereq: Fr

COMM 1905. Freshman Seminar. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics specified in Class Schedule.

COMM 1908W. Freshman Seminar. (CIV; Wi; 3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics specified in Class Schedule.

COMM 1910W. Freshman Seminar. (WI; 3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics specified in Class Schedule. prereq: Fr

COMM 3110. Topics in Communication Studies. (3 cr.; max 15 cr.; Student Option; Every Fall, Spring & Summer) Cases illustrating communication studies theory, underlying issues.

COMM 3110H. Honors Topics in Communication Studies. (3 cr.; max 15 cr.; A-F only; Every Fall, Spring & Summer) Cases illustrating communication studies, theory, underlying issues. prereq: Honors

COMM 3190H. Honors Course: Research Seminar in Communication. (3 cr.; max 6 cr.; A-F only; Every Fall & Spring) Students conduct original research in rhetoric, communication theory, or media for honors thesis. Theory, methods, research writing. prereq: Honors candidate in instr, instr consent, dept consent

COMM 3201. Introduction to Electronic Media Production. (3-4 cr.; A-F or Audit; Every Fall, Spring & Summer) Production/criticism of messages for electronic media. Theory/practice in planning, scripting, production, and criticism in various electronic media. Student productions in lab.

COMM 3202. Audio Production and Media Literacy. (3 cr.; Student Option; Every Fall) Experience with sound design/production. Models of media, audience, shared construction of reality. Sound/audio as medium of communication. What about sound is persuasive. How media producers use sound to make things seem realistic. Role sound plays in audience's construction of world. How people use sound in unexpected ways. How mode of delivery affects how content is produced/interpreted. Recording, Foley work, looping/ADR, production of radio play. prereq: 3201, able to meet outside of designated course window

COMM 3204. Advanced Electronic Media Production. (3-4 cr.; A-F or Audit; Every Fall & Spring) Video as communicative medium integrating visual/aural aesthetics. Creation of broadcast-quality production integrating message creation, audience analysis, argument development, and visual/audio scripting. Utilization of media aesthetics to develop/shape production content. prereq: 3201 or instr consent

COMM 3211. Introduction to Media Studies. (3 cr.; Student Option; Every Fall, Spring & Summer) Historical development and current issues in electronic media technologies and programming. Effects of governmental, industrial, and public organizations on message content. Problem areas of electronic media.

COMM 3231. Reality TV: History, Culture, and Economics. (3 cr.; Student Option; Every Spring) Social, visual, cultural, economic, historical, and ethical dimensions of reality television.
COMM 3263W. Media Literacy: Decoding Media Images and Messages. (WI; 3 cr.; A-F only; Every Fall, Spring & Summer) Analysis of media images/messages, Principles of literacy, Media content/industries, Media and identity, Media effects. Textbook/packet readings, videos, small groups of peer writing workshops, media analyses.

COMM 3401. Introduction to Communication Theory. (3 cr.; Student Option; Every Fall, Spring & Summer) Social scientific theory in human communication. Logic of scientific communication theories in interpersonal, small group, organizational, intercultural, and mediated communication.

COMM 3402. Introduction to Interpersonal Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Nature and function of communication between individuals in formal and informal relationships. Communicative interactions from theoretical and practical viewpoints.

COMM 3409. Nonverbal Communication. (SOSC; 3 cr.; Student Option; Every Fall, Spring & Summer) Nonverbal communication in interpersonal communication process. Nonverbal codes (touch, space, smell, eye contact) and their communicative functions (impression management, flirting, persuading, lying) in relational contexts (intimate relationships, friendships, work relationships). Theories, practices.

COMM 3411. Introduction to Small Group Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Cooperative thinking in task-oriented groups. Planning, preparing for, and participating in small groups in private and public contexts.

COMM 3422. Interviewing and Communication. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Application of communication concepts in information interview. Planning, conducting, and evaluating informational, journalistic/elite, helping, persuasive, appraisal, and employment interviews. Class training, field experience.

COMM 3431. Persuasion Theories. (3 cr.; Student Option; Every Fall, Spring & Summer) Sociological, psychological, and communication perspectives. Theoretical knowledge applied to persuasion problems. Prereq: Soph recommended

COMM 3441. Introduction to Organizational Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Functions of communication in work groups, in organizational hierarchies, and between organizations.

COMM 3451W. Intercultural Communication: Theory and Practice. (WI; 3 cr.; Student Option; Every Fall, Spring & Summer) Theories of and factors influencing intercultural communication. Development of effective intercultural communication skills. Prereq: Planning an intercultural experience

COMM 3452W. Communication and the Intercultural Reentry. (3 cr.; Student Option; Every Fall & Spring) Intercultural experience explored through stories and story telling, participant observation, and social scientific theory. Constructs include identity, learning styles, cultural adaptation, values, ethics. Prereq: Return from an intercultural experience

COMM 3601. Introduction to Rhetorical Theory. (3 cr.; Student Option; Every Fall, Spring & Summer) Theoretical systems to explain/direct creation of public discourse. Traditional rhetoric to contemporary perspectives. Using theory to explain practice of public discourse.

COMM 3605W. Persuasive Speaking and Speech Writing. (WI; 3 cr.; Student Option; Every Fall, Spring & Summer) Performance/composition with critical inquiry into rhetoric theories. Writing, thinking, and speaking skills. Prereq: 1101, Soph

COMM 3615. Argumentation. (3 cr.; Student Option; Every Fall, Spring & Summer) Argument(s) in relation to logic, dialectics, and rhetorical performance. Structured reasoning, informal conversation, familial arguments, debates in technical professions, communication ethics, and public/social argumentation. Prereq: Soph

COMM 3625. Communication Ethics. (3 cr.; A-F or Audit; Every Fall & Spring) Applying concepts/theories from philosophy and social science to ethical issues in interpersonal, group, organizational, intercultural, and media communication.

COMM 3631. Freedom of Speech. (CIV; 3 cr.; Student Option; Every Fall, Spring & Summer) Communication theories and principles that underlie the concept of freedom of speech in the United States. A variety of contexts and practices are examined in order to understand how communicative interaction should be described and, when necessary, appropriately regulated.

COMM 3635W. Famous Speeches. (WI; 3 cr.; A-F only; Every Fall) Speeches that became famous because of the occasion, issue, or speaker. Students analyze texts, research the issue/history and the speaker's biography/opposition, and evaluate the speech's artistry, ethical principles, effects on society, and contribution to history of ideas.

COMM 3645W. How Pictures Persuade. (WI; 3 cr.; A-F only; Every Fall) How words/pictures interact in graphic memoirs, political cartoons, and science to create/communicate meaning. How this interaction bears on public advocacy. Reading examples of comprehensive cognitive model of visual communication.

COMM 3676W. Communicating Terrorism. (GP, WI; 3 cr.; Student Option; Every Fall) Terrorism as an ethical and international problem. Different cultures' historical trajectories for terrorism. Contrasts between Algerian, Irish, and Arab terrorism.


COMM 3682W. Communicating War. (AH, WI, CIV; 3 cr.; Student Option; Every Spring) Claim: if ethics (right/wrong) exists in war, then right/wrong exist everywhere. Students experience this claim through its expression in various arts/humanities media of history, memoir, philosophical meditation, and film.

COMM 3970. Directed Study. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq: One Comm course, instr consent, dept consent, college consent.

COMM 3980. Directed Instruction. (1-3 cr. [max 6 cr.]; S-N or Audit; Every Fall, Spring & Summer) Supervised planning/teaching of undergraduate courses. Prereq: instr consent, dept consent

COMM 3990. Research Practicum. (1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) How communication research is designed, implemented, and published. Focus is on working with senior faculty on their current research projects.

COMM 3995W. Major Project. (WI; 1-3 cr.; S-N or Audit; Every Fall, Spring & Summer) Individualized instruction leading to completion of senior project. Prereq: Comm major, instr consent

COMM 4204. Producing for Television: Theory and Practice. (4 cr.; Student Option; Every Fall) Producing media content based on audience, design, and story. Developing a thematic design. Evaluating and choosing a projected audience based on story concept and program bible. Each student completes a television program, including writing a script, preproduction planning, and considering crew and talent needs. Media producer responsibilities. Prereq: 3201, 3204

COMM 4221. Communication and Popular Music. (3 cr.; Student Option; Periodic Fall) A critical media studies perspective on the production, distribution, consumption, circulation, and regulation of popular music. Prereq: 3211, sr, instr consent

COMM 4235. Electronic Media and Ethnic Minorities–A World View. (3 cr.; Student Option; Periodic Fall, Spring & Summer) Representation and involvement of various ethnic groups (e.g., African-Americans, Native Americans in United States and Canada, Maori, Turks in Europe) in radio, TV, cable, Internet. Roles of government, industry,
public organizations, and minority groups in regulating, managing, and financing ethnic media activities.

COMM 4245. Critical Television Studies. (3 cr.; Student Option; Periodic Fall) Television as object of criticism, as cultural institution, and as omnipresent mode of commercialized popular culture. Aesthetics, semiotics, political economics, consumer culture/advertising, social representation, global television, televisuality, flow. Reception and everyday life. prereq: 3211

COMM 4250. Environmental Communication. (ENV; 3 cr.; A-F only; Every Spring) Historical, cultural, material contexts within which environmental communication takes place. Understand environmental communication as well as develop communication strategies that lead to more sustainable social practices, institutions, and systems.

COMM 4263. Feminist Media Studies. (DSJ; 3 cr.; A-F only; Every Spring) Issues, controversies, and practices of gender and their relationship to U.S. media. Ways in which gender is represented in and comes into play with media texts/institutions. Histories of feminism, theories/methods/political economy, case studies. prereq: 3211 or instr consent

COMM 4291. New Telecommunication Media. (3 cr.; A-F or Audit; Periodic Fall) Development and current status of new telecommunication media such as cable TV, satellites, DBS, MDS, and video disk/cassettes. Technology, historical development, regulation, and programming of these media and their influence on individuals, organizations, and society. prereq: 3211 or instr consent

COMM 4404W. Language Borderslands. (WI; 3 cr.; Student Option; Every Fall) Effect of multilingualism on self identity/sense of community. Subjective/social dimensions of being multilingual. Experience of language loss.

COMM 4407. Communication and Conflict. (3 cr.; A-F or Audit; Every Fall) Aspects of conflict common across types of relationships. Theories as alternative lenses to illuminate aspects of conflict. Communication strategies to manage or resolve conflict. prereq: 3401 or instr consent

COMM 4471. Communication in Marriage and Family. (3 cr.; Student Option; Periodic Fall & Spring) Contemporary theories of marriage/family communication using life-cycle approach. Role/function of communication in changing relational contexts. Ways of improving marriage/family relationships. prereq: 3401 or 3402 or instr consent

COMM 4602W. Contemporary Political Persuasion. (WI; 3 cr.; Student Option; Periodic Fall) Contemporary political speech. Ideologies in political persuasion. prereq: 1101, 3431 or instr consent

COMM 4616. African American Civil Rights Rhetoric. (3 cr.; Student Option; Every Spring) Uses the struggle of African Americans to explore and analyze philosophical concepts, political issues, moral complexities, and discursive characteristics of civil rights rhetoric. prereq: Jr

COMM 4621W. Rhetoric of Feminism. (DSJ;WI; 3 cr.; Student Option; Every Fall) History/criticism of rhetoric of feminism from 19th century to present.

COMM 5110. Special Topics in Communication Theory. (3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer) Advanced theoretical problems. See department office for current offering.

COMM 5211. Critical Media Studies: Theory and Methods. (3 cr.; A-F only; Every Spring) Survey of theories, research methods, and scholars dominating critical media studies since late 1920s. prereq: Grad student or instr consent

COMM 5221. Media, Race, and Identity. (3 cr.; Student Option; Periodic Fall) Critical media studies perspective on cultural politics of race and ethnicity. Social construction of race, politics of racism, media representations of race. prereq: 3211 or instr consent

COMM 5231. Media Outlaws. (3 cr.; Student Option; Fall Even Year) People working outside of mainstream media institutions who find creative/provocative ways to use media as space for cultural, political, or economic critique/resistance.

COMM 5250. Environmental Communication. (3 cr.; A-F only; Every Spring) Historical, cultural, material contexts within which environmental communication takes place. Understand environmental communication as well as develop communication strategies that lead to more sustainable social practices, institutions, and systems.

COMM 5251. Political Economy of Media Culture. (3 cr.; Student Option; Every Fall & Spring) Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/process media content. prereq: 3211 or instr consent

COMM 5401. Advanced Theories of Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Survey of major theoretical approaches to communication including, positivism, constructivism, and systems. prereq: 3401 or grad

COMM 5402. Advanced Interpersonal Communication. (3 cr.; Student Option; Every Spring) Social scientific approaches to interpersonal communication. Theory, research findings. prereq: 3401 or 3402

COMM 5411. Small Group Communication Research. (3 cr.; A-F or Audit; Every Spring) Survey of small group communication research; theory and practice. Group decision-making and leadership. prereq: 3411 or instr consent

COMM 5421. Quantitative Methods in Communication Research. (3 cr.; A-F or Audit; Every Fall) Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit. prereq: 3401 or instr consent

COMM 5431. The Process of Persuasion. (3 cr.; Student Option; Every Fall & Spring) Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required. prereq: 3431

COMM 5441. Communication in Human Organizations. (3 cr.; Student Option; Every Fall, Spring & Summer) Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

COMM 5451W. Intercultural Communication Processes. (WI; 3 cr.; Student Option; Periodic Fall) Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.

COMM 5511. Survey of Rhetorical Theory. (3 cr.; Student Option; Periodic Fall) Rhetorical theory, from ancient to contemporary period. Application to public discourse.

COMM 5515W. Introduction to Rhetorical Criticism. (WI; 3 cr.; Student Option; Every Spring) Analysis of public discourse using various theoretical perspectives. prereq: 1101; 3601 recommended

COMM 5517. History and Criticism of U.S. Public Discourse: 1630-1865. (3 cr.; Student Option; Periodic Fall) How discourse has been used to establish or maintain power. Speeches and public debates used to examine American public address from 17th century (e.g., Puritan sermons) to the Civil War. prereq: Jr

COMM 5570. Directed Study. (1-3 cr. [max 6 cr.]; S-N or Audit; Every Fall, Spring & Summer) Guided individual reading or study. Prereq-Nine 3xxx-5xxx Sphcr or instr consent, dept consent, college consent.

COMM 5594. Communication Research Practicum. (1-3 cr. [max 9 cr.]; S-N or Audit; Every Fall, Spring & Summer) Students participate in research group. prereq: instr consent

COMM 8110. Seminar: Advanced Speech Problems. (3 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)
Evaluation of research methods in speech-communication. prereq: undergrad degree in spch-comm or equiv

COMM 8210. Seminar: Selected Topics in U.S. Electronic Media. (3 cr. [max 18 cr.]; Student Option; Periodic Fall & Spring) Literature survey; evaluating research on topics; conducting independent research project on a particular topic. prereq: 5210 or instr consent; offered when feasible

COMM 8211. Critical Communication Studies: History, Theory, Method. (3 cr.; Student Option; Every Fall, Spring & Summer) Qualitative research methods for studying media institutions, texts, audiences, and contexts.

COMM 8231. Seminar: National and International Electronic Media Systems. (3 cr.; Student Option; Periodic Fall) Historical and contemporary aspects of national and international electronic media systems. Roles of national and international regulatory bodies. Approaches to programming and evidence of effectiveness. prereq: 4231 or instr consent

COMM 8333. FTE: Master’s. (1-1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

COMM 8402. Seminar: Interpersonal Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Evaluate and develop new perspectives for analyzing, diagnosing, and managing interpersonal communication problems. prereq: 5402 or instr consent

COMM 8403. Seminar: Emotion and Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Major theories of emotion and the role of emotion in communication.

COMM 8444. FTE: Doctoral. (1-1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

COMM 8451. Seminar: Intercultural and Diversity Research. (3 cr.; Student Option; Every Fall, Spring & Summer) Development of ideas/methods for research project, M.A. Plan B project, or Ph.D. dissertation. prereq: instr consent

COMM 8452. Seminar: Methods of Intercultural/Diversity Facilitation. (3 cr.; Student Option; Every Fall, Spring & Summer) Theories of and techniques for managing effective intercultural communication and diversity. Intercultural training. prereq: 4451 or 5452 recommended

COMM 8502. Seminar: Communication Theory Construction. (3 cr.; Student Option; Periodic Fall & Spring) Logic of communication theory development and modification from a social scientific perspective. Types of communication theories. prereq: 5421 or instr consent

COMM 8504. Seminar: Rhetorical Criticism. (3 cr.; Student Option; Every Fall, Spring & Summer) Rhetorical criticism theories and methods. Rhetoric as applied to literary studies and the growth of hermeneutics as vantage points for reassessing rhetorical methods. prereq: 5615 or instr consent

COMM 8611. Seminar: Rhetoric. (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) History/criticism of rhetorical theory. Research in rhetoric. prereq: 5611 or instr consent

COMM 8625. Seminar: Communication Ethics. (3 cr.; A-F or Auditt; Periodic Fall) Independent research on communication ethics in interpersonal, group, organizational, intercultural, and media settings. Theories of ethics and methods of analysis. prereq: Ethics course or instr consent

COMM 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 10 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

COMM 8677. Thesis Credits: Master’s. (1-18 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

COMM 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

COMM 8994. Directed Research. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Supervised research project.

Compar Study in Discourse/Soc (CSDS)

CSDS 5555. Introduction to Semiotics. (3 cr.; Student Option; Periodic Spring) Problems of the sign. Sign function/production. Signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CSDS 5993. Directed Study. (1-3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Guided individual reading and study. prereq: instr consent

CSDS 8001. Basic Research Seminar: Comparative Studies in Discourse and Society I. (3 cr.; Student Option; Every Fall) Key texts, positions, problems in field of comparative critical theory. Historical precursors, influential contemporary debates, disciplinary genealogies.

CSDS 8002. Basic Research Seminar in Comparative Studies in Discourse and Society II. (3 cr.; Student Option; Every Spring) Key texts, positions, problems in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, disciplinary genealogies.

CSDS 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

CSDS 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

CSDS 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CSDS 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

CSDS 8901. Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities. (3 cr.; Student Option; Every Spring) Prepare graduate majors for teaching. Issues of pedagogy. Preparing syllabi for specific courses that graduate instructors teach. Required for students planning to teach in Department of Cultural Studies and Comparative Literature. prereq: Grad CSDS major

CSDS 8902. Methodologies Colloquium. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring) Presentations by CL/CSDS faculty. Methods in relation to field as a whole. Library component. Meetings with research librarians. prereq: CSDS grad major or instr consent

CSDS 8910. Advanced Topics in Comparative Studies in Discourse and Society. (3 cr. [max 24 cr.]; Student Option; Every Fall & Spring) Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics vary by instructor and semester.

CSDS 8920. Advanced Topics in Comparative Studies in Discourse and Society. (3 cr. [max 15 cr.]; Student Option; Every Fall) Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CSDS 8993. Directed Study in Comparative Studies in Discourse and Society. (1-4 cr.)
CMB 5200. Statistical Genetics and Genomics. (3 cr.; A-F or Audit; Fall Even Year)
Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis using pedigree data for codominant/dominant markers. Using radiation hybrid mapping and single cell typing. Design issues in linkage analysis, parentage testing, and marker polymorphism.

CMB 5303. Comparative Models of Disease. (2 cr.; A-F only; Every Spring)

CMB 5381. Pathogenesis of Infectious Zoonotic Diseases. (3 cr.; A-F only; Every Spring)
Introduction to mechanisms of transmission/pathogenesis for zoonotic infectious diseases. Lectures, review of current literature, student presentations, written reports. prereq: [Microbiology, biochemistry] courses or instr consent

CMB 5594. Directed Research in Comparative and Molecular Biosciences. (1-4 cr.; max 8 cr. ; Student Option; Every Fall, Spring & Summer)
Independent study as determined by instructor. Usual activity includes conducting research in instructor's lab. prereq: Jr, instr consent

CMB 5910. Grantwriting: What Makes a Winning Proposal?. (2 cr.; Grant Option; Every Spring)
Components of a strong proposal. Grant submission process. What reviewers look for. How to locate grant announcements that match research interests.

CMB 8012. Basic Concepts in Skeletal Biology. (2 cr.; A-F only; Every Spring)
Cells (osteoblasts, osteoclasts, chondrocytes) that make up skeleton. Transcription/signaling networks regulating cell growth/differentiation. Mechanisms of bone remodeling. Regulation of bone by agents such as hormones. prereq: CMB grad student or instr consent

CMB 8100. Research Rotation in Comparative and Molecular Biosciences. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
Current developments in faculty research. Topics specific to research advisor's area of interest. Eight weeks. prereq: CMB grad student

CMB 8134. Ethical Conduct of Animal Research. (3 cr.; Student Option; Every Fall)
Ethical considerations in the use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition and use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

CMB 8201. Mechanisms of Animal Health and Disease I. (3 cr.; A-F or Audit; Every Fall & Spring)
Basic mechanisms of animal health. Innate/ acquired immunity. Immune avoidance. Cellular basis for pathogenesis of animal diseases. Molecular/genetic mechanisms of host resistance. Host/pathogen interactions. prereq: 1st yr CMB grad student or approval of instr coordinator

CMB 8202. Mechanisms of Animal Health and Disease II. (3 cr.; A-F only; Every Fall & Spring)
Multi-perspective approach to critically evaluating journal articles, as done for peer-reviewed journals. Aspects of host/pathogen interactions, including molecular/genetic mechanisms of host resistance/pathogenesis.

CMB 8208. Neuropsychopharmacology. (3 cr.; A-F or Audit; Fall Even Year)

CMB 8300. Comparative Models of Disease. (2 cr.; A-F only; Every Spring)

CMB 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(TBD) prereq: Master's student, adviser and DGS consent

CMB 8344. Mechanisms of Hormone Action. (2 cr.; Student Option; Fall Even Year)
Mechanisms of hormone/cytokine action. Focuses on major signal transduction/ apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature. prereq: Course in biochemistry or cell biology or instr consent

CMB 8361. Neuro-Immune Interactions. (3 cr.; Student Option; Fall Odd Year)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Offered fall of even-numbered years. prereq: [MICB 5218 or equiv ]; [NSC 5561 or equiv]

CMB 8371. Mucosal Immunobiology. (3 cr.; A-F or Audit; Periodic Fall)
Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal, prereq: MICa 8001 or equiv or instr consent

CMB 8394. Research in Comparative Biomedical Sciences. (1-6 cr.; max 18 cr.; Student Option; Every Fall, Spring & Summer)
Directed research determined by student's interests, in consultation with faculty mentor. prereq: Grad CMB major

CMB 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CMB 8481. Advanced Neuropharmaceuticals. (4 cr.; A-F or Audit; Fall Even Year)
Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS. prereq: inst consent

CMB 8550. Comparative and Molecular Biosciences Seminar. (1 cr.; max 8 cr.; S-N or Audit; Every Fall & Spring)
Student/faculty presentations of their own research or a directed topic. prereq: Biol sciences grad student

CMB 8560. Research and Literature Reports. (1 cr.; max 2 cr.; S-N or Audit; Every Fall & Spring)
Current developments in cellular and molecular mechanisms of animal health and disease.

CMB 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
(TBD) prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CMB 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CMB 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Comparative Literature (CL)

CL 5555. Introduction to Semiotics. (; 3 cr.; Student Option; Periodic Spring)
Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CL 5910. Topics in Comparative Literature. (; 3-4 cr. [max 32 cr.]; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

CL 5992. Directed Reading in Comparative Literature. (; 1-3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Guided individual reading and study. prereq: instr consent

CL 8001. Basic Research Seminar in Comparative Literature I. (3 cr.; Student Option; Every Fall)
Key texts, positions, problems in field of comparative critical theory. Historical precursors, influential contemporary debates, disciplinary genealogies.

CL 8002. Basic Research Seminar in Comparative Literature II. (3 cr.; Student Option; Every Spring)
Key texts, positions, problems in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, disciplinary genealogies.

CL 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CL 8362. Modernity and Its Others. (; 4 cr.; Student Option; Periodic Fall & Spring)
Dialectical interrogation of Western and non-Western theories of modernity. Reckoning with differences and variations in its history, providing an account of the normative category of modernity (designated as European), and alternative articulations around the globe.

CL 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)

Computer Engineering (CMPE)

CMPE 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CMPE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Computer Science (CSCI)

CSCI 1001. Overview of Computer Science. (MATH,TS; 4 cr.; Student Option; Every Spring)

CSCI 1113. Introduction to Computing and Programming Concepts. (4 cr.; ; Student Option; Every Fall, Spring & Summer)

CSCI 1113H. Honors Introduction to Computing and Programming Concepts. (4 cr.; ; A-F only; Every Fall)
Programming concepts using Python language. Real world problem solving, recursion, object-oriented programming. Algorithm development techniques. Use of abstractions/modularity. Optional honors topics: programming robots, programming paradigms, artificial intelligence. prereq: [conc registration is required (or allowed) in MATH 1271 or concurrent registration is required (or allowed) in MATH 1371 or concurrent registration is required (or allowed) in MATH 1571H or instr consent

CSCI 1913. Introduction to Algorithms, Data Structures, and Program Development. (4 cr.; Student Option; Every Fall, Spring & Summer)
Advanced object oriented programming to implement abstract data types(stacks, queues, linked lists, hash tables, binary trees) using Java language. Searching/sorting algorithms. Basic algorithmic analysis. Scripting languages using Python language. Substantial programming projects. Weekly lab. prereq: EE major and EE 1301 or (CMPE major and EE 1301) or 1103 or 1113 or instr consent

CSCI 1933. Introduction to Algorithms and Data Structures. (4 cr.; Student Option; Every Fall, Spring & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Advanced object oriented programming to implement abstract data types (stacks, queues, linked lists, hash tables, binary trees) using Java language. Inheritance, searching/sorting algorithms. Basic algorithmic analysis. Use of software development tools. Weekly lab. prereq: 1133 or instr consent

CSCI 2011. Discrete Structures of Computer Science. (4 cr.; Student Option; Every Fall & Spring) Foundations of discrete mathematics. Sets, sequences, functions, big-O, propositional/predicate logic, proof methods, counting methods, recursion/recurrcences, relations, trees/graph fundamentals. prereq: MATH 1271 or MATH 1371 or instr consent

CSCI 2011H. Honors Discrete Structures of Computer Science. (4 cr.; A-F only; Every Spring) Foundations of discrete mathematics. Sets, sequences, functions, big-O, propositional/predicate logic, proof methods, counting methods, recursion/recurrcences, relations, trees/graph fundamentals. Advanced topics in discrete structures as time permits. prereq: [MATH 1271 or MATH 1371 or MATH 1571H], honors student

CSCI 2021. Machine Architecture and Organization. (4 cr.; Student Option; Every Fall & Spring) Introduction to hardware/software components of computer system. Data representation, boolean algebra, machine-level programs, instruction set architecture, processor organization, memory hierarchy, virtual memory, compiling, linking. Programming in C. prereq: 1913 or 1933 or instr consent

CSCI 2033. Elementary Computational Linear Algebra. (4 cr.; Student Option; Every Fall & Spring) Matrices/linear transformations, basic theory. Linear vector spaces. Inner product spaces. Systems of linear equations, Eigenvalues, singular values. Algorithms/computational matrix methods using MATLAB. Use of matrix methods to solve variety of computer science problems. prereq: [MATH 1271 or MATH 1371], [1113 or 1133 or knowledge of programming concepts]

CSCI 2041. Advanced Programming Principles. (4 cr.; Student Option; Every Fall & Spring) Principles/techniques for creating correct, robust, modular programs. Computing with symbolic data, recursion/induction, functional programming, impact of evaluation strategies, parallelism. Organizing data/computations around types. Search-based programming, concurrency, modularity. prereq: [1913 or 1933], 2011

CSCI 2999. Special Exam. (2 cr.; Student Option;) CSCI 2999. Special Exam. (4 cr.; Student Option;) CSCI 3003. Introduction to Computing in Biology. (3 cr.; Student Option; Every Spring) Emphasizes computing tasks common in biology. Programming techniques: variables, flow control, input/output, strings, pattern matching, arrays, hash tables, functions, subroutines. Concepts in computing: algorithms, complexity, documentation, regular expressions/grammars, local variables, encapsulation. Students complete lab projects in Perl language. prereq: 1002H or Biol 1002 or 1009H or Biol 1009 or equiv or instr consent

CSCI 3081W. Program Design and Development. (WI; 4 cr.; Student Option; Every Fall & Spring) Principles of programming design/analysis. Concepts in software development. Uses C/C++ language to illustrate key ideas in program design/development, data structures, debugging, files, I/O, state machines, testing, coding standards. prereq: [2021, 2041] or instr consent

CSCI 3921W. Social, Legal, and Ethical Issues in Computing. (CIV, WI; 3 cr.; Student Option; Every Fall) Impact of computers on society. Computer science perspective of ethical, legal, social, philosophical, political, and economic aspects of computing. prereq: At least soph or instr consent

CSCI 3970. Industrial Student Co-op Assignment. (2 cr. [max 4 cr.]; 4 cr.; S-N or Audit; Every Fall & Spring) Industrial work assignment in a co-op program involving advanced computer technology. Reviewed by a faculty member. Grade based on final written report. prereq: CSci, in co-op program, instr consent

CSCI 4011. Formal Languages and Automata Theory. (4 cr.; Student Option; Every Fall & Spring) Logical/mathematical foundations of computer science. Formal languages, their correspondence to machine models. Lexical analysis, string matching, parsing. Decidability, undecidability, limits of computability. Computational complexity. prereq: 2041 or instr consent

CSCI 4041. Algorithms and Data Structures. (4 cr.; Student Option; Every Fall & Spring) Rigorous analysis of algorithms/implementation. Algorithm analysis, sorting algorithms, binary trees, heaps, priority queues, heapsort, balanced binary search trees, AVL trees, hash tables and hashing, graphs, graph traversal, single source shortest path, minimum cost spanning trees. prereq: [(1913 or 1933) and 2011] or instr consent; cannot be taken for grad CSci cr

CSCI 4041H. Algorithms and Data Structures. (4 cr.; A-F only; Every Fall & Spring) Rigorous analysis of algorithms/implementation. Algorithm analysis, sorting algorithms, binary trees, heaps, priority queues, heapsort, balanced binary search trees, AVL trees, hash tables/hashing, graphs, graph traversal, single source shortest path, minimum cost spanning trees. prereq: [(1913 or 1933) and 2011] or instr consent. Cannot be taken for Grad CSci cr

CSCI 4061. Introduction to Operating Systems. (4 cr.; Student Option; Every Fall & Spring) Processes/threads, process coordination, interprocess communication, asynchronous events, memory management/file systems. Systems programming projects using operating system interfaces and program development tools. prereq: 2021 or EE 2361; no cr for grads in CSci

CSCI 4131. Internet Programming. (3 cr.; Student Option; Every Fall & Spring) Issues in internet programming. Internet history, architecture/protocols, network programming, Web architecture. Client-server architectures and protocols. Client-side programming, server-side programming, dynamic HTML, Java programming, object-oriented architecture/design, distributed object computing. Web applications. prereq: 4081, 4211 recommended, cannot be taken for grad CSci cr

CSCI 4203. Computer Architecture. (4 cr.; Student Option; Every Fall & Spring) Introduction to computer architecture. Aspects of computer systems, such as pipelining, memory hierarchy, and input/output systems. Performance metrics. Examines each component of a complicated computer system. prereq: 2021 or instr consent

CSCI 4211. Introduction to Computer Networks. (3 cr.; Student Option; Every Fall & Spring) Concepts, protocols, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, routing, transport, network programming interfaces, networked applications. Examples from Ethernet, Token Ring, TCP/IP, HTTP, WWW. prereq: 4061 or instr consent; basic knowledge of [computer architecture, operating systems] recommended, cannot be taken for grad CSci cr

CSCI 4511W. Introduction to Artificial Intelligence. (WI; 4 cr.; Student Option; Every Spring) Problem solving, search, inference techniques. Knowledge representation, Planning, Machine learning. Robotics. Lisp programming language. Cannot be taken for grad CSci credit. prereq: 2041 or instr consent


CSCI 4707. Practice of Database Systems. (3 cr.; Student Option; Every Fall & Spring) Concepts, conceptual data models, case studies, common data manipulation languages, logical data models, database design, facilities
for database security/integrity, applications. prereq: 4041 or instr consent

CSCI 4921. History of Computing. (HIST, Ts; 3 cr.; Student Option; Fall Even Year) Developments in last 150 years; evolution of hardware and software; growth of computer and semiconductor industries and their relation to other businesses; changing relationships resulting from new data-gathering and analysis techniques; automation; social and ethical issues.

CSCI 4950. Senior Software Project. (3 cr. [max 6 cr.]; A-F; only; Every Fall & Spring) Student teams develop a software system, distribute system to users, and extend/ maintain it in response to their needs. Software engineering techniques. Software development, team participation, leadership. prereq: Upper div CSci, instr consent

CSCI 4970W. Advanced Project Laboratory. (WI; 3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Formulate and solve open-ended project: design, implement, interface, document, test. Team work strongly encouraged. Arranged with CSci faculty. prereq: Upper div CSci, 4061, instr consent; cannot be taken for grad cr

CSCI 4994H. Honors Thesis. (1-5 cr.; A-F; only; Every Fall, Spring & Summer) Research work for an honors thesis arranged with a CS faculty member who is the adviser or coadviser. prereq: Honors student, instr consent

CSCI 5103. Operating Systems. (3 cr.; Student Option; Every Fall) Conceptual foundation of operating system designs and implementations. Relationships between operating system structures and machine architectures. UNIX implementation mechanisms as examples. prereq: 4061 or instr consent

CSCI 5105. Introduction to Distributed Systems. (3 cr.; Student Option; Periodic Spring) Distributed system design and implementation. Distributed communication and synchronization, data replication and consistency, distributed file systems, fault tolerance, and distributed scheduling. prereq: 5103 or equiv or instr consent

CSCI 5106. Programming Languages. (3 cr.; Student Option; Every Fall) Design and implementation of high-level languages. Course has two parts: (1) language design principles, concepts, constructs; (2) language paradigms, applications. Note: course does not teach how to program in specific languages. prereq: 4011 or instr consent

CSCI 5115. User Interface Design, Implementation and Evaluation. (3 cr.; Student Option; Every Fall) Theory, design, programming, and evaluation of interactive application interfaces. Human capabilities and limitations, interface design and engineering, prototyping and interface construction, interface evaluation, and topics such as data visualization and World Wide Web. Course is built around a group project. prereq: 4041 or instr consent

CSCI 5117. Developing the Interactive Web. (3 cr.; Student Option; Spring Even Year) Hands-on design experience using modern web development tools. Students work in teams to develop software programs using each of four toolkits. Analyze developments in forum posts and classroom discussions. prereq: 4131 or 5131 or instr consent; upper div or grad in CSci recommended

CSCI 5125. Collaborative and Social Computing. (3 cr.; Student Option; Spring Even Year) Introduction to computer-supported cooperative work, social computing. Technology, research methods, theory, case studies of group computing systems. Readings, hands-on experience. prereq: 5115 or instr consent

CSCI 5127W. Human-Centered Design and Prototyping of Ubiquitous Computing Systems. (WI; 3 cr.; Student Option; Fall Even Year) Principles of human-centered design applied to real-world challenges. A semester-long team project involving (1) investigating human needs, (2) charting the solution space through ideation and visual exploration, and (3) rapidly prototyping and iterating ubiquitous computing solutions. Collaborative writing describing your process and findings. prereq: CSCI 4041, upper division or graduate student, or instructor permission; CSCI 5115 or equivalent recommended.

CSCI 5143. Real-Time and Embedded Systems. (3 cr.; A-F only; Periodic Spring) Real-time systems that require timely response by computer to external stimulus. Embedded systems in which computer is part of machine. Increasing importance of these systems in commercial products. How to control robots and video game consoles. Lecture, informal lab. prereq: 4061 or instr consent, experience with C language

CSCI 5161. Introduction to Compilers. (3 cr.; Student Option; Every Spring) Techniques for translating modern programming languages to intermediate forms or machine-executable instructions/their organization into compiler. Lexical analysis, syntax analysis, semantic analysis, data flow analysis, code generation. Compiler project for prototypical language. prereq: [2021, 5106] or instr consent

CSCI 5204. Advanced Computer Architecture. (3 cr.; Student Option; Every Fall) Instruction set architecture, processor microarchitecture, memory, I/O systems. Interactions between computer software and hardware. Methodologies of computer design. prereq: 4203 or EE 4363

CSCI 5211. Data Communications and Computer Networks. (3 cr.; Student Option; Every Fall) Concepts, principles, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, network layer/routing protocols, transport, congestion/flow control, emerging high-speed networks, network programming interfaces, networked computing. Case studies using Ethernet, Token Ring, FDDI, TCP/IP, ATM, Email, HTTP, and WWW. prereq: [4061 or instr consent], basic knowledge of [computer architecture, operating systems, probability], grad student

CSCI 5221. Foundations of Advanced Networking. (3 cr.; Student Option; Spring Even Year) Design principles, protocol mechanisms. Network algorithms, implementation techniques. Advanced network architectures, state-of-art/emerging networking technologies/applications, network modeling. Simulation, experiments. prereq: 4211 or 5211 or equiv; intro course in computer networks recommended

CSCI 5231. Wireless and Sensor Networks. (3 cr.; Student Option; Spring Odd Year) Enabling technologies, including hardware, embedded operating systems, programming, environment, communication, networking, and middleware services. Hands-on experience in programming tiny communication devices. prereq: 4211 or 5211 or instr consent

CSCI 5271. Introduction to Computer Security. (3 cr.; Student Option; Every Fall) Concepts of computer, network, and information security. Risk analysis, authentication, access control, security evaluation, audit trails, cryptography, network/database/application security, viruses, firewalls. prereq: 4061 or equiv or instr consent

CSCI 5302. Analysis of Numerical Algorithms. (3 cr.; Student Option; Every Spring) Additional topics in numerical analysis. Interpolation, approximation, extrapolation, numerical integration/differentiation, numerical solutions of ordinary differential equations. Introduction to optimization techniques. prereq: 2031 or 2033 or instr consent

CSCI 5304. Computational Aspects of Matrix Theory. (3 cr.; Student Option; Every Fall) Perturbation theory for linear systems and eigenvalue problems. Direct/iterative solution of large linear systems. Matrix factorizations, Computation of eigenvalues/eigenvectors, Singular value decomposition, LAPACK/other software packages. Introduction to sparse matrix methods. prereq: 2031 or 2033 or instr consent

CSCI 5403. Computational Complexity. (3 cr.; Student Option; Periodic Fall & Spring) Computational models, complexity measures in each model, and related complexity classes. prereq: 4041 or instr consent

CSCI 5421. Advanced Algorithms and Data Structures. (3 cr.; Student Option; Every Fall & Spring) Fundamental paradigms of algorithm and data structure design. Divide-and-conquer, dynamic programming, greedy method, graph algorithms, amortization, priority queues
and variants, search structures, disjoint-set structures. Theoretical underpinnings. Examples from various problem domains. prereq: 4041 or instr consent

CSCI 5451. Introduction to Parallel Computing: Architectures, Algorithms, and Programming. (3 cr.; Student Option; Every Spring)
Parallel architectures design, embeddings, routing. Examples of parallel computers. Fundamental communication operations. Performance metrics. Parallel algorithms for sorting. Matrix problems, graph problems, dynamic load balancing, types of parallelisms. Parallel programming paradigms. Message passing programming in MPI, Shared-address space programming in openMP or threads. prereq: 4041 or instr consent

CSCI 5461. Functional Genomics, Systems Biology, and Bioinformatics. (3 cr.; Student Option; Every Fall)
Computational methods for analyzing, integrating, and deriving predictions from genomic/proteomic data. Analyzing gene expression, proteomic data, and protein-protein interaction networks. Protein/gene function prediction. Integrating diverse data, visualizing genomic datasets. prereq: 3003 or 4041 or instr consent

CSCI 5471. Modern Cryptography. (3 cr.; Student Option; Periodic Fall & Spring)
Introduction to cryptography. Theoretical foundations, practical applications. Threats, attacks, and countermeasures, including cryptosystems and cryptographic protocols. Secure systems/networks. History of cryptography, encryption (conventional, public key), digital signatures, hash functions, message authentication codes, identification, authentication, applications. prereq: [2031 or 2033] or instr consent

CSCI 5481. Computational Techniques for Genomics. (3 cr.; Student Option; Every Fall)

CSCI 5511. Artificial Intelligence I. (3 cr.; Student Option; Every Fall)
Introduction to AI. Problem solving, search, inference techniques. Logic/theorem proving. Knowledge representation, rules, frames, semantic networks. Planning/scheduling. Lisp programming language. prereq: [2041 or instr consent], grad student

CSCI 5512. Artificial Intelligence II. (3 cr.; Student Option; Every Spring)
Uncertainty in artificial intelligence. Probability as a model of uncertainty. Methods for reasoning/learning under uncertainty, utility theory, decision-theoretic methods, prereq: [STAT 3021, 4041] or instr consent

CSCI 5521. Introduction to Machine Learning. (3 cr.; Student Option; Periodic Fall)
Problems of pattern recognition, feature selection, measurement techniques. Statistical decision theory, nonstatistical techniques. Automatic feature selection/data clustering. Syntactic pattern recognition. Mathematical pattern recognition/artificial intelligence. prereq: [2031 or 2033], STAT 3021 or instr consent

CSCI 5523. Introduction to Data Mining. (3 cr.; Student Option; Periodic Fall & Spring)
Data pre-processing techniques, data types, similarity measures, data visualization/exploration. Predictive models (e.g., decision trees, SVM, Bayes, K-nearest neighbors, bagging, boosting). Model evaluation techniques, Clustering (hierarchical, partitional, density-based), association analysis, anomaly detection. Case studies from areas such as earth science, the Web, network intrusion, and genomics. Hands-on projects. prereq: 4041 or equiv or instr consent

CSCI 5525. Machine Learning. (3 cr.; Student Option; Fall Even Year)
Models of learning. Supervised algorithms such as perceptrons, logistic regression, and large margin methods (SVMs, boosting). Hypothesis evaluation. Learning theory. Online algorithms such as winnow and weighted majority. Unsupervised algorithms, dimensionality reduction, spectral methods. Graphical models. prereq: Grad student or instr consent

CSCI 5551. Introduction to Intelligent Robotic Systems. (3 cr.; Student Option; Periodic Fall)
Transformations, kinematics/inverse kinematics, dynamics, control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, microrobotics. prereq: 2031 or 2033 or instr consent

CSCI 5552. Sensing and Estimation in Robotics. (3 cr.; Student Option; Periodic Spring)

CSCI 5561. Computer Vision. (3 cr.; Student Option; Every Spring)
Issues in perspective transformations, edge detection, image filtering, image segmentation, and feature tracking. Complex problems in shape recovery, stereo, active vision, autonomous navigation, shadows, and physics-based vision. Applications. prereq: 5511 or instr consent

CSCI 5607. Fundamentals of Computer Graphics 1. (3 cr.; Student Option; Every Fall)
Fundamental algorithms in computer graphics. Emphasizes programming projects in C++. Scan conversion, hidden surface removal, geometrical transformations, projection, illumination/shading, parametric cubic curves, texture mapping, antialiasing, ray tracing. Developing graphics software, graphics research. prereq: concurrent registration is required (or allowed) in 2033, concurrent registration is required (or allowed) in 3081

CSCI 5608. Fundamentals of Computer Graphics II. (3 cr.; Student Option; Periodic Spring)
Advanced topics in image synthesis, modeling, rendering. Image processing, image warping, global illumination, non-photorealistic rendering, texture synthesis. Parametric cubic surfaces, subdivision surfaces, acceleration techniques, advanced texture mapping. Programming in C++. prereq: 5607 or instr consent

CSCI 5609. Visualization. (3 cr.; Student Option; Every Year)
Fundamental theory/practice in data visualization. Programming applications. Perceptual issues in effective data representation, multivariate visualization, information visualization, vector field/volume visualization. prereq: [1913, 4041] or equiv or instr consent

CSCI 5611. Animation & Planning in Games. (3 cr.; Student Option; Fall Odd Year)
Theory behind algorithms used to bring virtual worlds to life. Computer animation topics. Real-time, interactive techniques used in modern games. Physically-based animation, motion planning, character animation, simulation in virtual worlds. prereq: 4041 or 4611 or instr consent

CSCI 5619. Virtual Reality and 3D Interaction. (3 cr.; Student Option; Spring Odd Year)
Introduction to software, technology/applications in virtual/augmented reality, 3D user interaction. Overview of current research. Hands-on projects. prereq: 4611 or 5607 or 5115 or equiv or instr consent

CSCI 5707. Principles of Database Systems. (3 cr.; Student Option; Every Fall)
Concepts, database architecture, alternative conceptual data models, foundations of data manipulation/analysis, logical data models, database designs, models of database security/integrity, current trends. prereq: [4041 or instr consent], grad student

CSCI 5708. Architecture and Implementation of Database Management Systems. (3 cr.; Student Option; Every Spring)
Techniques in commercial/research-oriented database systems. Catalogs. Physical storage techniques. Query processing/optimization. Transaction management. Mechanisms for concurrency control, disaster recovery, distribution, security, integrity, extended data types, triggers, and rules. prereq: 4707 or 5707 or instr consent
CSCI 5715. From GPS and Virtual Globes to Spatial Computing. (3 cr.; Student Option; Spring Even Year)
Mathematical concepts, geo-information, representations, algorithms, data-structures/access methods, analysis, architectures, interfaces, reasoning, time. prereq: Familiarity with Java, C++, or Python

CSCI 5801. Software Engineering I. (3 cr.; Student Option; Every Fall)
Advanced introduction to software engineering. Software life cycle, development models, software requirements analysis, software design, coding, maintenance. prereq: 2041 or instr consent

CSCI 5802. Software Engineering II. (3 cr.; Student Option; Periodic Spring)
Introduction to software testing, software maturity models, cost specification models, bug estimation, software reliability models, software complexity, quality control, and experience report. Student groups specify, design, implement, and test partial software systems. Application of general software development methods and principles from 5801. prereq: 5801 or instr consent

CSCI 5980. Special Topics in Computer Science. (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Lectures and informal discussions on current topics in computer science. prereq: instr consent; may be repeated for cr

CSCI 5991. Independent Study. (1-3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Independent study arranged with CS faculty member. prereq: instr consent; may be repeated for cr

CSCI 5994. Directed Research. (1-3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Directed research arranged with faculty member. prereq: instr consent; may be repeated for cr

CSCI 5996. Curricular Practical Training. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall, Spring & Summer)
Industrial work assignment involving advanced computer technology. Reviewed by faculty member. Grade based on final report covering work assignment. prereq: [CSci or CompE] major, instr consent

CSCI 8001. Introduction to Research in Computer Science I. (1 cr.; A-F only; Every Fall)
First of two-part sequence course. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources. prereq: 1st yr CS PhD student

CSCI 8002. Introduction to Research in Computer Science II. (2 cr.; A-F only; Every Spring)
Second of two-part sequence course. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources. prereq: 1st yr CS PhD student

CSCI 8011. Advanced Operating Systems. (3 cr.; Student Option; Periodic Fall)
Successful research systems and existing theory of system design. Goal is not merely to catalog systems or learn mathematics, but to develop a sense of elegance of design that leads to successful systems. prereq: 5103 or instr consent

CSCI 8012. Foundations of Distributed Computing. (3 cr.; Student Option; Periodic Fall & Spring)
Fundamental principles underlying design of distributed and multiprocessor operating systems. Foundations of distributed computing systems; shared multiprocessor systems. prereq: 8101 or instr consent

CSCI 8115. Human-Computer Interaction and User Interface Technology. (3 cr.; Student Option; Periodic Fall & Spring)
Current research issues in human-computer interaction, user interface toolkits and frameworks, and related areas. Research techniques, model-based development, gesture-based input interfaces, coal-based programming, event processing, models, innovative systems, HCI in multimedia systems. prereq: 5115 or instr consent

CSCI 8117. Understanding the Social Web. (3 cr.; Student Option; Periodic Fall & Spring)
Research on the social web. Read, present, and discuss papers, do homework using social web research techniques such as data analysis and simulation. Semester research project. prereq: CS grad or instr consent

CSCI 8161. Advanced Compiler Techniques. (3 cr.; Student Option; Periodic Fall & Spring)
Techniques for uniprocessors and parallel computers. Fundamental program analysis instruments such as data flow analysis and data dependence analysis. Variety of code generation and transformation techniques. prereq: 4061 or instr consent

CSCI 8205. Parallel Computer Organization. (3 cr.; Student Option; Every Spring)
Design/implementation of multiprocessor systems. Parallel machine organization, system design. Differences between parallel, uniprocessor machines. Programming models. Synchronization/communication. Topologies, message routing strategies. Performance, optimization techniques. Compiler, system software issues. prereq: 5204 or EE 5364 or instr consent

CSCI 8211. Advanced Computer Networks and Their Applications. (3 cr.; Student Option; Periodic Fall & Spring)
Current research issues in traffic and resource management, quality-of-service provisioning for integrated services networks (such as next-generation Internet and ATM networks) and multimedia networking. prereq: 5211 or instr consent

CSCI 8271. Security and Privacy in Computing. (3 cr.; A-F or Audit; Periodic Fall)
Recent security/privacy issues in computer systems/networks. Threats, attacks, countermeasures. Security research, authentication, network security, wireless security, computer system security, anonymous system, pseudonym, access control, intrusion detection system, cryptographic protocols. How to pursue research in security and design secure systems. prereq: [5211, 5103] or instr consent; 5471 or EE 5248 or Math 5248 or equiv recommended

CSCI 8314. Sparse Matrix Computations. (3 cr.; Student Option; Periodic Spring)
Sparsity and sparse matrices. Data structures for sparse matrices. Direct methods for sparse linear systems. Reordering techniques to reduce fill-in such as minimal degree ordering and nested dissection ordering. Iterative methods. Preconditioning algorithms. Algorithms for sparse eigenvalue problems and sparse least-squares. prereq: 5304 or numerical linear algebra course or instr consent

CSCI 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description (prereq) prereq: Master’s student, adviser and DGS consent

CSCI 8363. Numerical Linear Algebra in Data Exploration. (3 cr.; Student Option; Periodic Spring)
Computational methods in linear algebra, matrix decompositions for linear equations, least squares, eigenvalue problems, singular value decomposition, conditioning, stability in method for machine learning, large data collections. Principal directions, unsupervised clustering, latent semantic indexing, linear least squares fit. Markov chain models on hyperlink structure. prereq: 5304 or instr consent

CSCI 8442. Computational Geometry and Applications. (3 cr.; Student Option; Periodic Spring)
Designing efficient algorithms and data structures for geometric problems. Models of computation, convex hulls, geometric duality, multidimensional search, Voronoi diagrams and Delauney triangulations, linear programming in fixed dimensions, lower bound techniques. Applications, advanced topics. prereq: 5421 or instr consent

CSCI 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description (prereq) prereq: Doctoral student, adviser and DGS consent

CSCI 8551. Intelligent Agents. (3 cr.; Student Option; Periodic Fall)
Theories of intelligent agents. Agent architectures; knowledge representation, communication, cooperation, and negotiation among multiple agents; planning and learning; issues in designing agents with a physical body; dealing with sensors and actuators; world modeling. prereq: 5511 or instr consent

CSCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Projects listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

CMGT 4000. The Construction Industry through Time and Tomorrow. (2 cr.; A-F or Audit; Every Fall)
This course centers on the construction industry in all its facets. The intention is to ensure that students taking it are provided with an in-depth understanding of how the industry evolved from early times to the present day and where the industry may be heading in the future. Equipped with this knowledge, graduates will be in a better position to understand their role in whichever sector of the industry they choose to build their careers and to contribute to positive change and improvement in how the industry serves its clients. It should be emphasized that this course is neither a history of architectural or engineering design, nor of construction technology, but concentrates rather on industry structure, organization, and the way it delivers its products.

CMGT 4003. Managing in the BIM Environment. (1 cr.; A-F or Audit; Periodic Fall & Spring)
For 5,000 years we have used hand drawings to communicate ideas and methodologies, from Egyptian hieroglyphs to computer technology. Building Information Modeling (BIM) computer models act as simulators, analyzing architectural programs, materials, energy usage, constructability, construction sequencing, and more, down to tens of micrometers. For example, metal units can be fabricated directly from 3D models; material quantities can be extracted from models and tied to cost early in the design process; coordinated models can be visualized by project teams, clarifying scope and providing a vehicle for communication. Although this survey course is a technical training in BIM, it will help you understand how BIM might shape your future as a construction manager and will guide you in applying techniques to manage the BIM process within your projects. Pre/req: None. However, if you have no prior experience with construction, we recommend CMGT 3001 - Intro to Construction and CMGT 4021 - Construction Planning and Scheduling for knowledge of industry project delivery.

CMGT 4011. Construction Documents and Contracts. (3 cr.; Student Option; Every Fall & Spring)
Definition, interpretation, and utilization of drawings. Specifications, agreements, bidding forms, general conditions. Bonds, contracts, subcontracts, and related documents. Appropriate provisions for minority business participation, such as tax exempt status and wage rates. Prereq: 3001, 45 sem cr

CMGT 4021. Construction Planning and Scheduling. (3 cr.; Student Option; Every Fall & Spring)

CMGT 4022. Construction Estimating. (3 cr.; Student Option; Every Fall & Spring)

CMGT 4031. Construction Safety and Loss Control. (3 cr.; Student Option; Every Fall & Spring)
Introduction to construction safety, health, and loss control. Hazard recognition. Control procedural systems for measuring/evaluating loss-control performances in the construction industry. Prereq: 3001, 45 sem cr

CMGT 4041W. Specifications and Technical Writing for Construction Professionals. (WI; 3 cr.; Student Option; Every Spring)
Develop/enhance appropriate oral/written communication necessary for use in the construction process from planning phase through contract closeout. Develop construction-specific practical applications to facilitate the process and avoid common pitfalls. Prereq: 4011 or concurrent registration is required (or allowed) in 4011

CMGT 4051. Construction Materials for Managers. (3 cr.; Student Option; Every Fall & Spring)
Concepts of physical properties. Behavior mechanisms for construction materials such as concrete, aggregate, steel, and wood. Standard specifications for material properties. Lab techniques for evaluation of each material. Prereq: 3001, [AEM 2011 or BP 3001 or BP 3101], 45 sem cr

CMGT 4073. Building Codes for Construction Managers. (1 cr.; Student Option; Every Spring)
Building codes history, foundation, structure, and organization. Importance to the built environment throughout building life cycle: design, construction, occupancy, demolition. Code compliance and role of building code official. Interpretation and application to specific scenarios. Recognizing and correcting code deficiencies. Prereq: 45 cr or instr consent

CMGT 4081. Managing Erosion and Sediment Control on Construction Sites. (1 cr.; A-F or Audit; Every Summer)
Best management practices relating to supervision or direction of construction site operations. Grading, culvert replacement, bridge construction, incorporating permit requirements, sample specifications, Storm Water Pollution Prevention Plan (SWPPP). Management practices to reduce or control erosion/sedimentation. Prereq: 3011 or related experience

CMGT 4193. Directed Study. (1-4 cr.; max 12 cr. ; Student Option; Every Fall, Spring & Summer)
Independent project. Topic arranged with supervised by construction management faculty. Prereq: Admitted to CMgt major or minor or certificate

CMGT 4196. Construction Management Internship. (1-4 cr.; max 12 cr. ; S-N only; Every Fall, Spring & Summer)
Hands-on work experiences in a construction company, applying coursework in the workplace, contributing knowledge of best practices, and participating in career development exercises. Prereq: [CMgt] major or minor or certificate student], [jr or sr], dept consent

CMGT 4201. Construction Accounting. (2 cr.; A-F or Audit; Every Fall)
Unique characteristics and dissimilarities crucial for all parties involved to understand/ analyze the common process. Unique aspects of construction financial accounting, managerial accounting, tax planning, and auditing. Prereq: 3001, Acc 2050, ABus 4101

CMGT 4211. Facility Cost Accounting and Finance. (2 cr.; A-F or Audit; Every Fall)
Lease types. Determination of total annual facility costs. Students apply accounting concepts within real property/facilities context. How to interpret financial statements and create capital/operating budgets. Asset depreciation, capital planning, expense management. Financial terminology for presenting to Corporate Suite. Prereq: ABUS 4101 or basic accounting/finance experience

CMGT 4213. Facility Operations and Maintenance Intensive. (3 cr.; A-F or Audit; Every Fall)
Managing operation/maintenance of building systems and facility management department. Operation of mechanical, electrical, and plumbing systems. Critical spaces, fire/ life safety systems, utilities. Maintenance for specific building systems. Technology/resources used to support building operations/maintenance. Prereq: [2021 or concurrent registration is required (or allowed) in 2021], [3001 or concurrent registration is required (or allowed) in 3001], [4011 or concurrent registration is required (or allowed) in 4011], [4562 or concurrent registration is required (or allowed) in 4562] recommended

CMGT 4215. Facility Quality Assessment and Commissioning. (2 cr.; A-F or Audit; Every Spring)
How to assess condition/quality of building site, exterior/interior of facility, and building equipment. Evaluating effectiveness/efficiency of facility operations/maintenance program. What to look for during building audits. How to write professional assessment reports. How to make useful recommendations for improvements. Value/purpose of building commissioning/ re-commissioning. Prereq: 3001, [4213 or concurrent registration is required (or allowed) in 4213], 4542, 4562
CMGT 4422. Advanced Construction Cost Estimating. (2 cr.; Student Option; Every Spring) Advanced estimating concepts, including procurement activity, and value engineering. Working in teams, students develop and deliver a competitive bid for a real project and examine strategies to meet the owner's budget and expectations through value engineering approaches. prereq: CMGT 4022 or instr consent

CMGT 4471. Sustainability for Construction Managers. (2 cr.; A-F or Audit; Every Spring) Building industry's impact on the environment; sustainable building initiatives; environmental principles and practices in pre-con, construction, close-out and operations; impact on construction manager role, procurement methods, contracts, estimating and scheduling, and team development; new build and renovation assessment; current technologies; future trends.

CMGT 4542. Building Energy Systems. (3 cr.; A-F or Audit; Every Spring) Functions of building mechanical systems, their integration with other building components. Residential/commercial HVAC systems, alternative energy sources, energy efficiency, structural implications of mechanical systems, indoor air quality, environmental strategies. Case studies. prereq: [3001, [jr or sr]] or instr consent

CMGT 4544. Materials and Structures I. (4 cr.; A-F or Audit; Every Fall) First part of the two-semester statics/materials/structures sequence. Introduces basic statics as it relates to structural analysis, including a fundamental understanding of forces, loads, shears, and moments applied to structural elements. These principles will be applied through the development of beam diagrams using load path analysis. Provides an introduction to building structural systems and their design and construction process, and covers building loads and the methods of analyzing and designing structural elements such as beams and columns. Discusses the path of loads applied to a building and the structural materials?specifically, wood and steel?that are commonly used to support these loads in building construction. Finally, the course provides an overview of the tools and techniques used by the structural engineer in the course of building design, as well as basic procedures for choosing materials and member sizes for use in a building system.

CMGT 4550. Topics in Construction Management. (1-2 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Seminar. Timely issues/themes in construction management.


CMGT 4572. Structural Frames and Building Design/Construction. (3 cr.; A-F or Audit; Every Fall & Spring) Basic contemporary structural systems in masonry, steel, and wood framing systems. Covers behavior of systems. prereq: 3001, [AEM 2011 or BP 3001 or BP 3101]

CMGT 4861. Construction Management Capstone. (2 cr.; A-F or Audit; Every Spring) Project management/leadership. Apply coursework to industry case studies to create, solve, critically consider, effectively articulate solutions. prereq: 4011, 4021, 4022, 4031

Continuing Dental Education (CDED)

CDED 6101. Postgraduate Contemporary Esthetic Dentistry I: Level I--Lecture/Laboratory Series. (5 cr.; S-N or Audit; Every Fall, Spring & Summer) Dental materials, occlusion, dental photography, smile design, anterior ceramic restorations, posterior ceramic restorations. Color, bleaching, and endoesthetics. Anterior composite restorations. Posterior composite restorations, fiber-reinforced composite bridges, in-office indirect restorations, partial/full denture esthetics, implant esthetics, peri-esthetics, practice management for contemporary esthetic dentistry. Lectures, discussion, lab applications.

CDED 6202. Postgraduate Contemporary Esthetic Dentistry: Level II--Patient Series. (5 cr.; S-N or Audit; Every Fall, Spring & Summer) Dental photography, anterior/posterior composite restorations, indirect anterior restorations, indirect posterior restorations. Lectures, case presentations. Clinical experience with multi-unit, complex restorative problems. prereq: 6101


CDED 7302. Postgraduate Contemporary Esthetic Dentistry: Level III--Orthodontic and Periodontal Esthetics. (1-1.5 cr.; S-N or Audit) How periodontal/orthodontic therapies may be used to enhance esthetic outcome of restorative cases. How to use cephalometric analysis for evaluating facial esthetics. When to use limited orthodontic treatment before restorative treatment. How to eliminate uneven gingival contours, lengthen crowns, recontour interdental papilla, and optimize periodontal esthetics around dental implants. Lectures, workshop with removable appliances. Surgical demonstrations, discussions of cases from practice.

CDED 7303. Postgraduate Contemporary Esthetic Dentistry: Level III--Dental Implants. (2 cr.; S-N or Audit) How to use dental implants as part of restorative treatment plan. Patient selection/treatment planning, surgical phases of implant placement, restorative phases of implant placement, peri-implant esthetics related to dental implants. Lectures, lab, clinical demonstrations, discussion of cases from practice.


CDED 7306. Postgraduate Contemporary Esthetic Dentistry: Level III--Diagnostic Box. (1 cr.; S-N or Audit) Advanced techniques for photographic, cosmetic, and occlusal analysis. How to customize gender, age, and personality into case design. Emphasizes effective case presentation and staff involvement. Lecture, lab, clinical experience with diagnostic records, cosmetic previews.

CDED 7307. Postgraduate Contemporary Esthetic Dentistry: Level III--Technology in Restorative Dentistry. (1 cr.; S-N or Audit) How to incorporate new technologies into practice. Composite curing technology, digital radiography, high tech software programs CAD/CAM technology digital cameras, diagnosten, intraoral cameras, other new high tech equipment. CEREC digital radiography, digital cameras, diagnosten, high tech software systems. Small group interaction with faculty.

CDED 7401. Postgraduate Contemporary Esthetic Dentistry: Level III--Research Design. (1 cr.; S-N or Audit) Analyzing research findings, writing a research proposal. How to critique dental literature, evaluate claims made by dental manufacturers. Methods of research design, data collection/interpretation. Methods to pose a research question, prepare a research plan, and apply analytical skills to everyday practice.
Contribute to health, happiness, and well-being. Students develop a personal plan for health and well-being and one for a community.

**CSPH 3201. Introduction toMindfulness-Based Stress Reduction.** (2 cr.; Student Option; Every Fall) Techniques by which stress endemic in a fast-paced competitive culture can be reduced or worked with constructively. Students practice/apply techniques of mindfulness. Recent medical-scientific literature on physiological/psychological elements in the stress response.

**CSPH 3211. Living on Purpose: An Exploration of Self, Purpose, and Community.** (2 cr.; Student Option; Every Fall & Spring) Explore questions of meaning/purpose. Explore other people's ways of living on purpose. Consider big questions that shape present/future. Build framework to lead purposeful life. Primarily Online Course with 3 in-person meetings prereq: 30+ credits completed or instr consent


**CSPH 4311. Foundations of Hatha Yoga: Alignment & Movement Principles.** (3 cr.; Student Option; Every Fall & Summer) Anatomical considerations/understanding critical to executing safe/effective Hatha Yoga instruction. Overview of human gross anatomy/bodily systems essential to Hatha Yoga. First in sequence of three courses in University of Minnesota Yoga Teachers Education & Training Sequence. Students who complete sequence may be qualified to register with Yoga Alliance as 200 hour Registered Yoga Teacher. prereq: [Prerequisite PsTL 1135 Essentials of Human Anatomy or Physiology or equivalent], instr consent (prerequisite course may be taken concurrently)

**CSPH 4312. Hatha Yoga Philosophy, Lifestyle, & Ethics.** (3 cr.; Student Option; Every Fall, Spring & Summer) History, tradition, philosophy of Hatha Yoga with emphasis on ethical practice of Hatha Yoga. Study of classical/modern text. Foundation concepts of how to use knowledge to facilitate strong Yoga Asana, Pranayama, meditation practice. Second course in sequence of three (3) courses in University of Minnesota Yoga Teachers' Education & Training Sequence. prereq: 4311

**CSPH 4313. Hatha Yoga Teaching Principles & Methodology.** (2 cr.; Student Option; Every Fall, Spring & Summer) Communication/sequencing principles necessary for teaching effective, safe Hatha Yoga classes. Use knowledge/skills gained during prerequisite two Hatha Yoga courses. Practice skills through participation in Service Learning. Third course in sequence of three (3) courses in University of Minnesota Yoga Teachers' Education & Training Sequence. prereq: 4311, 4312

**CSPH 5000. Explorations in Integrative Therapies and Healing Practices.** (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Research and practice on therapies, delivery of complementary therapies and, regulatory issues. prereq: Jr or sr or grad student or instr consent

**CSPH 5101. Introduction to Integrative Healing Practices.** (3 cr.; Student Option; Every Fall, Spring & Summer) Cultural contexts of healing traditions. Integrative therapies presented by practitioners, including traditional Chinese medicine, meditation, mind-body healing, spiritual practices, energy healing, naturopathy, herbalism, movement therapies, homeopathy, manual therapies, nutrition. prereq: Jr or sr or grad student; or instructor consent

**CSPH 5102. Art of Healing: Self as Healer.** (1 cr.; Student Option; Every Fall & Spring) Introduction to individual transformational journey as part of health science education. Students become aware of their responsibility/resources to facilitate development of the self. Research data, experience of self that is part psychoneuroimmunology, mind-body-spirit approaches. Lecture, scientific literature, meditation, imagery, drawing, group interaction. prereq: Jr or sr or grad student or instr consent

**CSPH 5111. Ways of Thinking about Health.** (2 cr.; S-N or Audit; Every Fall) Cultural contexts explored through field-trip immersion experiences. Aspects of different health care systems. Indigenous North American, Vedic, traditional Chinese, biomedical. Writing assignment. prereq: [Jr, Sr, or grad student standing], instr consent

**CSPH 5115. Cultural Awareness, Knowledge and Health.** (3 cr.; Student Option; Every Spring) How knowledge can become resource for individual, family, community health. Interactive glimpse of wisdom of cultural communities. Develop capacity to see culture within professional education/practice. Cultural constructs underpinning medical system, role of culture in interaction between practitioner/patient, role of reconnection to cultural heritage in healing. prereq: Jr or sr or grad student or instr consent

**CSPH 5121. Whole Systems Healing: Health and the Environment.** (2 cr.; Student Option; Every Fall & Spring) Selected interfaces between human health and the environment. Using complexity theory as a theoretical framework, students use phenomenological methodologies to analyze and describe the interrelated dynamics of human and natural systems. Case studies. Develop strategies to optimize the healthy functioning of human/environmental systems. prereq: Jr or sr or grad student
CSPH 5201. Spirituality and Resilience. (2 cr.; Student Option; Every Spring & Summer) Links between resilience and spirituality. Applications of resilience/heath realization model to personal/professional lives. Review of literature, theory, and research. prereq: Jr or sr or grad student or instr consent

CSPH 5211. Peacemaking and Spirituality: A Journey Toward Healing and Strength. (2-2.5 cr.; Student Option; Every Fall & Summer) Influence of spirituality upon process of resolving conflict and making peace in intense interpersonal/intrapsychic conflicts in multiple health care and social work settings, including in families, between patients/clientns and nurses/social workers, within communities, among friends, between co-workers, or within ourselves. prereq: Jr or sr or grad student or instr consent

CSPH 5212. Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community. (3 cr.; Student Option; Every Spring & Summer) Contemplative mindfulness practice. Tapping into reservoir of strength, compassion, and wisdom that fosters expressions of unconditional love, reconciliation, and forgiveness. Shifting from ego centered cognitive analysis/assessment to heart centered presence and deep listening grounded in humility/compassion. Native American circle process, including use of talking piece. prereq: Jr or sr or grad student or instr consent

CSPH 5215. Forgiveness and Healing: A Journey Toward Wholeness. (3 cr.; Student Option; Every Spring & Summer) Impact of forgiveness on process of interpersonal healing. Forgiveness/healing in health care and social work settings from multiple spiritual/secular traditions. prereq: Jr or sr or grad student or instr consent

CSPH 5225. Meditation: Integrating Body and Mind. (2 cr.; Student Option; Periodic Fall) Meditation as a physical, emotional, intellectual, and spiritual inquiry. Students examine a variety of texts and develop ability to enter a state of calm, meditative awareness. prereq: Jr or sr or grad student or instr consent

CSPH 5226. Advanced Meditation: Body, Brain, Mind, and Universe. (1 cr.; Student Option; Periodic Fall) Students work to integrate meditation practice into daily life, cultivating awareness of the fundamental oneness of body, brain, mind, and universe. Mind-body interactions in health. “Hard problem” of consciousness in brain science. Emergence of compassion, wisdom, and healing in non-discursive awareness. prereq: [5225, Jr or sr or grad student]] or instr consent

CSPH 5311. Introduction to Traditional Chinese Medicine. (2 cr.; A-F or Audit; Every Spring & Summer) Philosophical roots of Shamanism, Confucianism, Taoism, and Buddhism. Influence of these philosophies on Chinese medicine. Evolution of concepts of the tao, Yin-Yang, microcosm, macrocosm. Development of herbal medicine, Tui Na, Qi Gong, acupuncture, moxibustion. Traditional Chinese medicine etiology of disease, physiology, diagnosis, therapy, disease prevention, ethics, psychology, cosmology. prereq: Jr or sr or grad student or instr consent

CSPH 5313. Acupressure. (1 cr.; Student Option; Every Fall & Summer) Principles/applications. Location, indications for use, and techniques of stimulation of acupressure points. Methods for self care and care of others. Treatment of pain conditions, chronic health conditions, palliative care, oncology, women's health care.

CSPH 5315. Traditional Tibetan Medicine: Ethics, Spirituality, and Healing. (2 cr.; Student Option; Periodic Fall) Ethics, spirituality, and healing from perspective of traditional Tibetan medicine. Belief that illness results from imbalance and that treating illness requires correcting underlying imbalance. How to apply these principles in clinical practice, and consult with a traditional Tibetan doctor. prereq: Jr or sr or grad student or instr consent

CSPH 5316. Tibetan Medicine, Ayurveda, and Yoga in India. (4 cr.; max 12 cr.; Student Option No Audit; Every Fall & Summer) Students study with expert practitioners in India. Using critical thinking, philosophical knowledge, cultural practices, scientific evidence, and research-based programs, to integrate these traditions into personal/professional life. prereq: [5315, 5317] or instr consent

CSPH 5317. Yoga: Ethics, Spirituality, and Healing. (2 cr.; Student Option; Every Summer) Students test claim that systematic yoga practice leads to optimal health. Yoga's philosophy, scientific evidence, practical application. Students propose research-based programs for integrating yoga into personal/professional life.


CSPH 5331. Foundations of Shamanism and Shamanic Healing. (2 cr.; S-N or Audit; Periodic Fall) 3 day retreat intensive. Shamanic philosophies, ritual etiquette, Core beliefs common to all shamanic healing practices. Cross-cultural healing beliefs/practices, unique psychology for understanding them, their use with contemporary healing practices and for personal growth. prereq: Jr or sr or grad student or instr consent

CSPH 5332. Global Healing Traditions: Amazonia Plant Spirit Medicine. (2 cr.; S-N or Audit; Periodic Fall) Non-biomedical traditional healing paradigms as practiced in other parts of the world. Focuses on indigenous healing practices in Peru as directed by a local shaman, prereq: [5331, Jr or sr or grad student or instr consent]


CSPH 5401. People, Plants, and Drugs: Introduction to Ethnopharmacology. (3 cr.; Student Option; Every Fall, Spring & Summer) Biologically active substances used in traditional cultures. Ethnopharmacology's past, current, and potential contributions to human knowledge. Concrete examples. prereq: Jr or sr or grad student or instr consent

CSPH 5405. Plants in Human Affairs. (4 cr.; Student Option; Periodic Fall) Twelve-day, intensive course. Introduction to ethnobotany/ethnopharmacology. Lectures, field trips, presentations by local experts. prereq: Jr or sr or grad student or instr consent

CSPH 5421. Botanical Medicines in Integrative Healthcare. (3 cr.; Student Option; Every Fall) Widely-used botanical medicines from biomedical perspective. Alternative therapeutic systems presented according to bodily systems/processes. Evidence for therapeutic use. Botanical characteristics, traditional uses, chemical properties, dosage, hazards/safety issues, quality control. prereq: Jr or sr or grad student or instr consent


CSPH 5431. Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health. (2 cr.; Student Option; Periodic Fall) Principles of nutrition related to metabolic function. Model attempts to reduce chronic
disease by looking for underlying causes/ triggers and to intervene to restore function and achieve optimal health. Emphasizes importance of nutrition as a component of self-care. prerequisite: Jr or sr or grad student in Health Sciences or instr consent

CSPH 5503. Aromatherapy Fundamentals. (1 cr.; Student Option; Every Spring & Summer)
For health professionals/practicing health professionals. Essential oil therapy and current aromatherapy practices in clinical settings. Key safety/toxicity issues. Critique scientific/historical evidence about the therapeutic qualities of six essential oils in common use by the public and in clinical settings. prerequisite: Jr or sr or grad student

CSPH 5511. Interdisciplinary Palliative Care: An Experiential Course in a Community Setting. (2 cr.; Student Option; Every Fall & Spring)
Multidisciplinary student teams partner with interdisciplinarily community hospice teams in delivery of care to patients in a variety of settings. Series of seminars employs self-analysis/case studies. prerequisite: instr consent

CSPH 5512. Spiritual Aspects of Palliative Care. (2 cr.; Student Option; Every Fall, Spring & Summer)
This course examines spiritual care as an essential component of providing palliative care across the life span. Students will explore spiritual assessment tools, spiritual care models, and formulate a spiritual care plan within an interdisciplinary team perspective. prerequisite: Instructor consent

CSPH 5521. Therapeutic Landscapes. (3 cr.; Student Option; Every Spring)
Principles of therapeutic design for specific population requirements. Therapeutic landscape design. Incorporates interdisciplinary interaction between horticulture, landscape architecture, and health science departments. prerequisite: Jr or sr or grad student in health sciences or therapeutic recreation or horticulture or landscape architecture) or health professional or instr consent

CSPH 5522. Therapeutic Horticulture. (3 cr.; Student Option; Periodic Fall)
Central elements of therapeutic horticulture in context of multiple health care settings. Evidence-based history, principles, precepts, and practical application of therapeutic horticulture. Various plant/plant-related modalities from current research findings are related to populations, using therapeutic horticulture as a treatment intervention. prerequisite: 5101 or Hort 5072 or instr consent

CSPH 5523. Applications in Therapeutic Horticulture. (2 cr.; Student Option No Audit; Every Summer)
How to develop comprehensive program plans in therapeutic horticulture. Evidence-based principles, facilitation techniques. Documentation, assessment, program development techniques, evaluation. Leadership training, program plan components, book reviews, readings, comprehensive exam.

CSPH 5533. Introduction to Energy Healing. (2 cr.; Student Option; Every Fall)
Healing techniques that use energetic systems in body to enhance body's ability to heal. Therapeutic touch, healing touch, Reiki, acupuncture, reflexology, magnets, homeopathy, other modalities. Scientific theories on mechanisms of energetic medicine and ways to measure energy. Students interact with practitioners of energy healing. prerequisite: Jr or sr or grad student or instr consent

CSPH 5535. Reiki Healing. (1 cr.; S-N only; Every Fall, Spring & Summer)
History, principles, precepts, and practical application of Reiki energy healing. Alternative energy healing modalities, current research findings. Activation of the Reiki energy, hand positions to perform a treatment. Students provide Reiki treatments, discuss findings. prerequisite: Jr or sr or grad student or instr consent

CSPH 5536. Advanced Reiki Healing: Level II. (1 cr.; S-N only; Every Spring)
Principles/application of Reiki energy healing. Four levels of healing. Emphasizes healing at spiritual level. Activation of Reiki energy. Symbols that allow for energy transfer through space/time. Using second level Reiki energy for both distance healing and standard Reiki treatment. Students provide Reiki treatments, discuss findings. prerequisite: 5535, instr consent

CSPH 5541. Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind. (2 cr.; Student Option; Every Fall)
Experiential training in the cultivation of happiness, emotional health, and healing for multi-disciplinary professions. Ancient/contemporary, eastern/western approaches. How to increase positive emotions and mind states. Meditation, integrative approaches. Case examples. prerequisite: Sr or grad student or instr consent

CSPH 5545. Mind-Body Healing Therapies. (2 cr.; A-F or Audit; Periodic Fall)
Philosophies/paradigms. Four modalities commonly used in allopathic nursing, medicine and other health professions (biofeedback, hypnosis, imagery/visualization, meditation). Experiential and group discussion format. prerequisite: Grad student or Jr or sr or instr consent

CSPH 5555. Introduction to Body and Movement-based Therapies. (2 cr.; Student Option; Periodic Fall)
Theoretical approaches of selected somatic therapies, including dance, movement, and body-based therapies. Historic/theoretical perspectives on use of movement, dance, and somatic re-patterning. Demonstrations of techniques. Application of techniques to specific populations/settings. prerequisite: Jr or sr or grad student or instr consent

CSPH 5561. Overview of the Creative Arts in Health and Healing. (2 cr.; Student Option; Every Summer)
How creative arts therapies are integrated into health care. Art therapy, poetry therapy, dance/movement therapy, music therapy. Guided experiential exercises, discussions, readings, individual learning interventions, lectures. prerequisite: Jr or sr or grad student

CSPH 5601. Music, Health and Healing. (2 cr.; Student Option; Every Fall & Summer)
Music therapy, music medicine, music psychotherapy. Techniques/interventions. Hypotheses/rationale related to interventions. Related research. prerequisite: Jr or sr or grad student or instr consent

CSPH 5605. Movement and Music for Well-being and Healing. (2 cr.; Student Option; Every Fall)

CSPH 5631. Healing Imagination I. (2 cr.; Student Option; Every Spring)
How imagery and imagination therapies are implemented for healing and to promote health/well-being. Experience/create imagery interventions. Instructional strategies include experiential, discussions, readings, lecture, and individual learning interventions. prerequisite: Jr or sr or grad student

CSPH 5641. Animals in Health Care: The Healing Dimensions of Human/Animal Relationships. (3 cr.; Student Option; Every Summer)
Central elements of animal assisted therapy in multiple health care settings. History, principles, and evidence-based guidelines. Community-based interventions, in-class demonstrations, field trips. prerequisite: Jr or sr or grad student

CSPH 5642. Nature Heals: An Introduction to Nature-Based Therapeutics. (3 cr.; Student Option; Every Fall, Spring & Summer)
This course will cover the basic theories and approaches of Nature-Based Therapeutics including restorative environments, therapeutic horticulture, animal assisted interactions, therapeutic landscapes, forest bathing, green care farming, facilitated green exercise, wilderness therapy and ecopsychology. The course includes: 1) historic and theoretical perspectives 2) research into specific techniques 3) application of techniques to specific population and setting

CSPH 5643. Horse as Teacher: Intro to Nature-Based Therapeutics Equine-Assisted Activities & Therapies (EAAT). (3 cr.; Student Option; Every Fall)
This course is designed to introduce students to the field of Equine-Assisted Activities and Therapies (EAAT) and to the range of therapeutic and learning opportunities found within equine interactions. Five domains of practice in EAAT are covered and include physical, social, cognitive, psychological and spiritual contexts. The course presents historical and theoretical concepts which helped develop various types of EAATs, and how the growth of EAAT nationally and internationally has continued to mold the
professions. Students will learn to describe safety guidelines, best practices as they are currently known, and precautions and contraindications in EAAT sessions. During a three-day face-to-face class, students will engage in hands-on learning with horses and apply course concepts and topics during this intensive. Students will evaluate peer-reviewed literature in EAAT research to identify the strengths and weaknesses of such published material. Students will synthesize reading, lecture and experiential learning to develop an EAAT plan for an assigned target group population. prereq: jr or sr or grad or instr consent

CSPH 5701. Fundamentals of Health Coaching I. (4 cr.; A-F only; Every Fall) Tenets of health coaching model. Tools for self development, deep listening, communication. Building blocks for optimal health from holistic perspective. How to identify/benchmark, stages/patterns of change, interface with interdisciplinary health care providers, educate clients on self-care practices. prereq: Admitted to Integrative Therapies and Healing Practices certificate program's health coaching track or instr consent

CSPH 5702. Fundamentals of Health Coaching II. (4 cr.; A-F or Audit; Every Spring) Basic tenets of health coaching model. Tools for self development, deep listening, and effective communication. Core building blocks for optimal health from a holistic perspective. Identifying/benchmarking stages/patterns of change, interfacing with interdisciplinary health care providers, locating resources to assist clients in decision making, and educating clients on self-care practices. prereq: 5701

CSPH 5703. Advanced Health Coaching Practicum. (3 cr.; A-F only; Every Fall) Case-based. Identify/utilize broad-based resources in guiding/supporting individual client cases. Application of theory/process from earlier courses. Ethical issues, professional boundaries, referral processes, client selection. prereq: 5101, 5102, 5701, 5702, admitted to Postbaccalaureate Certificate in Integrative Therapies/Healing Practices Health Coaching Track

CSPH 5704. Business of Health Coaching. (2 cr.; A-F only; Every Fall) Applying health coaching knowledge/skills in service delivery venues or private practice. Starting business. Business models. Student determine supervision appropriate for them. Legal/ethical considerations. prereq: 5101, 5102, 5701, 5702, admitted to Postbaccalaureate certificate in Integrative Therapies/healing practices health coaching track

CSPH 5705. Health Coaching Professional Internship. (2 cr.; S-N only; Every Spring) 120 hours of health coaching practice. Students work with individual clients in acute/longitudinal encounters, provide wellness teaching, design career plan. prereq: 5701, 5702, 5703, admitted to postbaccalaureate certificate in integrative therapies/healing practices health coaching track, [S101, 5102, 5704 recommended]

CSPH 5706. Lifestyle Medicine. (2 cr.; Student Option; Every Fall & Spring) This course provides a foundation in the theory and clinical application of lifestyle medicine. Lifestyle medicine aims to address the behavioral and lifestyle bases of common illnesses through health promoting activities and reducing harmful behaviors. In this course, we will explore optimal nutrition, lifestyle, physical activity, and attitude. We will examine the emerging evidence base of lifestyle medicine and how it relates to health promotion and disease prevention. Participants will be introduced to common laboratory and imaging findings, and how they relate to optimal health. prereq: Basic course in Biology or Human Physiology; Admitted to one of the following programs: Integrative Health and Wellbeing Coaching Master's or Integrative Therapies and Healing Practices Certificate-Health Coaching Track or Doctorate in Nursing Practice; or instructor consent.

CSPH 5707. Coaching People with Clinical Conditions. (2 cr.; Student Option; Every Spring & Summer) This course provides the student with a basic awareness and expanded perception of prevalent clinical conditions, and supports the development of empathy. It equips the student with best practice coaching skills to use with a client managing one or more clinical conditions. And it supports the development of professional communication skills. prereq: CSPH 5701, 5702 and 5706; practicing health professional admitted to one of the following programs: Integrative Health and Wellbeing Coaching Master's or Integrative Therapies and Healing Practices Certificate-Health Coaching track, or instructor consent

CSPH 5708. Mind-Body Science and the Art of Transformation. (1 cr.; Student Option; Every Fall, Spring & Summer) Explore how utilizing transformative practices changes in our physical brain, thoughts, beliefs, bodies, emotions and paradigms and create sustainable shifts towards optimal health, wellness and living. This course will include knowledge and discoveries from multiple disciplines including but are not limited to psychologists, scientists, quantum physicist, philosophers, healers, educators. The mind-body research has accelerated dramatically in the past couple decades and will provide students with an opportunity to discover new ways of understanding our human brains and bodies. This in turn provides new insight and innovation into human behavior and sustainable transformative change.

CSPH 5709. Health and Wellbeing Group Coaching. (2 cr.; Student Option No Audit; Every Fall) The Group Coaching course expands the competencies of the Health Coach from the one-to-one coaching process to a group format. Theories and tools of group coaching will be applied to facilitating a group coaching process in the community. Course progress will include: Foundations of Group Coaching; Developing Group Coaching Skills; Application of Group Coaching Skills to a Community Organization; Expanding Theory and Application of Group Coaching. Prereq admission to Integrative Health & Wellbeing MA or graduate of Certificate in Integrative Therapies and Healing Practices-Health Coaching program or instructor approval; CSPH 5701, 5702,5706; recommended CSPH 5707; or instructor approval.

CSPH 5711. Optimal Healing Environments. (3 cr.; Student Option; Every Fall) Development/implementation of optimal healing environments. Evidence base supporting structural, architectural, human, and care processes. Emphasizes identifying models of optimal healing environments and leadership strategies that support diffusion of innovation. prereq: Jr or sr or grad student or instr consent

CSPH 5805. Wellbeing in the Workplace. (3 cr.; Student Option No Audit; Every Fall & Spring) Work and experiences in the workplace have a profound impact on many dimensions of individual and collective wellbeing, including a sense of purpose and meaning, financial and emotional security, quality of relationships and community, physical and emotional health, and the local and global environments. In this course, students will learn multi-disciplinary perspectives on key challenges in creating workplaces that contribute to greater wellbeing. Students will also reflect on their own personal experiences with wellbeing in their current and past work environments and examine strategies for enhancing wellbeing based on interdisciplinary theory and research. Specific topics include the importance of purpose and meaning at work, challenges in achieving work-life integration, the impact of technology on work expectations, and organizational change. This course is based on a whole-life, integrative model of wellbeing and draws from research and theory across the social, behavior, and health sciences.

CSPH 5806. Wellbeing and Resiliency for Health Professionals. (3 cr.; Student Option; Every Fall, Spring & Summer) This course will teach health professional students and health professionals self-care strategies that will improve their individual wellbeing and reduce the stress and burnout often experienced in these professions. Improving individual wellbeing will also contribute to greater wellbeing in the teams and systems in which these professionals work.

CSPH 5807. Mindfulness in the Workplace: Pause, Practice, Perform. (2 cr.; Student Option; Every Fall & Spring) An experiential course designed to teach core mindfulness skills while also exploring specific applications to the workplace setting. Explores key mindfulness traits and how they relate to essential workplace skills, such as resilience, task execution, critical analysis, intra/interpersonal growth, and leadership. The course will explore existing workplace programs and how corporate culture can be a barrier or a catalyst for adoption of mindfulness principles. From the perspective

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of the workplace and academic literature, students will gain an understanding of how to practically apply evidence-based techniques to help them succeed on the job.

CSPH 5905. Food Matters: Cook Like Your Life Depends On It. (1 cr. ; Student Option; Every Fall & Spring) This course examines the role of food as it bears on the current acute care approach to health and healing, the predominance of chronic disease and the important role that lifestyle (physical activity, stress, sleep, diet) has on all aspects of well being. For healthcare students and future practitioners, this course will support the development of personal food and cooking skills. This will allow them to serve as models to patients, as well as provide tools, resources and applications to support and guide patients in addressing their own diet and cooking challenges, specifically as they pertain to improving their health outcomes. Provides an in-depth exploration of dietary trends, their risks and benefits in relation to current health concerns such as diabetes, obesity, heart disease, etc. Also examines the impact of the Standard American Diet (SAD?) on these public and personal health problems linked to diet and lifestyle. Analyzes the components of a food system including how production, distribution and consumption of food are interrelated.

CSPH 6000. Integrative Therapies and Healing Practices Topics. (1-14 cr. ; max 16 cr.) ; Student Option; Every Fall, Spring & Summer) Topics-based exploration/research on integrative therapies/healing practices. prereq: Grad student or instr consent

CSPH 7001. The Healer’s Art. (1 cr. ; S-N only; Every Spring) Hidden crisis in medicine. Growing loss of meaning/commitment experienced by physicians nationwide under stresses of today’s health care system. How to stress-proof students to meet challenges of practices. prereq: Medical student

CSPH 8100. Special Topics in Complementary Therapy and Healing Practices. (1-6 cr. ; max 12 cr.) ; Student Option; Periodic Fall, Spring & Summer) Critiquing research on complementary therapies (e.g., design, outcome measures). Synthesizing research findings on a therapy. Hypothesizing future directions for research on complementary therapies.

CSPH 8101. Critiquing and Synthesizing Complementary and Alternative Healing Practices (CAHP) Research. (2 cr. ; Student Option; Every Fall & Spring) Seminar. Students evaluate peer-reviewed literature in complementary/alternative healing practices (CAHP) research. Identifying strengths/weaknesses of published research, synthesizing findings from multiple studies. prereq: Grad student

CSPH 8191. Independent Study in Integrative Therapies and Healing Practices. (1-6 cr. ; Student Option; Every Fall, Spring & Summer) Individual study with faculty guidance. Students write proposal, including outcome objectives/ work plan. Faculty member directs work, evaluates project. prereq: instr consent

CSPH 8701. Integrative Health and Wellbeing Coaching MA Capstone Project. (2 cr. ; A-F only; Every Fall & Spring) Culminating course for the Master of Arts in Integrative Health and Wellbeing Coaching Program. Students use coaching data collected during the Advanced Health Coaching Practicum, Health Coaching Professional Internship, or Group Health Coaching Course to write and orally present a research-informed concept analysis and retrospective narrative case report. prereq: Integrative Health and Wellbeing Coaching MA student, CSPH 5701, 5702, 5703, 5704, 5706, 5707, 5709.

Cultural Stdy/Comparative Lit (CSCl)

CSCl 1001. Introduction to Cultural Studies: Rhetoric, Power, Desire. (AH,DSJ; 3 cr. ; Student Option; Every Fall & Spring) Ways of reading texts, artistic forms, everyday practices that define ongoing conflicts over meaning, value, truth. Examples from visual arts, music, film, literature, myth, ritual, built environment.

CSCl 1101. Literature. (LITR; 4 cr. ; Student Option; Every Fall & Spring) Introduction to literature across time, national boundaries. Basic genres, including poetry, novel, drama, historical/philosophical writing. Key questions: What is literature? What forms does it take? Why does literature matter?

CSCl 1201W. Cinema. (AH,HI; 4 cr. ; Student Option; Every Fall & Spring) Introduction to the critical study of the visual in modernity, presented through sustained analysis of the cinema and cinematic codes. Emphasizes on analysis and major film movements and conventions in the international history of cinema. Students develop a vocabulary for formal visual analysis and explore major theories of the cinema.

CSCl 1202W. Media: Word, Image, Sound. (AH,HI; 4 cr. ; Student Option; Every Fall & Spring) Introduction to the critical and theoretical study of media and technology from Aristotle to the modern world. The first half of the course emphasizes theoretical readings in dialogue with historical apparatuses (printing press, photography, radio, cinema, television) and various expressive objects (the bible, early film, ethnographic sound recordings). The second half turns to the modern culture industry since World War II, and introduces students to the critical study of mass culture, the concept of ideology, and of the relationship between corporate power and media conglomerates.

CSCl 1301W. Reading Culture: Theory and Practice. (AH,HI; 3 cr. ; Student Option; Every Fall & Spring) How discourse reproduces consciousness and persuades us to accept that consciousness and the power supporting it. Literary language,
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advertising, electronic media; film, visual and musical arts, built environment and performance. Techniques for analyzing language, material culture, and performance.

CSCL 3175. Comedy: Text and Theory. (AH; 3 cr.; Student Option; Every Fall & Spring) Comedy as a discursive/political practice. Jokes, stand-up routines, plays, films, satire, and social ritual. Philosophical, literary, psychological, anthropological, feminist, and postmodern theory.

CSCL 3176. Oppositional Cinemas. (GP; 4 cr.; Student Option; Every Fall, Spring & Summer) The ways diverse national cinemas engage the international hegemony of Hollywood cinema. The cinematic struggle against cultural imperialism and the role of race, class, and gender in the domain of international cultural politics.

CSCL 3177. On Television. (CIV; 3 cr.; Student Option; Every Fall & Spring) Key debates in the history, theory, and criticism of television. Focuses on critical/creative "readings" of television's past/present forms. TV's influence on film, music, and digital media.

CSCL 3179. Reading Literary Movements. (LITR; 3 cr.; Student Option; Every Fall & Spring) Literary movements that emerge when group of writers puts forth new definition of literature. Literary movements created by scholars after the fact. Focuses on one or two related movements (e.g., surrealism, dadaism).

CSCL 3212W. Documentary Cinema: History and Politics. (WI; 4 cr.; Student Option; Periodic Fall & Spring) Documentary cinema from its emergence in 1920s to present. Complex power relations between filmmakers and their subjects. Political appropriations of the genre.

CSCL 3220. Screen Cultures. (3 cr.; Student Option; Every Spring) Study of the ways that technologies of film, television, and computing have shaped the twentieth and twenty-first centuries, especially our forms of cultural expression and identity. These topics are approached from both critical and historical perspectives in order to explore the complex relationship between media technologies and audiences.

CSCL 3321W. Theories of Culture. (AH,WI; 3 cr.; Student Option; Every Fall & Spring) Examination of three prevalent theoretical perspectives on culture - philosophical, anthropological, and aesthetic -- as they converge in the work of writers who have contributed to our contemporary conception of cultural diversity.

CSCL 3331. Science and Culture. (AH; 3 cr.; Student Option; Every Spring) Science and technology engaged through historical and cultural manifestations from film, literature, and YouTube to scientific and philosophical essays. Relations among humanities, science, economics, politics, philosophy and history. Psychiatry and drugs, food and agriculture, sexuality, religion and science, climate change.

CSCL 3361. Visions of Nature: The Natural World and Political Thought. (ENV; 3 cr.; Student Option; Every Spring) Scientific and cultural theory concerning the organization of nature, human nature, and their significance for development of ethics, religion, political/economic philosophy, civics, and environmentalism in Western/other civilizations.

CSCL 3405. Marx for Today. (3 cr.; Student Option; Every Spring) This course provides students with an introduction to Marxist theory, with particular attention to its relevance for the contemporary world. The first half of the course will focus on Marx's writings, and the second half will turn to a range of applications and case studies. Among the many topics to be considered include topics like labour, production, consumption, primitive accumulation, the commodity, surplus value, the falling rate of profit, rent, crisis, money, imperialism, ideology, fetishism, finance capital, neoliberalism and debt. Students will be required to take two exams, in addition to completing a final paper. It is a discussion-based course, and active participation, close reading, and analytical writing will be expected.

CSCL 3412W. Psychoanalysis and Literature Part I: The Essential Freud. (WI; 3 cr.; Student Option; Every Fall) Theoretical writings of Sigmund Freud; basic concepts of psychoanalytic criticism; dream and interpretation; genre of the case study; Freud's ideas concerning the constitution of ethnicity, culture, identity, and gender; fantasy versus reality; psychoanalysis of the author/character/culture.

CSCL 3413W. Psychoanalysis and Literature Part II: Post Freudian Criticism. (WI; 3 cr.; Student Option; Every Spring) Impact of psychoanalytic discourses on literary studies and vice versa. Archetypal of Jung; structural of Lacan; post-structural of Derrida and Kristeva; feminist psychoanalysis of Mitchell; self/object of Kernberg and Kohut; the unconscious and society of Deleuze and Guattari.

CSCL 3456W. Sexuality and Culture. (DSJ,WI; 3 cr.; Student Option; Every Fall, Spring & Summer) Historical/critical study of forms of modern sexuality (heterosexuality, homosexuality, romance, erotic domination, lynchings). How discourses constitute/regulate sexuality. Scientific/scholarly literature, religious documents, fiction, personal narratives, films, advertisements.

CSCL 3461W. Monsters, Robots, Cyborgs. (LITR; 3 cr.; Student Option; Every Fall) Historical/critical reading of figures (e.g., uncanny double, monstrous aberration, technological hybrid) in mythology, literature, and film, from classical epic to sci-fi, cyberpunk, and Web.

CSCL 3465. Aliens. (DSJ; 3 cr.; Student Option; Periodic Fall & Spring) Do interactions with people from other countries affect fears, anxieties, and desires about beings from other worlds? In whose interests are "aliens" used? Novels, radio broadcasts, and films considered from perspectives of sociology, philosophy, psychology, literary criticism, and history.

CSCL 3472. Gay Men and Homophobia in American Culture. (DSJ; 3 cr.; Student Option; Periodic Fall & Spring) The historical experience of gay men, the social construction of same-sex desire in American society since 1700, studied in a broad context of cultural history and discourse, including literature and the arts, journalism, science and medicine, religion, and law.

CSCL 3557W. Close Reading. (LITR; 3 cr.; Student Option; Every Fall & Spring) History/theory of 'close reading' (i.e., the most intense encounter between reader and text) exemplified through critical texts. Students perform close readings of various texts.

CSCL 3621W. Colonial and Postcolonial Literatures and Theory: 1700 to the Present. (GP,WI,LITR; 3 cr.; Student Option; Fall Odd, Spring Even Year) Readings in colonial/postcolonial literatures/ theory from at least two world regions: Africa, the Americas, the Arab world, Asia, Europe, and the Pacific. Cultural/psychological dynamics and political economy of world under empire, decolonization, pre- vs. post-coloniality, globalization.

CSCL 3771. Basic Concepts of Literary Study. (; 3 cr.; Student Option; Every Fall & Spring) Concepts used when carrying out work of reading/interpretation. How analysis works: aspects of distinction between text text/context, other concepts. How to understand/justify literary interpretation. Course does not engage in the reading of literature.

CSCL 3910. Topics in Cultural Studies and Comparative Literature. (; 3 cr. [max 24 cr.]; Student Option; Every Fall, Spring & Summer) Topics specified in Class Schedule.

CSCL 3910H. Topics in Cultural Studies and Comparative Literature: Honors. (; 3 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Topics specified in Class Schedule.

CSCL 3993. Directed Study. (1-3 cr.; Student Option; Every Fall & Spring) Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

CSCL 4944H. Honors Thesis. (; 3 cr.; A-F only; Every Fall & Spring)
Honors thesis. prereq: Candidate for honors in CSCL, consent of CSCL honors adviser

CSCL 4993. Directed Study. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Guided individual study.

CSCL 5281. European Intellectual History: The Early Modern Period, Antiquity to 1750. (3 cr. ; Student Option; Periodic Fall)
First of a two-semester course. European thought in its historical/cultural context. Emphasizes development of philosophical/scientific thought, its relation to thinking about the individual and the community. Readings from original sources.

CSCL 5282. European Intellectual History: The Modern Period, 1750-Present. (3 cr. ; A-F or Audit; Periodic Spring)
Second of a two-semester course. European thought in its historical/cultural context. Emphasizes development of philosophical/scientific thought, its relation to thinking about the individual and the community. Readings are from original sources.

CSCL 5305. Vision and Visuality: An Intellectual History. (3 cr.; A-F only; Periodic Fall & Spring)
Central role of vision/visuality in modernity. Modern age as scopic regime. Ways that ideas/ideologies of perception have shaped aesthetic experience within social existence.

CSCL 5331. Discourse of the Novel. (3 cr.; Student Option; Periodic Fall)
Comparative study of the novel, 18th century to present. Its relations to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity, and its role in articulating international cultural relations.

CSCL 5411. Avant-Garde Cinema. (4 cr.; A-F or Audit; Every Fall)
History/theory of avant-garde cinema, from classical period (1920s) to post-WWII. prereq: 1921 or ARTH 1921W or equiv

CSCL 5501. Origins of Cultural Studies. (3 cr.; Student Option; Periodic Fall & Spring)
Intellectual map of the creation of cultural studies as a unique approach to studying social meanings. Key figures and concepts, including nineteenth- and early twentieth century precursors.

CSCL 5555. Introduction to Semiotics. (3 cr.; Student Option; Periodic Spring)
Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Application of semiotics to various signifying practices (literature, cinema, daily life).

CSCL 5666. Film Music: Theory, History, Practice. (4 cr.; A-F only; Periodic Fall & Spring)
Role of music in American/European film from early 20th century silent cinema to near present. Narrative features, shorts, documentary, horror, thriller, science fiction, comedy, cartoon. Film music as social/cultural practice and as part of political economy within culture industry.

CSCL 5800. Translation Studies. (1 cr.; S-N only; Periodic Fall & Spring)
Techniques of reading/translations texts in fields of cultural studies/comparative literature. Attention to grammar, syntax, lexicon. prereq: CSCL grad student

CSCL 5833. Marx, Freud, Nietzsche: Intellectual Foundations. (3 cr.; Student Option; Periodic Fall & Spring)
Three thinkers who defined modernity: Marx, Freud, and Nietzsche. Central tenets of their thought/terms associated with their theories. Their careers portrayed against the background of their times; their place in intellectual history.

CSCL 5910. Topics in Cultural Studies and Comparative Literature. (3-4 cr. [max 32 cr.]; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

CSCL 5993. Directed Study. (1-3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

Curriculum and Instruction (CI)

CI 822. Introductory Algebra (Computer). (0 cr.; Student Option; Every Fall, Spring & Summer)
Students learn via multimedia software. Instructor helps students individually during class. Real numbers, expressions, equations, inequalities, rectangular graphs, systems, word problems, exponents, polynomials, factoring. prereq: [4 cr equiv], General Math Placement Test

CI 832. Algebra Review. (0 cr.; Student Option; Every Fall, Spring & Summer)
Students learn via multimedia software. Instructor helps students individually during class.

CI 1001. Introduction to the Elementary School. (3 cr.; A-F or Audit; Every Fall & Spring)
Three modules focus on important aspects of contemporary urban elementary school teaching: the principal's role, the teacher's role, and the students. Central to each module are school-based visits, observations, and interviews.

CI 1032. Creating Identities: Learning In and Through the Arts. (AH; 4 cr.; Student Option; Every Fall & Spring)
Students create and analyze art in order to experience how creative expressions reveal aspects of our personal and social identities. Through multiple mediums, students explore how artists are influenced by cultural elements (environments, religion, nationality, socioeconomic status, etc.) and how artists shape perceptions of culture and identity.

CI 1121. Educational Movements Past and Present: Multicultural Perspectives. (DSJ; HIS; 4 cr.; Student Option; Every Fall & Spring)
Students will explore diverse historical perspectives regarding educational movements in the U.S. since the Civil War. Through challenging questions and problems in educational history, students will develop critical frameworks necessary for interpreting America's educational past and how it is tied to culture, politics, privilege, and power.

CI 1124. Global Stories of Education: Literature for Young Adults. (GP,LITR; 3 cr.; Student Option; Every Fall & Summer)
Using young adult novels, short stories, nonfiction, and poems by immigrant, indigenous, minority, and refugee authors, students explore learning experiences of youth. Through immersion in the global lives and identities of characters who cross geographic and cultural borders, students consider what stories teach and how young people learn.

CI 1150. Special Topics History. (GP,HIS; 4 cr.; Student Option; Every Fall & Spring)
History topics in education.

CI 1512. Nature in the City. (BIOL,ENV; 4 cr.; Student Option; Every Fall & Summer)

CI 1563. Physics by Inquiry. (PHYS; 4 cr.; Student Option; Every Fall & Spring)
Laboratory-based introductory class where students learn by experimenting and model building and testing. Topics include electric circuits, light and color, and observational astronomy. Emphasizes include the nature of science and science learning, effective strategies for team-based learning, and logical reasoning skills.

CI 1806. College Algebra through Modeling. (MATH; 3 cr.; Student Option; Every Fall, Spring & Summer)
Math modeling, including linear, polynomial, rational, exponential, logarithmic functions, counting/probability. Excel or calculators used to develop equations/graphics from theoretical/real interdisciplinary data. Projects enable students to use models to examine trends, make predictions. prereq: Three yrs high school math or grade of at least C in PsTL 0731 or PsTL 0732 or CI 0832 or placement test score or instr consent

CI 1871. Computer Literacy and Problem Solving. (4 cr.; Student Option; Every Fall, Spring & Summer)
Competencies in computer applications used in the social sciences and business to solve problems. Using advanced word processing techniques to create complex documents, electronic spreadsheets to analyze data and present it graphically, database management programs to store, organize, and query data, and presentation software to communicate ideas.
CI 1904. Freshman Seminar, Global Perspectives. (1-3 cr. [max 6 cr.]; Student Option No Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

CI 1905. Freshman Seminar. (3 cr.; Student Option No Audit; Every Fall & Spring) Reading, discussion, writing, critical analysis. Topics specified in Class Schedule.

CI 1908W. Freshman Seminar: Civic Life and Ethics, Writing Intensive (CIV, WI). (CIV, WI; 1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Interdisciplinary seminar. Topics specified in class schedule. prereq: Fr

CI 1911. Ethics, Wealth, and Education in a Democracy. (3 cr.; A-F or Audit; Periodic Fall) Relationship between democratic citizenship and education. Role of economics/ethics in defining character of education. Relationship between school/university programs and citizenship. Relevance of education in contemporary society.

CI 1942. Freshman Seminar: Technology and Society. (TS; 3 cr.; A-F only; Every Spring) This online course is designed to educate learners about the current impact of social media, particularly the tools most commonly used today and those which could potentially arise with future developments and innovations. A humanistic perspective provides the lens by which learners examine strategies and measures individuals and community members can take to leverage social media's potential for networking, forming connections, and interacting as global citizens.

CI 2110. Topics in Education. (1-6 cr. [max 12 cr.]; Student Option; Periodic Fall, Spring & Summer) Topics related specifically to Education. Topics, location, credits, and duration may be highly flexible.

CI 2311W. Introduction to Technology and Ethics in Society. (CIV, WI; 3 cr.; Student Option; Every Fall, Spring & Summer) Values and ethical issues related to technology use in education, workplace, and family/community life.

CI 2312. Sex, Drugs, and the Internet: Educational Perspectives. (3 cr.; A-F only; Every Fall, Spring & Summer) Immersive exploration/critique of advantages/risks associated with society’s pervasive use of the Internet. Dangers and strategies to combat them. The Internet's potential for teaching/learning.

CI 3001. Engaged Arts Learning in Elementary Classrooms. (2 cr.; A-F or Audit; Periodic Fall & Spring) Introduction to pictorial expression, design, and the function of art in the social environment.

CI 3101. Issues in Urban Education. (3 cr.; Student Option; Every Fall & Spring) Issues in urban education examines and critiques contemporary commentary on urban education through texts, social media, case studies, and service-learning in schools. Through examination of socio-cultural and socio-political contexts of urban education, this course considers the role of teachers, curriculum, and community in urban schooling.

CI 3211. Introduction to Elementary Teaching. (3 cr.; A-F only; Every Fall & Spring) Classroom management, instructional planning, working with families in elementary classroom. Assigned readings, lectures, classroom activities, assignments. prereq: [Elementary ed or early childhood ed foundations major], concurrent practicum experience

CI 3212. Practicum: Elementary Teaching. (2 cr.; S-N only; Every Fall & Spring) Field-based practicum. Students apply learning from their University courses to elementary school setting, connecting theory, research, and practice. prereq: concurrent registration is required (or allowed) in EDPSY 5111, [elementary education foundations or early childhood foundations major]

CI 3283. Practicum: Special Education K-6. (2 cr.; S-N only; Every Fall & Spring) Field-based practicum. Students apply learning from their university course in elementary school setting, linking theory, research, and practice. prereq: concurrent registration is required (or allowed) in EDPSY 5613, concurrent registration is required (or allowed) in EDPSY 5616, elementary education: foundations major

CI 3401W. Diversity in Children's Literature. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Classic/contemporary books for children in all genres, created by authors/illustrators. Research in transactional theory. Cultural authenticity. Reading, discussion, group activities, interactive lectures, projects.

CI 3610. Linguistics for Teachers. (SOCS; 3 cr.; A-F only; Every Fall & Spring) For pre K-6 pre-service teachers. Introduction to linguistics. Terminology and knowledge and how to apply methods of linguistic analysis to English, focusing on educational settings and classroom instruction.

CI 3611W. Basics in Teaching English as a Second Language. (WI; 4 cr.; Student Option No Audit; Every Fall & Spring) Writing intensive course that combines service learning internship with classroom lectures, discussions, group work, experiential activities. Prepares students for teaching ESL to adults in community programs. prereq: Have studied another language.

CI 3612. Introduction to Pronunciation and Grammar for ESL Teachers. (4 cr.; Student Option No Audit; Every Fall & Spring) Introduces English language analysis with key concepts/theories in English pronunciation system/grammar. Issues within each/explore way ESL textbooks/instructors can advance ESL learners’ language proficiency in these areas. prereq: An Introduction to Linguistics course, e.g., CI 3610 or LING 3001

CI 3613. Practical Language Learning for International Communication. (3 cr.; Student Option No Audit; Every Fall & Spring) Foundations of international/cross-cultural communication. Increased understanding of personal preferences/experiences in learning languages/using them in international communication. How these skills vary across individuals/contexts.

CI 4121. Culture Power and Education. (2-3 cr.; A-F only; Every Fall & Spring) Manifestations of culture/power in education. How culture is mediating factor in educational achievement of students of color. Relationship between home/community, school cultures. Theories/research that show importance of integrating students’ interests, knowledge, experience for increasing student engagement/achievement.

CI 4122. Social Class Education and Pedagogy. (2-3 cr.; A-F only; Every Fall & Spring) Social, psychological, economic, political aspects of social class/poverty. Implications for education as social institution/classroom pedagogy. Social class in U.S., working-class literature for adults/children, labor histories, economic systems.

CI 4311W. Technology and Ethics in Society. (CIV, WI; 3 cr.; Student Option; Every Fall, Spring & Summer) Critique of values and ethical issues related to technology use in education, the workplace, and family and community life.

CI 4312. Sex, Drugs, and the Internet: Educational Perspectives. (3 cr.; A-F only; Every Fall, Spring & Summer) Immersive exploration/critique of advantages/risks associated with society’s pervasive use of the Internet. Dangers and strategies to combat them. The Internet’s potential for teaching/learning.

CI 4602. English Learners and Academic Language. (1 cr.; A-F only; Every Spring) The course prepares teacher candidates to work effectively with English Learners (ELs) and other linguistically diverse students in their subject areas of music and agricultural education and to develop their students’ academic language proficiency as needed for school success.

CI 5008. Theory and Practice of Arts Teaching. (1-2 cr. [max 3 cr.]; A-F or Audit; Every Fall & Spring) Designed for students pursuing visual or performing arts education licensure, the course explores: 1) Arts concepts, skills, and processes appropriate for elementary school; 2) methods of teaching arts for social justice; and 3) an overview of children’s production of and responses to visual and performing art.

CI 5049. Art Media Theory and Practice. (1-4 cr.; A-F or Audit; Every Summer) This course explores: 1) Principles and theories of animation; 2) Animation pedagogy, content knowledge, and technology; 3) Strategies and ideas for integrating animation in P-12 arts classrooms.
CI 5050. Issues in Art Education. (1-4 cr. [max 12 cr.]: Student Option; Every Fall & Summer) Issues/trends, current practices, recent research.

CI 5065. Improving Arts Programs in the Schools. (3 cr.: A-F or Audit; Every Fall) This course provides students with an exploration of issues in visual and performing art instruction, including teaching methods and evaluation, philosophical frameworks of pedagogy, and institutional issues concerning arts programs in middle and high schools; social and cultural structures of schooling, practical issues, and teaching arts.

CI 5069. Curriculum Innovations in Arts Education. (3 cr.: A-F or Audit; Every Fall) This course provides students with an examination of traditions in American schooling related to visual and performing arts education curricula.

CI 5075. The Social, Historical and Cultural Foundations of Arts Education. (1-3 cr.: A-F or Audit; Periodic Fall) The Social, Historical and Cultural Foundations of Arts Education will examine the arts in public education since the 1800s.

CI 5078. Application of Aesthetic Theory in Education. (2 cr.: A-F or Audit; Every Spring & Summer) The course explores: ?contemporary theories of arts ?psychological and philosophical foundations ?an overview of children's production of and responses to visual and performing arts

CI 5096. Arts Education Practicum. (1-6 cr.: A-F or Audit; Every Fall) In this course, students complete practicum observations in designated K-12 visual art or performing art, special education, and kindergarten classrooms.

CI 5097. Student Teaching in Arts Education. (8 cr.: S-N or Audit; Every Spring & Summer) Teacher candidates spend 16 weeks student teaching in visual art, dance, or theatre. Eight weeks occur in an elementary setting and eight weeks occur in a secondary setting including, but not limited to, middle school.

CI 5105. Increasing Access and Success in Undergraduate Classrooms. (3 cr.: A-F or Audit; Every Fall, Spring & Summer) Fundamentals and best practices for promoting student access, persistence, and retention within classroom. Focuses on traditionally under-represented-served populations.

CI 5106. Multicultural Teaching and Learning in Diverse College Contexts. (3 cr.: A-F only; Every Fall) Theory/pedagogy for culturally responsive teaching from perspectives of teachers/learners in postsecondary settings. Critical multicultural education, universal instructional design, integrated multicultural instructional design.

CI 5111. Introduction to Elementary School Teaching. (3 cr.: A-F or Audit; Every Fall, Spring & Summer) Curriculum organization, instruction, management, assessment, professional decision making, prerequisite: Foundations of education major or elem ed initial lic

CI 5113. Classroom Management in the Elementary School. (3 cr.: Student Option; Every Summer) For teachers, administrators, and support staff working in elementary school programs. Focus on management of student behavior, instruction as it relates to student behavior, and teacher organizational tasks in the classroom.

CI 5116. Action Research Methods to Improve College Teaching and Learning. (3 cr.: A-F or Audit; Every Spring) Action research as method of improving teaching/learning at postsecondary level. Experience doing research in college classrooms. Relative strengths/challenges of different approaches to classroom research. Ethical issues.

CI 5136. History of the American Curriculum. (3 cr.: Student Option; Even) Survey of formation of public school subjects and curriculum theory in United States. Social, political, and economic implications of curriculum theory.


CI 5145. Critical Pedagogy. (3 cr.: A-F or Audit; Every Spring) Examination of critical pedagogy: critique of power relations regarding race, culture, class, gender, and age in various educational settings; consideration of improved practice in education for children, youth, and adults.

CI 5150. Curriculum Topics. (1-6 cr. [max 12 cr.]: Student Option; Every Fall, Spring & Summer) Special topics, current trends in curriculum. Subject integration, curriculum contexts, development, implementation, evaluation.

CI 5155. Contemporary Approaches to Curriculum: Instruction and Assessment. (3 cr.: A-F or Audit; Every Fall, Spring & Summer) Current research/issues that cross disciplinary boundaries in curriculum development, instructional practices, and assessment methods. Interrelationships among curriculum, instruction, and assessment within framework of constructivist learning theory. Individual classroom practices/theories. prerequisite: Grad students only

CI 5156. Popular Culture, Teaching, and Learning. (3 cr.: A-F only; Every Fall) Approaches to the study of popular culture and education. Intersection between everyday life and broader historical contexts. Sporting events, toys, clothing, shopping malls, vampire mania, music festivals, video, and comics are the kinds of popular forms of culture we will engage as we develop teaching/learning strategies. prerequisite: Grad student or sr in a program that values teaching as a component of the discipline

CI 5163. Child and Adolescent Development for Teaching and Learning I. (1 cr.: A-F only; Every Fall & Summer) Attending to constant transitions/development in which children and adolescents negotiate their road to adulthood. How to foster learning/positive development. prerequisite: Enrolled in teacher initial licensure program

CI 5164. Child and Adolescent Development for Teaching and Learning II. (2 cr.: A-F only; Every Fall & Spring) Transitions/development in which children/adolescents negotiate road to adulthood. How to foster learning/positive development. prerequisite: Enrolled in teacher initial licensure program

CI 5177. Practical Research. (1-3 cr.: A-F or Audit; Every Fall, Spring & Summer) Preparation for identifying a research and development topic, reviewing the existing knowledge on the topic, planning and carrying out a project, further investigating the topic, and writing a report on the project. prerequisite: CI MEd student, or CI or EdPA Teacher Leadership MEd student

CI 5181. Clinical Experience in Elementary School Teaching. (2-10 cr. [max 30 cr.]: S-N or Audit; Every Fall, Spring & Summer) Students spend full days in the elementary classroom gradually assuming responsibility for teaching the class. Students prepare a portfolio based on criteria given. One seminar per week. prerequisite: Foundations of education and elem ed initial licensure only

CI 5186. School-Related Projects. (1-4 cr.: A-F or Audit; Every Fall, Spring & Summer) Research or evaluation project related to teaching, curriculum, or other aspect of schooling. Approved and supervised by faculty advisor. prerequisite: MEd student

CI 5187. Practicum: Improvement of Teaching in Elementary or PreKindergarten Schools. (2-3 cr.: S-N or Audit; Every Fall, Spring & Summer) Elementary school classroom teaching project designed to improve specific teaching skills. Approved and directed by adviser. prerequisite: Students in early childhood educ M Ed, or elem educ M Ed, or teaching M Ed

CI 5190. Directed Individual Study in Curriculum and Instruction. (1-6 cr. [max 12 cr.]: Student Option; Every Fall, Spring & Summer) Producing/evaluating curriculum materials. Literature review of issues/problems. Assessing curriculum processes. prerequisite: Grad student, instr consent

CI 5211. Elementary Education Content and Pedagogy I. (4 cr.: A-F only; Every Fall, Spring & Summer) Teacher Candidates will complete 8 modules about elementary content/pedagogy. Introduce
various concepts/practices that will be spiraled in each subject area throughout time in this two-year alternative program.

CI 5212. Elementary Education Content and Pedagogy II. (3 cr.; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete 5 modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/practices from introductory course. Introduces content that will be spiraled in each subject area throughout time in this two-year alternative program.

CI 5213. Elementary Education Content and Pedagogy III. (3 cr.; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete 6 modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/practices from previous three courses. Introduces content that will be spiraled in each subject area throughout time in this two-year alternative program.

CI 5214. Elementary Education Content and Pedagogy IV. (3 cr.; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete 5 modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/practices from introductory courses. Introduces content in each subject area. Serves as conclusion to elementary ed content/pedagogy courses.

CI 5254. Kindergarten Methods. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
Purpose of kindergarten, its place in elementary program. Curriculum appropriate for needs of age group, including children with special needs. Assessment procedures, role of classroom teachers. Prereq: Foundations of Education/Elementary Education or M.Ed./ILP Elementary Education

CI 5263. Practicum: Applying Instructional Methods in the Elementary Classroom. (3 cr.; [max 6 cr.]; A-F only; Every Fall & Spring)
Field-based practicum in elementary school setting. In-class discussions about application of classroom learning to school setting. Prereq: M.Ed./Elementary education initial licensure students

CI 5265. Clinical Experience in Elementary School Teaching. (12 cr.; [max 24 cr.]; S-N only; Every Fall, Spring & Summer)
Students spend full days in elementary classroom, gradually assuming responsibility for teaching, and prepare portfolio based on criteria given. One seminar per week. Prereq: M.Ed./Elementary education initial licensure students

CI 5286. Student Teaching Seminar: Elementary Education. (3 cr.; [max 6 cr.]; A-F only; Every Fall & Spring)
Weekly seminar supplementing student teaching experience. Class discussions, sharing of artifacts from the classroom, reflections, and readings. Prereq: M.Ed./Elementary education initial licensure only

CI 5287. Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools. (3 cr.; A-F only; Every Fall, Spring & Summer)
Elementary school classroom teaching project to improve specific teaching skills. Approved/directed by adviser. Prereq: M.Ed./Elementary education initial licensure student

CI 5300. Teaching Introductory Computer Concepts and Skills. (1-3 cr.; A-F or Audit; Every Spring)
Pedagogical strategies for teaching keyboarding and word processing.

CI 5301. Foundations of Computer Applications for Business and Education. (3 cr.; A-F only; Every Fall, Spring & Summer)
Instructional uses of computers/representative business, education, marketing applications. Word processing, databases, spreadsheets, graphic design. Expectations are for demonstrations of skills on apps/understanding of concepts that go beyond basic.

CI 5304. Data Management for Online Integration. (3 cr.; Student Option; Every Spring)
Using database software to organize, manage, and display online data, to create content management systems, and to integrate into existing websites.

CI 5305. Integrated Computer Applications in Business and Marketing Education. (3 cr.; Student Option; Every Fall & Spring)
Case-based authentic business computing problems requiring integration of two or more application packages. Pedagogical issues of learning/teaching advanced computer applications.

CI 5307. Technology for Teaching and Learning. (1.5 cr.; A-F or Audit; Every Fall, Spring & Summer)
Diverse educational technology in K-12 classrooms. Effective use of technology. Computer technologies used to stimulate personal productivity/communication and to enhance teaching/learning processes. Prereq: [MEd inicial licensure or CLA music ed major or preteaching major or instr consent], basic computer skills

CI 5325. Designing and Developing Online Distance Learning. (3 cr.; A-F or Audit; Every Fall)
Students research, use, and evaluate technologies for distance learning and design their own learning environments. Prereq: 5351 or 5362 recommended

CI 5327. Designing Online Adventure Learning. (3 cr.; A-F or Audit; Every Spring)
Brings adventure to your online learning environments: learn to design, develop, and deliver an online program that provides opportunities to explore real-world issues through authentic learning experiences in a collaborative online space. You'll engage learners virtually and in real-time. For more info go to http://www.chasingseals.com then sign up and start exploring.

CI 5330. Special Topics in Learning Technologies. (1-3 cr. [max 12 cr.]; A-F or Audit; Every Fall & Summer)
Topics related to needs of in-service teachers. Topics, location, credits. Duration flexible.

CI 5331. Introduction to Learning Technologies. (3 cr.; A-F or Audit; Every Fall)
An exciting look at the field of learning technologies (LT), examining the numerous opportunities this area of study brings to individuals who decide to pursue a LT degree. Students engage in numerous real-world projects as they come to understand both the past and future of technology in education, business, and society as a whole.

CI 5336. Planning for Multimedia Design and Development. (3 cr.; A-F or Audit; Every Spring)
Theory, research, practice in instructional design. Generic components of instructional design process. Applying principles to design/development of computer-based instructional materials.

CI 5351. Technology Tools for Educators. (3 cr.; A-F or Audit; Every Fall)
Develop skills in using technology applications to support teaching and learning. Internet applications, presentation software, Web 2.0 technologies, and Web site development.

CI 5361. Teaching and Learning with the Internet. (2-3 cr.; Student Option; Every Spring)
Implications/challenges in using Internet-based technologies in classroom. Pedagogical models.

CI 5362. Foundations of Interactive Design for Web-based Learning. (3 cr.; A-F or Audit; Every Fall)
Processes of designing/developing interactive learning media and online applications from ground up. Focuses on usability/aesthetics in online learning.
CI 5363. New Media and Interaction Design for Online and Mobile Learning. (3 cr.; A-F or Audit; Every Fall)

CI 5365. Contemporary Software Development Issues and Tools. (3 cr.; A-F or Audit; Every Summer)
Software used in multimedia design/development. Uses of the software, intricacies of interface, relevant programming principles. Introduction to developing multimedia applications. prereq: Familiar with standard computer/internet operations

CI 5367. Interactive Multimedia Instruction. (3 cr.; A-F or Audit; Every Spring)
Principles of effective computer-based design; tools in multimedia development; contemporary issues and skills used in the design, development, and implementation of interactive multimedia instruction. Use multimedia development tools, create a multimedia portfolio, and investigate the issues surrounding their effective use. prereq: Knowledge of principles and procedures of CBI design and one multimedia authoring system

CI 5390. Learning Technologies Field Experiences. (2 cr.; S-N only; Every Fall & Spring)
Field-based experience for students enrolled in computers, keyboarding, and related technology applications methods classes. Apply learning from University courses to the K-12 school setting. In-class discussions about the application of classroom learning to the school setting. prereq: Students in teachers of computers/keyboarding/related technology applications additional licensure program

CI 5402. Introduction to Special Collections. (3 cr.; A-F or Audit; Periodic Fall)
Uses Children's Literature Research Collection as research material. Study of manuscripts, original art, and letters. prereq: Children's lit course

CI 5403. Writing For and By Children. (3 cr.; A-F only; Every Fall)

CI 5404. Multicultural Literature for Children and Adolescents. (3 cr.; A-F or Audit; Spring Odd Year)
Course explores multicultural literature for children and adolescents as a site where difference can be emphasized and appreciated rather than downplayed and muted. We study award-winning works of fiction and arrive at a definition of multicultural literature for the modern classroom.

CI 5405. Middle School Language Arts Methods. (2 cr.; A-F only; Fall Odd Year)
Introduction to the unique needs of middle school students in the language arts classroom. Language arts content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school language arts classroom. prereq: Elem ed licensure student

CI 5410. Special Topics in the Teaching of Literacy. (1-3 cr. [max 12 cr.]; Student Option; Every Fall & Summer)
Topics related specifically to the needs of inservice teachers. Topics, location, credits, and duration will be highly flexible.

CI 5413. Foundations of Reading. (3 cr.; A-F or Audit; Periodic Spring)
Reading processes, development of readers. Assessment and tutoring of individual children in reading and other literacy practices. prereq: CI 3610 and concurrent registration with CI 5414

CI 5414. Practicum: Working With Developing Readers. (2 cr.; S-N only; Every Fall & Spring)
Field-based practicum. Students apply learning from their University course to working with developing readers. Instructor provides specific assignment. prereq: CI 3610 and concurrent registration with CI 5413 required; elementary education foundations major

CI 5417. Elementary literacy Instruction for ESL Students. (3 cr.; A-F or Audit; Fall Odd Year)
Teaching reading/writing in elementary grades to students from diverse languages. Second-language literacy development. Phonemic awareness, phonics, fluency, vocabulary, comprehension. Ways to connect students' background knowledge to literacy curriculum. prereq: Bachelor's degree completed

CI 5422. Teaching Writing in Schools. (3 cr.; A-F or Audit; Periodic Fall & Spring)

CI 5425. Reading Instruction in the Elementary Grades. (3 cr.; A-F only; Every Fall & Spring)
Curricular/methodological issues in teaching of reading. Reading/orthographic processes, strategy instruction for word recognition/comprehension, authentic assessment strategies, and teaching diverse students. prereq: [Elementary or early childhood] licensure student

CI 5426. Language Arts Instruction in the Elementary Grades. (3 cr.; A-F only; Every Fall & Spring)

CI 5431. Introduction to Instructional Leadership in K-12 Reading. (3 cr.; A-F or Audit; Every Summer)
K-12 curriculum in reading, major theories/research that motivate curriculum. Major instructional principles, alignments needed, resources available. prereq: Minnesota license valid for classroom teaching in pre-kindergarten, [adult basic education or grades kindergarten through 6 or 1 through 6 or 5 through 8 or 9 through 12 or kindergarten through 12]

CI 5432. Instructional Leadership in Reading in Kindergarten and the Elementary Grades. (3 cr.; A-F or Audit; Every Fall)
Research-based reading instruction for elementary grades. How to help other teachers improve practice. Characteristics of effective schools within context of improving students' reading achievement. prereq: 5431

CI 5433. Instructional Leadership in the Middle and Secondary Grades. (3 cr.; A-F or Audit; Every Spring)
Curriculum/instruction for middle/secondary school students. prereq: 5432

CI 5434. Professional Development and Evolving Practice in K-12 Reading. (3 cr.; A-F or Audit; Every Fall)
Developing e-program to assess competence in standards for teaching K-12 reading. Evolving teaching practices. Applications of current technologies. prereq: 5433

CI 5435. Instructional Leadership in Preventing Reading Difficulties. (3 cr.; A-F or Audit; Every Fall)

CI 5441. Teaching Literature in the Secondary School. (2-3 cr.; A-F or Audit; Periodic Fall & Spring)

CI 5442. Literature for Adolescents. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Characteristics of literature written for adolescents; rationale for using adolescent literature; adolescents' reading interests and attitudes; analysis of quality and appeal; individualized reading programs; methods of promoting reading; multicultural literature; developing teaching activities.

CI 5451. Teaching Reading in Middle and Secondary Grades. (3 cr.; A-F or Audit; Every Fall)
Methods of accommodating to students' abilities and facilitating reading in regular content classes.

CI 5452. Reading in the Content Areas for Initial Licensure Candidates. (1-2 cr.; A-F only; Periodic Fall & Spring)
Web-based course. Fostering students' reading related to learning from text. prereq: Concurrent enrollment in licensure area methods course(s), enrolled in Initial Licensure Program, Internet access, basic understanding of [computer use, Web browsers, email, word processing software]
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.


CI 5463. Minnesota Writing Project Annual Invitational Summer Institute. (3 cr.; A-F only; Every Summer) Workshop. Participants reflect on their own literacy processes, participate in a writing group, discuss current reading texts, and demonstrate best practices in classroom. Prereq: Licensed teacher or administrator or [space available, faculty letter of recommendation]

CI 5464. The Politics of Literacy and Race in Schools. (3 cr.; A-F or Audit; Every Fall) Literacy and race in schools examined, especially how power plays out, and what are the possibilities for creating radical democratic forms of life. Conceptions of language, literacy, whiteness, and racial identities are explored. Topics include educators? talk and silence about race, Ebonics, and youth?s racial identities in global times.

CI 5465. Minnesota Writing Project Open Institute: Writing for Social Justice. (3 cr.; Student Option; Every Summer) In this institute, participants will focus on three areas: writing, teaching, and learning. Participants will also consider the theory and practice of writing instruction that helps students achieve their potential as writers and change agents. Participants will investigate and present a literacy issue relevant to the course theme: social justice.

CI 5469. Minnesota Writing Project Directed Studies. (1-3 cr.; A-F only; Every Summer) Directed study for teachers involved in MWP. Capstone coursework for those enrolled in the Certificate in Teaching Writing and Critical Literacy. Teachers investigate current theory and practice of literacy instruction. Ongoing cohort for those enrolled in the Certificate. Prereq: Teaching license, [CI 5463 or enrolled in the Certificate for Teaching Writing and Critical Literacy]

CI 5471. Clinical Experience in Teaching Secondary English. (3 cr.; A-F only; Every Fall) Initial licensure candidates in English Education will observe the teaching and learning experience in a school and classroom context; implement approaches, assessments, and philosophies learned about in corresponding methods courses; reflect upon the complexities of classroom life in a seminar format; and co-plan and co-teach a five-day unit. Prereq. Must register same semester as CI 5441 and CI 5451.

CI 5472. Teaching Critical Media Analysis in Schools. (3 cr.; A-F or Audit; Every Fall & Spring) "Critical" media literacy means that we focus on, among other things, analyzing the intersection between media and issues of identity -- like gender, race, class and sexuality. We also focus on how to teach critical media analysis to students and others.

CI 5474. New Literacies Frameworks and Instruction: Digital Texts and Digital Reading. (3 cr.; A-F only; Every Fall) Read digital texts against backdrop of traditional print-based notions of reading, literacy, school curricula/instruction. Assists education professionals in making school/district-wide decisions based on sound research on digital reading/new literacies.


CI 5486. Directed Experiences in Teaching English. (4 cr.; S-N or Audit; Every Fall & Spring) Student teaching/clinical experience for English Education (Comm Arts & Lit) initial licensure and middle level endorsement students. Credits vary depending on length of field experience and should be determined with your academic adviser. Prereq: MED/initial licensure students in English ed only

CI 5502. Science Instruction in the Elementary Grades. (3 cr.; A-F or Audit; Every Fall & Spring) Methods/materials for teaching science/health at elementary school level. Prereq: Early Childhood or Elementary Education ILP recommended.

CI 5511. Introduction to Secondary Science: Laboratory-based Instruction. (4 cr.; A-F only; Every Fall, Spring & Summer) Inquiry about teaching/learning, observing/analyzing instruction, reflecting on own/each other's science teaching. How to use various instructional techniques/reflect upon teaching. Develops understanding of research-based instructional methods in secondary science classrooms.

CI 5513. Secondary Science Methods: Equity in Science Teaching. (3 cr.; A-F only; Every Fall, Spring & Summer) Inquiry about teaching/learning, observing/analyzing instruction, reflecting on own/each other's science teaching. How to use various instructional techniques/reflect upon teaching. Develops understanding of equitable science teaching/practices/important classroom culture.

CI 5514. Secondary Science Methods: The Science Learning Environment. (2 cr.; A-F only; Every Fall, Spring & Summer) Inquiry about teaching/learning, observing/analyzing instruction, reflecting on science teaching. How to use various instructional techniques, reflect upon professional growth using evidence from teaching. Identify goals/instruction plans for professional practice.

CI 5515. Secondary Science Methods: Developing Adaptive Expertise. (3 cr.; A-F only; Every Fall, Spring & Summer) Inquiry about teaching/learning, observing/analyzing instruction, reflecting on science teaching. How to use various instructional techniques, reflect upon professional growth using evidence from teaching. Identify goals/instruction plans for professional practice.

CI 5530. Secondary Science Teaching: Laboratory-based Instruction. (3 cr.; A-F only; Every Summer) Lab-based science teaching in secondary school setting. Research-based teaching strategies are modeled that address national/state-level standards. How to use various inquiry-based instructional techniques/methods. Prereq: Science ed MED ILP student

CI 5531. Teaching Middle School Science. (3 cr.; A-F or Audit; Every Fall) Methods of planning/teaching science to middle school students. Prereq: Initial licensure student in science ed

CI 5532. Teaching Secondary School Science. (3 cr.; A-F or Audit; Every Spring) Methods of planning/teaching science for secondary school students. Prereq: Admission to initial licensure program in science

CI 5533. Current Developments in Science Teaching. (3 cr.; A-F or Audit; Every Summer) Using curriculum standards to design science courses. Prereq: MED, initial licensure, grad student, or instr consent

CI 5534. Studies in Science Education. (3 cr.; A-F or Audit; Every Fall) Improvement of science teaching through the application of research findings. Prereq: M.Ed., init lic, or instr consent

CI 5535. Foundations of Science Education. (3 cr.; A-F or Audit; Every Spring)
CI 5536. Equity, Policy, and Assessment in Science Education. ( ; 3 cr.; A-F only; Every Fall) Nature of equity, diversity, and policy matters that influence schools/teachers involved in science teaching and scientific literacy. Classroom presentations, discussions, readings in current research. prereq: Med, or grad student, or instr consent

CI 5537. Principles of Environmental Education. ( ; 3 cr.; A-F or Audit; Every Fall) Critical review of Environmental Education, its history, theories, curricula, teaching methods, and assessment practices. Development of an exemplary unit plan for teaching environmental studies. prereq: Undergrad in NRES or M.Ed. or grad student in education or instr consent

CI 5538. Action Research in Science Education. ( ; 3 cr.; A-F only; Every Spring) This course is designed to accomplish several main goals for those enrolled: (1) articulate their own understanding of what it means for there to be equity in science education and how their personal interpretation aligns with existing frameworks for viewing equity; (2) become familiar with interconnections between equity and educational policies, including standardized testing, school organization, and teacher preparation in Minnesota; (3) design and conduct an investigation around a classroom dilemma pertaining to an issue of equity.

CI 5540. Special Topics: Science Education. ( ; 1-8 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Detailed examination and practice of the teaching of one area of science (e.g. geology, health, physical science) or one method of instruction (e.g. laboratories, demonstrations, Internet, simulations).

CI 5541. Teaching History and Nature of Science. ( ; 3 cr.; A-F or Audit; Every Fall) Understanding nature of science(NOS). Integrate/reflect on NOS in secondary science classroom. Historical cases/integrating NOS with scientific inquiry. prereq: Med ILP or professional studies student in science education or instr consent

CI 5551. Reflecting on Science Classroom Practices I. ( ; 1.5 cr.; A-F only; Every Fall) Students reflect on their instruction and student learning during first years of teaching. Monthly meetings, observations, online discussion. Classroom management, planning, inquiry-based teaching, assessment, equity in the classroom.

CI 5552. Reflecting on Science Classroom Practices II. ( ; 1.5 cr.; A-F only; Every Spring) Students reflect on their instruction and student learning during first years of teaching. Monthly meetings, observations, online discussion. Classroom management, planning, inquiry-based teaching, assessment, equity in the classroom.

CI 5596. Clinical Experience in Middle School Science. ( ; 4 cr.; A-F or Audit; Every Fall) Supervised clinical experience in middle school science teaching.

CI 5597. Clinical Experience in Secondary School Science Teaching. ( ; 4-8 cr.; S-N or Audit; Every Spring) Supervised clinical experience in secondary school science teaching. prereq: initial licensure or instr consent


CI 5612. ESL Methods for Multilingual Development. ( ; 2 cr.; A-F only; Every Fall, Spring & Summer) Introduction to methods of developing reading, writing, speaking, listening skills among English learners in K-12. Reflect on beliefs/ideas, cultivate orientation towards supportive teaching/learning environment.

CI 5613. Testing and Assessment for English Learners. ( ; 3 cr.; A-F only; Every Fall, Spring & Summer) Develop awareness of familiar/similarities in policies, procedures, practices in use in attempting to determine academic readiness of students learning English as secondary language in American public schools.

CI 5614. Curriculum and Materials Development for English Learners. ( ; 3 cr.; A-F only; Every Fall, Spring & Summer) Explore role ESL teachers play in curriculum/materials development. Historical overview of curriculum development in second language education, factors that influence curriculum development, range of models for curriculum development tailored to English learners.

CI 5615. Academic English for English Learners: Planning, Assessment, Instruction. ( ; 2 cr.; A-F only; Every Fall, Spring & Summer) Prepares ESL teacher candidates to develop academic English skills of English learners of various proficiency through bilingual teaching strategies. Prepares students to offer leadership with colleagues from content areas to integrate language/content. Includes focused study of advanced-level syntactic structures/completion of edTPA.

CI 5617. Academic Language and English Learners I. ( ; 1 cr.; A-F only; Every Summer) Working with English learners and other linguistically diverse students across content areas to develop academic language proficiency. prereq: Enrolled in teacher initial licensure program

CI 5618. Academic Language and English Learners II. ( ; 1 cr.; A-F only; Every Spring) Working with English learners and linguistically diverse students across all content areas to develop academic language proficiency.
to develop rating criteria and rubrics, and a standards-based performance assessment unit.

CI 5626. Developing Learners' Sociocultural Competence. (2 cr.; Student Option No Audit; Every Summer)
Overview of how to incorporate a pragmatics component into second/foreign language curriculum to enhance learners' sociocultural competence. Includes approaches to teaching/evaluating pragmatics.

CI 5628. Analyzing Learner Language in Second Language Acquisition. (3 cr.; Student Option No Audit; Every Fall & Spring)
Review broad findings in second language acquisition (SLA) research. Cognitive/social process of becoming multilingual. How to carry out classroom-based research projects focused on learner language development. prereq: 5646, 5649 [or other course on the grammar of a language]

CI 5631. Second Language Curriculum Development and Assessment. (3 cr.; A-F or Audit; Every Fall)
Instruction/assessment of ESL and World Languages in the modalities of speaking, listening, reading, and writing. Backwards design, proficiency-oriented approach, use of content-based instruction. Planning for the integration of instruction and assessment. prereq: SLC initial licensure only

CI 5632. Literacy and Language Development in Second Language Classrooms. (3 cr.; A-F or Audit; Every Fall)
Processes/instructional approaches in developing second language proficiency in the modalities of reading, writing, speaking, and listening and communicative modes (interpretive, presentational, interpersonal); development of literacy in a second language; planning L2 literacy instruction based on research on L1 and L2 literacy development; integration of instruction/assessment in language teaching. prereq: SLC initial licensure only

CI 5634. Content-Based Instruction in Second Language Settings. (3 cr.; A-F or Audit; Every Spring)
Building on foundation from other courses in the sequence. Instruction/assessment of ESL and World Languages at the secondary level. Prepares students to connect language teaching with other content areas, analyze/address the academic language needs of English learners, and advocate for second language programs and students. prereq: SLC initial licensure only

CI 5635. Culture and Diversity in Second Language Classrooms. (3 cr.; Student Option; Every Spring)
Teaching culture as content and including students' home cultures in the curriculum and diverse student needs. Needs of students of various educational, social, and cultural backgrounds/ways to develop academic success through instruction in learning strategies and other approaches to differentiation. prereq: Initial licensure program only

CI 5641. Language, Culture, and Education. (3 cr.; A-F or Audit; Periodic Spring & Summer)
Applies current sociolinguistic and discourse theory/research to study of relationships between language and culture in educational settings: language curriculum and instruction; classroom language use; borders between school and home/community language use; and educational policies on literacy/second-language instruction. prereq: MED or grad student

CI 5642. Assessing English Learners. (3 cr.; A-F or Audit; Spring Odd Year)
Current practices concerning language and academic content assessment of English learners (ELs) at the school site, state, and national level; factors affecting academic learning needs of ELs/where assessment fits into that picture.

CI 5645. Teaching English Learners in the Elementary Classroom. (3 cr.; A-F only; Every Fall, Spring & Summer)
Benefits/challenges of working with English learners (ELs). Linguistically/culturally diverse students. Instructional practices/strategies for teaching ELs in elementary classrooms. Language learning/bilingualism. Cultural differences. prereq: Early Childhood or Elementary Education ILP

CI 5646. English Grammar for ESL Teachers. (3 cr.; Student Option; Every Fall)
English syntax from pedagogical perspective. Grammatical structures that challenge ESL learners. Analyzing learner errors. Issues/activities related to teaching grammar in ESL contexts. prereq: LING 5001 or instr consent

CI 5647. Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling. (3 cr.; Student Option; Periodic Fall)
Academic/social/political factors that affect students' success in school. Strategies for teaching. Programmatic choices.

CI 5648. Advanced Practices in Teaching Academic Language. (3 cr.; A-F only; Every Spring)
Prepares K-12 teachers for student development of academic language proficiency. Read/discuss current research. Implement innovative teaching practices. prereq: Grad student, instr consent

CI 5649. Language Analysis for ESL Teaching in Higher Ed. (4 cr.; Student Option No Audit; Every Spring)
Overview of complex aspects of English grammar not covered in 5646. Academic uses of passives, indirect objects, conditionals, relative clauses, complementation, reported speech, deixis/reference, articles, prepositions, phrasal verbs, pragmatics. prereq: 5646

CI 5651. Foundations of Second Languages and Cultures Education. (3 cr.; A-F or Audit; Every Fall)
Historical overview of second language teaching/learning in U.S. introduction to second language acquisition. Second language instructional concepts across elementary, secondary/university options for foreign language, bilingual education, immersion language programs, and English as a second language programs. Theoretical frameworks for language instruction are tied to practice.

CI 5653. Methods in Teaching English as a Second Language (ESL) in Higher Education. (3 cr.; Student Option No Audit; Every Fall & Spring)
Theory/practice teaching academic English as second or foreign language in contexts of higher education. History of field/varied methods in language teaching. Current best practices in teaching academic English pronunciation, listening, speaking, reading, writing skills. prereq: An intro to linguistics course

CI 5654. Practicum in Teaching English as a Second Language (ESL) in Higher Education. (6 cr.; S-N only; Every Spring)
Practical, hands-on training in teaching of English as Second Language. Applying theoretical/descriptive material studied in 5653. Discuss readings/research articles on ESL in higher ed, applying theoretical/practical principles to specific critical classroom incidents. prereq: 5653

CI 5655. Teaching Literacy in Second Language Classrooms. (3 cr.; A-F or Audit; Every Fall)
Reading comprehension/composing processes in a second language; relationship between first and second literature development; relationship between reading and writing; relationship of culture to reading comprehension and writing; politics of literacy; assessment of second language literacy; using technology to enhance literacy instruction.

CI 5657. Teaching Speaking and Listening in Second Language Classrooms. (3 cr.; A-F or Audit; Spring Even Year)
Theories/methods in teaching language as communication in oral/aural modes; planning student interaction; classroom organization for oral language learning/acquisition; using technology to enhance interaction; assessment of listening comprehension and oral communication.

CI 5658. Foreign Language Testing and Assessment. (3 cr.; A-F or Audit; Spring Odd Year)
For world language/EFL teachers. Aligning foreign language classroom instruction/assessment; language testing/assessment; classroom-based and large-scale proficiency testing/assessment; assessing proficiency in speaking, listening, reading, writing and communicative modes (interpretive, presentational, interpersonal); creation of formative/summative assessments; critique of contemporary assessment instruments.

CI 5660. Special Topics in the Teaching of Second Languages and Cultures. (1-4 cr. [max 12 cr.]; Student Option; Every Spring & Summer)
Topics related specifically to the needs of the in-service teacher. Topics, location, credits, and duration are flexible.
CI 5662. Second Language Curriculum Design. (3 cr.; A-F or Audit; Every Spring) Historical overview of curriculum development in second language education; contexts that influence curriculum development; models for curriculum development in second language settings; politics of curricular reform; national/state standards and implications for curriculum development; effects of technology on second language curriculum.

CI 5670. Foundations of Dual Language and Immersion Education. (3 cr.; Student Option; Every Fall) Research foundations and program principles for dual language/immersion. Second language acquisition; critical features of program design/implementation; benefits/challenges of dual language/immersion; program assessment; advocacy. Theory/research for dual language/immersion tied to practical application. prereq: Enroll in certificate program in dual language/immersion educ or instr consent

CI 5671. Curriculum Development and Assessment in Dual Language/Immersion Classrooms. (3 cr.; Student Option; Fall Odd Year) Content-based language instruction and curriculum development for dual language, bilingual, and immersion contexts; balancing content/language goals/objectives in curriculum and instruction; integration of language, literacy content, and culture in curriculum; standards-based instruction; backwards design; assessment that aligns with content-based curriculum and instruction. prereq: instr consent

CI 5672. Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms. (3 cr.; Student Option; Every Spring) Counterbalanced instruction with integrated focus on language and literacy development for dual language, bilingual, and immersion classrooms. Materials development; proactive/reactive instructional techniques; noticing and awareness-raising strategies; structuring student language production; differentiating for content, ability, and language. prereq: instr consent

CI 5673. Immersion 101: An Introduction to Immersion Teaching. (2 cr.; Student Option No Audit; Every Summer) Research-based introduction to issues for teachers, administrators, and district personnel in K-12 immersion education. One-way (foreign language), two-way (bilingual) and indigenous programs. Principles/practices that inform language-attentive curriculum development/instruction.

CI 5674. Immersion 101: An Introduction to Immersion Teaching in Character-based Languages. (2 cr.; Student Option No Audit; Every Summer) Research-based introduction to issues for teachers, administrators, and district personnel in K-12 immersion education. One-way (foreign language) and two-way (bilingual) programs. Principles/practices that inform language-attentive curriculum development/instruction.

CI 5676. Biliteracy Development in Dual Language/Immersion Classrooms. (3 cr.; Student Option; Spring Odd Year) This course aims to provide dual language, bilingual and language immersion educators with an understanding of the complex phenomena of literacy and biliteracy and with a range of instructional strategies for fostering literacy and biliteracy development in dual language/immersion classrooms.

CI 5693. Directed Study in Second Languages and Cultures. (1-4 cr.; Student Option; Every Fall, Spring & Summer) Individual or group work on curricular, instructional, or assessment problems. prereq: instr consent

CI 5696. Practicum: Teaching World Languages and Cultures in Elementary Schools. (2-6 cr.; Student Option; Every Fall, Spring & Summer) Teaching and learning experiences in Second Languages and Cultures at the elementary-school level. Requires students to work in a public school setting. prereq: 5619, adviser approval; credits cannot be counted on a graduate degree program for endorsement candidates

CI 5697. Practicum: ESL in the Elementary School. (2-6 cr.; Student Option; Every Fall, Spring & Summer) Teaching/learning experiences in an English as a Second Language setting at elementary school level. Requires students to work in a public school setting. prereq: Adviser approval

CI 5698. Student Teaching in Second Languages and Cultures. (2-6 cr.; max 14 cr.; Student Option; Every Fall, Spring & Summer) Student teaching in Second Languages and Cultures at the secondary level for teachers already licensed in another field. Requires students to work in a public school setting. prereq: Adviser approval; credits cannot be counted on a graduate degree program

CI 5699. Clinical Experiences in Second Languages. (3-12 cr.; max 16 cr.; A-F or Audit; Every Fall & Spring) Teaching and learning experiences in elementary and secondary second language instructional settings. Includes a seminar held concurrently to support the student teaching experience. prereq: SLC initial licensure program only

CI 5702. Social Studies Instruction in the Elementary Grades. (3 cr.; A-F only; Every Fall & Spring) Content/organization of elementary social studies programs. Programs of understanding. Improving learning situation. prereq: Early Childhood or Elementary Education ILP

CI 5741. Introduction to Social Studies Education. (3 cr.; A-F only; Every Summer) Broad issues and themes related to social studies education, including societal context, rationale, and scope and sequence. Analysis and evaluation of selected teaching strategies, methods, and resources.

CI 5742. Advanced Methods of Teaching the Social Studies. (3 cr.; A-F only; Every Fall) Focus on developing a repertoire of instructional methods that support authentic pedagogy and assessment. Enhancing reading comprehension and writing skills in the social studies. prereq: Secondary social studies initial licensure student

CI 5743. The Social Sciences and the Social Studies. (3 cr.; A-F only; Every Fall) Development of instructional strategies and contexts for exploring the social sciences as disciplines at the secondary level; central concepts and generalizations; tools of inquiry; competing structures and theories; and the relative impact of multicultural and gender-fair perspectives on the nature of history and the social sciences. prereq: Secondary social studies initial licensure student

CI 5744. Seminar: Reflecting on Professional Development in Social Studies Education. (3 cr.; A-F only; Every Spring) Reflecting on teaching experience, examining social/cultural context of teaching/learning, developing a professional identity. Refining teaching and teacher research skills. prereq: Secondary social studies initial licensure student

CI 5745. Engaging Youth With Social Studies Texts. (3 cr.; A-F only; Every Spring) Ways to engage students (grades 5-12) in social studies (textbooks, literature, speeches, editorials, political cartoons, tables, graphs, maps, films). Developing middle/high school students’ disciplinary literacy.

CI 5746. Global and Multicultural Education in the Secondary Classroom. (3 cr.; A-F only; Every Spring) Issues, classroom practices, and controversies surrounding global/multicultural perspectives in social studies education. Strategies for helping secondary social studies students develop global/multicultural worldviews.

CI 5747. Global and Environmental Education: Content and Practice. (3 cr.; A-F or Audit; Every Spring) Preparing educators for leadership responsibilities in the area of global environmental education. Focus on the knowledge and process skills necessary to carry out a leadership role in the curriculum.

CI 5762. Developing Civic Discourse in the Social Studies. (3 cr.; A-F or Audit; Periodic Spring & Summer) Philosophies, strategies, and research on developing civic discourse in secondary social studies classroom. Selecting issues. Democratic classroom climate. Relating to social/cultural contexts.

CI 5782. Developing Civic Discourse in the Social Studies. (1-8 cr.; max 16 cr.; S-N or Audit; Every Fall & Spring) Student teaching experiences for students preparing to become secondary social studies teachers. Teacher candidates work closely with social studies teachers in grades 5-12 to plan and implement engaging and meaningful learning experiences for middle and high school students. prereq: MEd/initial licensure student
CI 5811. Introduction to Teaching Secondary Mathematics. (4 cr.; A-F only; Every Fall, Spring & Summer) Introduction to teaching mathematics. Fundamental mathematical ideas/different ways children think about these ideas.

CI 5812. Teaching Algebra. (3 cr.; A-F only; Every Fall, Spring & Summer) Uses algebra as vehicle to discuss student learning trajectories, ways to measure students understanding, make instructional decisions to help students grow.

CI 5813. Teaching Geometry. (3 cr.; A-F only; Every Fall, Spring & Summer) Geometry/measurement ideas as vehicle to model ways to engage/manage students in more effective ways.

CI 5814. Teaching and Learning Mathematics. (3 cr.; A-F only; Every Fall, Spring & Summer) Topics require more sophisticated understanding of teaching based on first year experience/reflect deeper on teaching.

CI 5815. Leadership in Mathematics Education. (2 cr.; A-F only; Every Fall, Spring & Summer) Preparing to give back to profession as you grow in role as teacher leader.

CI 5822. Mathematics Instruction in the Elementary Grades. (3 cr.; 3 cr.: A-F or Audit; Every Fall & Spring) Principles of learning mathematics in elementary grades. Objectives, content, philosophy, instructional materials, methods of instruction/evaluation. Prereq: Early Childhood or Elementary Education ILP.

CI 5980. Clinical Experiences for K-12 Teaching. (1-4 cr.; A-F only; Every Fall, Spring & Summer) Practical teaching/learning experiences in public school setting. Includes one-on-one coaching/co-teaching opportunities with University Mentors/TFA Coaches with gradual movement toward more self assessment/edTPA portfolio.

CI 5981. Introduction to Equity-Based Pedagogy. (1 cr.; A-F only; Every Fall, Spring & Summer) Introduces aspects of inequities in U.S. society/school. Examines how social class/poverty permeated education as social institution/classroom pedagogy. Covers five principles for social class-sensitive change/intersections between social class/other markers of difference.

CI 5982. Enacting Equity-Based Pedagogy. (2 cr.; A-F only; Every Fall, Spring & Summer) Extended study of inequities. Examines working-class literature for adults/children. Labor histories, economic systems, hierarchies of class, race, gender, sexuality, language in schools/communities.

CI 5983. Equity-Based Pedagogy/Advocacy. (1 cr.; A-F only; Every Fall, Spring & Summer) Extends study of inequities in society. Five principles for social class-sensitive change. Intersections between social class/other markers of difference such as race, gender, sexuality, language.

CI 5984. Planning Design and Management. (1 cr.; A-F only; Every Fall, Spring & Summer) Foundational understanding of being teacher, developing culturally responsive classroom, designing learning experiences. Conceptualization of teacher nationally/locally, language in classroom. Foundational concepts/tools used when facilitating learning.

CI 5985. Academic Language and English Learners in the Content Areas. (1 cr.; A-F only; Every Fall, Spring & Summer) Prepares teacher candidates to work effectively with English learners/other linguistically diverse students across all content areas. Develop students' academic language proficiency as needed for school success.

CI 5986. Foundations of Special Education. (1 cr.; A-F only; Every Fall, Spring & Summer) Introduces research/ issues emphasizing collaborative problem solving approach that facilitates effective family-professional partnerships/educational programming for individuals with disabilities.

CI 5987. Child and Adolescent Development for Teaching, Learning, and Assessment. (1 cr.; A-F only; Every Fall, Spring & Summer) Cognitive, social, emotional development of childhood/adolescence. Ecological influences in development. Theories of learning/cognition, cognitive/social development, motivation, individual/group differences, testing/assessment, teaching methodologies, pragmatic issues.

CI 5988. Clinical Experience: Improvement of Teaching. (2 cr.; A-F only; Every Fall, Spring & Summer) Capstone project. Link theory/practice, integrate coursework with experiences in classroom.

CI 5993. Directed Study in Family, Youth, and Community. (1-3 cr.; [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member. Prereq: Instr consent.

CI 5996. Internship in Family, Youth, and Community. (1-6 cr.; Student Option; Periodic Fall) Involvement in work experience focused on educational competencies in family, youth, and community settings. Nature/extent of responsibilities are defined by position the student assumes. Prereq: Instr consent.

CI 8075. Seminar: Art Education. (2 cr.; A-F or Audit; Periodic Fall & Spring) Reports, evaluation of problems, and review of recent literature. Prereq: Educ grad student or instr consent.

CI 8079. Research in Art Education. (3 cr.; A-F or Audit; Periodic Fall) Current research agenda. Helps students identify research questions and choose appropriate methodologies. Prereq: Educ grad student or instr consent.

CI 8095. Problems: Art Education. (1-12 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance; may include advanced studio practice and educational issues requiring a research methodology. Prereq: Grad art educ major or instr consent.

CI 8111. Representations of Knowledge in Curriculum and Culture. (3 cr.; A-F or Audit; Periodic Fall) Overview of research and theory on sociology of knowledge and education. Conceptions of knowledge in curriculum; connections between cultural conditions and curriculum design and implementation; influence of national political agendas, population, the mass media, and textbooks on curriculum in diverse educational settings. Prereq: CI grad student or instr consent.

CI 8115. Curriculum and Achievement Outcomes in a Diverse Society. (3 cr.; A-F or Audit; Periodic Fall) Examination of American public school experiences for students of African-American, Hispanic, Asian, and American Indian background; social, political, regional, and educational variables that influence student outcomes; perspectives concerning ethnic student achievement; factors influencing school achievement, and prospects for change. Prereq: Doctoral student.

CI 8121. Curriculum Change: Perspectives, Processes, and Participants. (3 cr.; Student Option; Periodic Fall) Examination of curriculum within educational organizations; educational organization as mediator and transmitter of societal/cultural perspectives; implications of organizational context for curriculum change, change processes, and change participants. Prereq: CI grad student or instr consent.

CI 8127. Curriculum Theory and Research: Alternative Paradigms and Research Methods. (3 cr.; Student Option; Periodic Fall) Traditions of inquiry, exemplary studies, and associated research methods; survey and assessment of topics and methods as applied to curriculum questions; and relationships between theory and research. Prereq: CI grad student or instr consent.

CI 8131. Curriculum and Instruction Core: Critical Examination of Curriculum in Context. (3 cr.; A-F or Audit; Periodic Fall & Spring) Central concepts, ideas, and debates in professional field of curriculum. Curriculum in general education. Prereq: CI PhD or MA student or instr consent.

CI 8132. Curriculum and Instruction Core: Teaching Theory and Research. (3 cr.; A-F or Audit; Every Fall & Spring) Overview of research on teaching: historical perspective, modern research/findings, implications for practice/research. Prereq: CI PhD or MA student or instr consent.
CI 8133. Research Methods in Curriculum and Instruction. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Survey of educational research methods, comparison of underlying assumptions/procedures. prereq: CI PhD or MA student or instr consent

CI 8134. Foundations of Research in Curriculum and Instruction I. (3 cr.; A-F or Audit; Every Spring)
This Foundations of Research course is the first of a two-course sequence required for PhD students in Curriculum and Instruction. The course is designed to ground students in qualitative and quantitative paradigms and epistemology and to prepare students for specialized methodology courses that focus on specific research approaches in education.

CI 8145. Using Mixed Methods in Educational Research. (3 cr.; A-F or Audit; Every Fall & Spring)
Conceptual issues surrounding design/use of mixed methods in addressing problems/research questions in education. Critique of select mixed design exemplars published in respected research publications/practical application of analyses of data using mixed inquiry methods. prereq: [8133, 8148, OLPD 8812] or equiv. [CI PhD student or instr consent], additional qualitative/quantitative methodology courses recommended

CI 8146. Critical Ethnography in Education. (3 cr.; A-F or Audit; Spring Odd Year)
Theoretical/methodological foundations. Possibilities and problems for understanding inequality/disparities in education. Research design, data collection, analysis, writing. prereq: [8148, EDPA 5061, WOST 5011] or instr consent

CI 8147. Critical Discourse Analysis in Educational Research. (3 cr.; A-F or Audit; Fall Odd Year)
Students apply CDA methods to analysis of written, visual, and spoken texts in social settings such as schools, families, and communities. prereq: MA or PhD student

CI 8148. Conducting Qualitative Studies in Educational Contexts. (3 cr.; Student Option; Every Spring)
Qualitative research methods. Ethnography, sociolinguistics, symbolic interactionism. Observation. prereq: CI 8133 and [CI or OLPD PhD student]

CI 8149. Qualitative Research: Coding, Analysis, Interpretation, and Writing. (3 cr.; A-F or Audit; Periodic Fall)
How to code/analyze field notes. Individual/group interviews, multimedia using NUDIST NVivo software. Students interpret analyzed material and complete a article length document that includes a review of related research/methodology. prereq: [8133, 8148, grad student, completion of a qualitative research study] or instr consent

CI 8150. Research Topics in Curriculum & Instruction. (1-6 cr. [max 12 cr.]; Student Option; Every Spring)
Special topics, current research trends in curriculum and instruction. Research review, subject integration, curriculum contexts, development, implementation, data collection, analysis, evaluation.

CI 8151. Paradigms and Practices in Teacher Preparation. (3 cr.; A-F or Audit; Fall Even Year)
Theory-practice gap in professional education. Conceptions of teacher learning. Pedagogies for teaching “practices” and program design. Research methodologies. prereq: Grad student

CI 8152. Teacher Learning and Professional Development. (3 cr.; A-F or Audit; Fall Odd Year)
Theoretical/empirical work on teacher learning, professional communities, teacher inquiry, perspectives on outcomes of professional development, and policy recommendations for supporting teacher learning. Research methodologies. prereq: Grad student

CI 8154. Culturally Relevant Pedagogy. (3 cr.; A-F or Audit; Fall Even Year)
Research on relationship between home and school cultures. Education of students of color. Culture, including experiences/practices of students' homes. Cultural approaches for improving teaching, transforming society.

CI 8155. Immigrant Families and U.S. Schools. (3 cr.; A-F or Audit; Fall Odd Year)

CI 8156. Asian American Education. (3 cr.; A-F or Audit; Spring Even Year)

CI 8159. Culture and Teaching Colloquium. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall)
Doctoral seminar. Interdisciplinary perspectives on theme central to cultural study of teaching. Theme varies year to year.

CI 8161. Research Experience I: Study Design and Planning. (3 cr.; Student Option No Audit; Every Fall)
Students identify research topic, conduct literature review, refine research questions, design study, obtain IRB approval as needed, and begin data collection. Readings, seminar discussions, peer critique of work. prereq: [8133, 6-12 cr of research methodology, CI PhD student] or instr consent

CI 8162. Research Experience II: Data Analysis and Manuscript Preparation. (3 cr.; Student Option No Audit; Every Spring)
Students complete data collection/analysis, prepare research manuscript. Seminar discussions, critical examination of their own and peers? work. prereq: 8161

CI 8165. Queer and Feminist Theories: Collective Memory Research Methods. (3 cr.; A-F only; Spring Even Year)
Seminar for advanced graduate students to work with queer and feminist theorists in what is broadly constructed as educational research. We consider post-modern theoretical work that recognizes the "rational"? being and the mind/body dichotomy as constructions which reproduce existing structures. Collective memory writing is explored as a research method.

CI 8181. Seminar in Teaching in Colleges of Education. (3 cr.; Student Option; Periodic Fall)
Goals, instructional strategies, evaluation procedures, and professional considerations. prereq: CI PhD student or instr consent

CI 8195. Problems: Improvement of Instruction. (1-6 cr.; Student Option; Every Fall & Summer)
Independent research in curriculum and instruction. prereq: instr consent

CI 8196. Practicum in Teaching in Colleges of Education. (1 cr.; S-N only; Periodic Fall & Spring)
Practicum experience for graduate students to learn how to teach a college level course through a supervised, mentored experience. Supervised teaching occurs in an education course at the University or other institution.

CI 8197. Problems: Curriculum Studies. (1-4 cr.; max 8 cr.; A-F or Audit; Every Fall)
Directs students to completing Plan B paper for M.A. degree. prereq: MA student

CI 8198. Problems: Teacher Education. (1-6 cr. [max 12 cr.]; Student Option; Every Spring)
Independent research. prereq: instr consent

CI 8202. Elementary Education Colloquium. (3 cr.; Student Option; Fall Even, Spring Odd Year)
In this course, students will consider how elementary education has been and continues to be imagined as a scholarly field of study, with particular focus on how the field is seen as a fluid intellectual space in which scholars study broad philosophical, political, and social ideas, issues, and concerns as they take concrete (lived) shape in the schooling, cultures, and pedagogies of elementary schooling.

CI 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Master's student, adviser approval, DGS approval

CI 8350. Special Topics in Learning Technologies. (1-3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall)
Topics in learning technologies. Topics and credits are flexible.

CI 8361. Advanced Courseware and Design: Issues. (3 cr.; A-F or Audit)
Examination and critique of existing research. Students identify a research topic, write a literature review, plan a study, and present a research proposal.

CI 8391. Learning Technologies Seminar. (1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
This seminar course offers an advanced exploration and critique of contemporary
research in the field of learning technologies; topics, location, credits, and duration are highly flexible.

CI 8395. Directed Study: Learning Technologies. (1-6 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Students work with faculty member on a directed project or study focused on exploring literature, organizing and engaging in research, designing and developing projects, etc. prereq: instr consent

CI 8400. Special Topics in Children's and Young Adult Literature. (1-6 cr.; Student Option; Periodic Fall) Overview of research and issues. Study of original manuscripts and artwork for children’s books; research in child and young adult response to literature. Topics vary by offering. prereq: grad course in children's or young adult lit

CI 8410. Special Topics in Reading Research and Instruction. (1-6 cr.; Student Option; Periodic Spring) Research at all levels. Topics vary. May include research designs, trends, and specific studies. prereq: [MA or PhD] student

CI 8412. Research in Reading. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Theory and of research on writing process. Applications to developing writing curriculum/instruction. prereq: [MA or PhD] student

CI 8421. Research in Composition. (3 cr.; Student Option; Periodic Spring) Research designs: experimental, case study, descriptive, qualitative, ethnographic. Writing in social contexts. Teaching/evaluating writing. Rhetorical, linguistic, and discourse analysis of texts. Validity/reliability in coding/rating. Portfolio/large-scale writing assessments. prereq: [MA or PhD] student

CI 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student, adviser approval, DGS approval


CI 8470. Special Topics on Literacy. (1-6 cr.; Student Option; Periodic Fall) Current theories/research on literacy and literacy development. Alternative methods of conducting literacy research. Implications for literacy instruction. prereq: [MA or PhD] student

CI 8492. Readings in English Education and Reading. (1-3 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Independent study course. prereq: instr consent

CI 8495. Problems: Teaching English and Reading. (1-6 cr.; A-F or Audit; Every Fall, Spring & Summer) Individual research. prereq: instr consent

CI 8511. Seminar: Research in Science Education. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Students and faculty present research projects for comment and critique. Special topics may also be considered. prereq: grad student or instr consent

CI 8541. History and Philosophy of Engineering and Engineering Education. (3 cr.; A-F only; Every Fall) History and philosophy of engineering/engineering education. Critical reflection/analysis of philosophical, epistemological, historical arguments. prereq: PhD or MA student or instr consent

CI 8542. Modeling and Model-Based Reasoning in STEM Education. (3 cr.; A-F or Audit; Every Fall & Spring) Models/modeling perspectives for engineering, mathematics, and science education. Theorists/researchers that shaped STEM model-based reasoning. Discussions, individual/group presentations, small-group activities. prereq: STEM Education PhD or MA student or instr consent

CI 8570. Advanced Topics in Science Education. (3 cr.; A-F or Audit; Every Fall & Spring) Examination/critique of current research topics, methods, and issues. prereq: instr consent

CI 8571. Equity, Policy, and Social Justice in Science Education. (3 cr.; Student Option No Audit; Every Fall) Interactions of issues of diversity, equity, policy, and social justice as related to science education. Diverse perspectives on purposes/scope of science education. Consequences for diversity, equity, access, social justice, empowerment, and educational policy. prereq: Science ed or STEM grad student or instr consent

CI 8572. Learning Theory and Classical Research in STEM Education. (3 cr.; A-F only; Spring Even Year) STEM education research. Theorists/classical research. Mathematics, science, engineering education. prereq: Grad math educ major

CI 8573. Nature of Inquiry in STEM Education. (3 cr.; A-F only; Every Fall & Spring) STEM Education. Mathematics, science, engineering. Teaching/learning/teacher education through evaluation of national teaching standards, current research, current cognitive theories of learning. prereq: MA or PhD student or instr consent

CI 8594. Conducting Research in Science Education. (3 cr.; Student Option; Periodic Fall) Application of research methodology to a specific science education issue. prereq: sci educ research course

CI 8595. Problems: Science Education. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent research. prereq: CI grad student or instr consent

CI 8645. Indigenous Language Revitalization and Activist Research Methods. (3 cr.; A-F only; Fall Even Year) This course is a hands-on look at activist research methods situated in the context of Indigenous Language Revitalization. That is, what happens when a community problem is the organizing force in research? Students will be expected to both engage in language learning, research, designing a research project, and connecting this to critical thinking as applied to culture, language and indigenous language revitalization.

CI 8650. Seminar: Special Topics in Second Languages and Cultures Research. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Summer) Research topics vary. prereq: CI grad student or instr consent

CI 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CI 8671. Sociolinguistic Research Approaches to Education. (3 cr. [max 6 cr.]; A-F only; Spring Odd Year) This course provides students with an overview of current research approaches, theories, and methods in linguistic anthropology and interactional sociolinguistics with a focus on educational contexts and linguistic diversity. Course activities include reviewing and critiquing current research and theory in the field and working on small projects.

CI 8689. Language and Education Policy. (3 cr. [max 6 cr.]; A-F or Audit; Every Spring) Students will gain a solid understanding of language policy theory, language policy research methods, and key empirical findings. They will acquire skills to critically analyze and evaluate language policy, and gain experience and academic practice in doing so.

CI 8691. Readings in Second Languages and Cultures Education. (1-3 cr.; Student Option; Every Fall & Spring) Independent reading. prereq: instr consent

CI 8695. Problems: Second Languages and Cultures Education. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent research. prereq: instr consent

CI 8741. History and Theory of Social Studies Education. (3 cr. [max 6 cr.]; A-F or Audit; Every Spring) History/theory of social studies education in United States, organization, subject matter, methods of instruction.

CI 8742. Seminar: Research in Social Studies Education. (3 cr.; A-F or Audit; Every Spring)
Critical review and analysis of seminal research studies; criteria for appraising research findings; educational implications. prereq: CI grad student or instr consent

Cl 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD

Cl 8795. Problems: Social Studies Education. (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Independent research. prereq: CI grad student or instr consent

Cl 8796. Research Internship in Social Studies Education. (1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer) Internship with social studies education faculty member; experience in collecting and analyzing data; drafting and presenting reports; writing for publication. prereq: CI grad student

Cl 8888. Thesis Credits: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) Thesis credits: Doctoral prereq: Max 18 cr per semester or summer; 24 cr required

Cl 8900. Family, Youth, and Community Colloquium. (1-4 cr. ; S-N only; Periodic Fall & Spring) Theories, philosophies, practices, pedagogies, epistemologies, and public policies do not deal with in regular courses. Content varies by offering. prereq: [MA or PhD] student

Cl 8913. Interpretive Research. (3 cr. ; A-F only; Every Fall) Hermeneutic, ethnomet hodological, and phenomenological research methodologies. Ethics, evaluation, and usefulness of interpretive research. Practice in conducting interpretive research.

Cl 8914. Critical Science Research. (3 cr. ; A-F only; Every Spring) Origins, influences, characteristics, and central concepts. Distinction between critical science and other action research. Requisite skills/knowledge for conducting critical science research, using that knowledge in a project.

Cl 8994. Directed Research in Family, Youth, and Community. (1-6 cr. ; A-F only; Every Fall, Spring & Summer) tbd prereq: Family, Youth, and Community student doing Plan B research

Dakota (DAKO)

DAKO 1121. Beginning Dakota I. (5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing. Oral drills, in-class participation focused on questions/answers. prereq: 1122

DAKO 1122. Beginning Dakota II. (5 cr.; Student Option; Every Spring) Further development of language acquisition skills. Oral drills, in-class participation focused on questions/answers. prereq: 1122

DAKO 3123. Intermediate Dakota I. (5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing. Oral drills, in-class participation focused on questions/answers. prereq: 1122

DAKO 3124. Intermediate Dakota II. (5 cr.; Student Option; Every Spring) Listening, speaking, reading, writing. Oral drills, in-class participation focused on questions/answers. prereq: 1121, 1122, 3123

DAKO 3125. Introduction to Dakota Linguistics. (3 cr.; Student Option; Every Fall) Structure of Dakota, including phonology, morphology, syntax, and semantics. prereq: 3124

DAKO 3126. Dakota Language for the Classroom. (3 cr.; A-F only; Every Spring) General/specialized language for core subjects, daily routines, and classroom discourse. Methods for teaching Dakota language. prereq: 1122

DAKO 3127. Dakota Language for Teachers. (3 cr.; A-F only; Every Fall) Dakota language for teachers. Methods of teaching Dakota language in the classroom. prereq: 1121

DAKO 4121. Beginning Dakota I. (3 cr.; Student Option; Every Fall) Language acquisitions skills, oral drills. In-class participation focuses on questions/answers. prereq: [1122, 1004] in another language or passing score on LPE or grad student

DAKO 4122. Beginning Dakota II. (3 cr.; Student Option; Every Spring) Further development of language acquisition skills. Oral drills, in-class participation focused on questions and answers. prereq: [1121, 1004] in another language or passing score on LPE or grad student

DAKO 4123. Intermediate Dakota I. (3 cr.; Student Option; Every Fall) Listening, speaking, reading, writing. Oral drills. In-class participation focuses on questions/answers. prereq: 1121, 3123, 5126

DAKO 4124. Intermediate Dakota II. (3 cr.; Student Option; Every Spring) Listening, speaking, reading, writing. Oral drills. In-class participation focuses on questions/answers. prereq: 1121, 1122, 3123

DAKO 5126. Advanced Dakota Language I. (3 cr. [max 12 cr.]; A-F or Audit; Every Fall) Focuses on immersion method.

DAKO 5129. Advanced Dakota Language II. (3 cr. [max 12 cr.]; A-F or Audit; Every Spring) Focuses on immersion method.

Dance (DNCE)

DNCE 1001. Modern Dance Technique 1. (1 cr.; Student Option; Every Fall, Spring & Summer) First course in ten-section sequence of modern dance technique. Introductory modern dance technique training. Dance form varies according to assigned instructor. prereq: 1001 or audition or instr consent

DNCE 1010. Modern Dance Technique 3. (1-2 cr. [max 4 cr.]; Student Option; Every Fall) Third course in ten-section sequence of modern dance technique. Beginning modern dance technique training. Dance form varies by instructor. prereq: dept consent, audition

DNCE 1020. Modern Dance Technique 4. (1-2 cr. [max 4 cr.]; Student Option; Every Spring) Fourth course in ten-section sequence of modern dance technique. Beginning modern dance technique training. Dance form varies by instructor. prereq: 1010, dept consent, audition

DNCE 1030. Athletic Movement for Dance. (1 cr. [max 3 cr.]; Student Option; Periodic Fall & Spring) This course explores athletic movement and its applications to dance training. Athletes and dancers are the focus of this course. Class work will emphasize: agility, dexterity, hand-eye coordination, 360 degree body motion, strong alignment/skeletal understanding in motion, holistic strength training and stamina.

DNCE 1040. Modern Dance Partnering Technique. (1 cr. [max 2 cr.]; A-F only; Every Spring) Technical demands, approaches, and skills needed for partnering in modern dance. prereq: Dance major or instr consent

DNCE 1101. Ballet Technique 1. (1 cr.; Student Option; Every Fall & Summer) Principles, basic technique, and vocabulary of ballet; barre, center, and allegro

DNCE 1102. Ballet Technique 2. (1 cr.; Student Option; Every Spring) Second of two-semester sequence of fundamental Classical Ballet Technique. Principles of Classical Ballet technique. Each principle introduced separately/in progression. Barre/center work with emphasis on simplicity, repetition, creativity. prereq: 1101, or audition, or instr consent

DNCE 1110. Ballet Technique 3. (2 cr. [max 4 cr.]; Student Option; Every Fall) First of two-semester sequence of beginning ballet technique. Level 3 in eight-level sequence of ballet technique. Practical application of ballet principles. Barre work needed for center work. Center work will consist of adagio, basic turns, petit, grand allegro. prereq: dept consent, audition

DNCE 1120. Ballet Technique 4. (2 cr. [max 4 cr.]; Student Option; Every Spring) Second of two-semester sequence in beginning ballet. Practical application of ballet principles. Barre/center work. Ever-changing combinations/steps learned in previous level. prereq: 1110, dept consent, audition

DNCE 1201. Jazz Technique 1. (1 cr.; Student Option; Every Fall & Summer)
First of six-semester sequence of jazz dance. Fundamental jazz vocabulary/movement. Basic understanding of proper body placement, clear articulation, basic mechanics of jazz movement, rhythmic footwork. Improvisation will be introduced. Overview of history of jazz music/dance styles.

DNCE 1202. Jazz Technique 2. (1 cr.; Student Option; Every Spring)
Second of six-semester sequence in jazz dance. Fundamental jazz vocabulary/movement. Clear articulation of movement, use of space, weight, dynamics, focus, style, musicality. Improvisation. Overview of history of jazz music/dance styles. prerequisite: 1201 or audition or instructor consent

DNCE 1210. Jazz Technique 3. (1 cr. [max 2 cr.]; Student Option; Every Fall)
Third of six-semester sequence of jazz dance. Vocabulary. Technical skills using variety of jazz dance styles while increasing flexibility, groundedness, strength. Increase understanding of musicality, dynamics, style, improvisation. prerequisite: dept consent, audition

DNCE 1220. Jazz Technique 4. (1 cr. [max 2 cr.]; Student Option; Every Spring)
Fourth of six-semester sequence of jazz dance. Expand vocabulary/develop skills, technique, style. Increase flexibility, strength. Use of space, clear articulation of movement, rhythmic footwork, grounding movement, dynamics, musicality. prerequisite: 1210, dept consent, audition

DNCE 1301. Tap Technique 1. (1 cr.; Student Option; Every Fall & Summer)
Learning fundamental terms, basic rhythm structures, stock steps, and standard time steps.

DNCE 1302. Tap Technique 2. (1 cr.; Student Option; Every Spring)
Fundamental terms, basic rhythms and syncopation, stock steps, and standard time steps; clarity of sound and rhythm. prerequisite: 1301 or instructor consent

DNCE 1313. African Based Movement. (1 cr.; Student Option; Every Fall & Spring)
Varied movement of African diaspora, primarily but not limited to West African region and continent of Africa. Traditional movement. Movement inspired by Africa, the Caribbean, and African diaspora at large. In-class movement participation, one movement midterm, one two-page paper.

DNCE 1315. Flamenco. (1 cr.; Student Option; Every Fall, Spring & Summer)
Basic Spanish Flamenco dance technique with focus on rhythm, footwork, body style. Choreography incorporating techniques learned. Live flamenco guitar accompanies classes.

DNCE 1323. Swing Dance. (1 cr.; Student Option; Every Fall & Spring)
Traditional swing dances popular in the United States from 1930s through early 1960s. Each week new movements/figures are taught and previous dances reviewed. Students are expected to change partners.

DNCE 1327. Argentine Tango. (1 cr.; Student Option No Audit; Periodic Fall)
Basic rhythms emphasizing posture, axis, walking, lead/follow techniques, footwork patterns. Students listen to music to identify rhythm, communicate.

DNCE 1331. Yoga. (1 cr.; Student Option; Every Fall, Spring & Summer)

DNCE 1335. Tai Chi Ch’uan. (1 cr.; Student Option; Every Spring & Summer)

DNCE 1343. Hip Hop Movement. (1 cr.; Student Option No Audit; Periodic Fall)
Hip hop’s forms: old school, popping, locking, breaking, contemporary choreography, social dances. History, culture, technique. Warm-up, strength/endurance applications, choreography, cool down. Lecture, demonstration, practice.

DNCE 1345. Alexander Technique for Movement Artists. (2 cr.; Student Option No Audit; Every Spring)
Increased kinesthetic awareness of habitual movement patterns in order to improve dance/technique and prevent related injuries.

DNCE 1347. Pilates Conditioning. (1 cr.; Student Option; Every Fall & Summer)

DNCE 1349. Contact Improvisation. (1 cr.; Student Option; Every Fall, Spring & Summer)
Safe, clear introduction to principles of contact improvisation. Rolling point of contact, supporting/being supported, falling/recovering, connecting with center as source/support for movement. Classes include warm-up.

DNCE 1351. African Diasporic Movement 1. (1 cr.; Student Option No Audit; Every Fall)
First of six-course sequence. Introduction to traditional West African dance technique as foundational base to begin learning technique, body placement, movement, space, time, energy, isolations, patterns, etiquette, community building, group work and presentation.

DNCE 1352. African Diasporic Movement 2. (1 cr.; Student Option No Audit; Every Spring)
Second of six-course sequence. Builds on level 1 by further developing in complexity technique movement, poly-rhythm, levels, undulation, combinations, dynamics. Relationship between dance/drum, energy expressing. prerequisite: 1351 recommended

DNCE 1353. African Diasporic Movement 3. (1 cr.; Student Option No Audit; Every Fall)
Third of six-course sequence. Afro-Brazilian dance, including jumps, turns, floor work, and rhythmicity to develop flexibility, strength, and vocabulary in polycentric movement, moving toward body-sound harmony, illuminating dynamics of coordination, relaxation, breathing, undulation.

DNCE 1354. African Diasporic Movement 4. (1 cr.; Student Option No Audit; Every Spring)
Fourth of six-course sequence. Builds on level 3 by exploring movement from mythology of Afro-Brazilian belief systems orix?? and Candombl???. How corporeal knowledge and technique fluency through the course sequence support different dance techniques. prerequisite: 1353 or audit or instructor consent

DNCE 1401. Introduction to Dance. (AH; 3 cr.; Student Option No Audit; Every Fall & Spring)

DNCE 1500. Topics in Dance. (1-3 cr. [max 10 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

DNCE 1601. Dance Improvisation. (1 cr.; A-F or Audit; Every Fall)
Individual ways of moving linked to fundamental elements of dance: time, space, and energy. Metered time, musical phrasing, Movement speed, shape, and quality. Creative process, individual movement vocabulary, structural devices in dance. prerequisite: Concurrent registration in a modern dance technique course, department consent

DNCE 1626. Music for Dance. (AH; 3 cr.; Student Option; Every Fall)
Cultural gravity of the Western perspective. Ways global regions express natural laws of acoustics through music while considering historical, political, and ethical issues around the relationship between music and dance. Workshops, practice, and exercises. prerequisite: department consent

DNCE 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule. prerequisite: Freshman Seminar.

DNCE 3010. Modern Dance Technique 5. (2 cr. [max 4 cr.]; Student Option; Every Fall)
Application of principles of space, time, energy, Alignment, power from pelvic center, rotation/tumour, muscular tonality, joint articulation, clarity of intent, stretch, strength, stamina. prerequisite: department consent, audition

DNCE 3020. Modern Dance Technique 6. (2 cr. [max 4 cr.]; Student Option; Every Spring)
Continuation of 3010. Application of principles of space, time, energy. Alignment, power from pelvic center, rotation/tumour, muscular tonality, joint articulation, clarity of intent,
DNCE 3110. Ballet Technique 5. (2 cr. [max 4 cr.]; Student Option; Every Fall)
Stretch, strength, balance, muscualtity. Longer phrases in adagio/leggero work. More complex elevations in petit allegro. Practical work conducted in context of study of technical development of ballet. prereq: dept consent, audition

DNCE 3120. Ballet Technique 6. (2 cr. [max 4 cr.]; Student Option; Every Spring)

DNCE 3210. Jazz Technique 5. (1 cr. [max 2 cr.]; Student Option; Every Fall)
Continuation of jazz technique. Rhythm structures, longer phrases, greater physical speed, attack/control. prereq: dept consent, audition

DNCE 3220. Jazz Technique 6. (1 cr. [max 2 cr.]; Student Option; Every Spring)
Continuation of 3210. Jazz technique. Rhythm structures, longer phrases, greater physical speed, attack/control. prereq: 3210, dept consent, audition

DNCE 3301. Tap Technique 3. (1 cr.; Student Option; Every Fall & Summer)
Tap techniques and creative development through improvisational studies. prereq: 1302 or inst consent

DNCE 3302. Tap Technique 4. (1 cr.; Student Option; Every Spring)
Tap techniques and rhythm structures. prereq: 3301 or inst consent

DNCE 3311. Contemporary Indian Dance 1. (1 cr.; Student Option No Audit; Periodic Fall)
First in two-course sequence. Odissi classical Indian dance, martial movement Chhau, Iyengar yoga. Students deconstruct, extend and interweave these to create contemporary South Asian form. Footwork, hip flexion, torso movement, breath, rhythmic complexity. prereq: instr consent

DNCE 3312. Contemporary Indian Dance 2. (1 cr.; Student Option No Audit; Periodic Spring)
Second in two-course sequence. Odissi classical Indian dance, martial movement Chhau, Iyengar yoga. Students deconstruct, extend and interweave these to create contemporary South Asian form. Footwork, hip flexion, torso movement, breath, rhythmic complexity. prereq: 3311 or inst consent

DNCE 3334. Introduction to Dance/Movement Therapy. (2 cr.; Student Option; Every Fall & Spring)
Historical/theoretical perspectives on use of movement/dance in relationship to psychology/healing. D/MT pioneers/techniques. Applications of D/MT with various populations/settings. Experiential course. prereq: dept consent

DNCE 3337. Body Mind Centering. (2 cr.; Student Option; Every Fall, Spring & Summer)
Improvisational movement explorations, hands-on re-patterning work. Direct experience of the way mind (desire, attention, intention) is expressed through various body systems. Students use imagery, touch, and anatomical information to access a range of inner sensations and movement experiences. Emphasizes each individual's unique experience of the body.

DNCE 3351. African Diasporic Movement 5. (1 cr. [max 2 cr.]; Student Option No Audit; Every Fall)
Rigorous practice. West African techniques. Cardiovascular endurance of students will improve as a result. Live drummers, students can expect to learn drum parts to enhance the understanding of the rhythms. prereq: 1354 or audition or inst consent

DNCE 3352. African Diasporic Movement 6. (1 cr. [max 2 cr.]; Student Option No Audit; Every Spring)
Dances performed by dance companies of Guinea through the use of more complex and deep rhythms such as Yamama, Doundounba, Bahro and Tiribah. Rigorous practice. West African techniques. Live drummers. prereq: DNCE 3351 African Diasporic Movement 5 or audition or instructor consent

DNCE 3401W. Dance History 1. (3 cr.; Student Option; Every Fall)
Historiography of dance, 20th century through present. Reconstruction/incorporation of dance practice in context of globalization. Artistic choices as influenced by complex history of performing arts and terrain of body/politics.

DNCE 3402W. Dance History 2. (3 cr.; Student Option; Every Spring)
History/theory of dance in varied forms/aspects. From development of ballet through 20th century modern dance. Second half of year-long survey. prereq: 3401W

DNCE 3411. Dance and Popular Culture: Choreographing Race, Class, and Gender. (DSJ; 3 cr.; Student Option; Every Spring)
How race, class, and gender become aestheticized and are put into motion as popular culture. Choreographic analysis of moving bodies. How "popular" affects understanding of culture. Exoticism, binary structures of stereotypes, identity, hegemony.

DNCE 3433. Articulate Body. (3 cr.; Student Option; Every Spring)
Lectures and movement sessions in biodynamic considerations for optimal dance performance and metabolistic demands of dance. prereq: Dnce major, dept consent

DNCE 3434. Nutrition and Body Maintenance for Movement Artists. (2 cr.; Student Option No Audit; Every Spring)
Students learn and research ways to improve nutrition and remain injury-free throughout career and beyond. Discuss nutrition principles and apply to unique challenges, needs, interests of movement artists. Examine anatomy of movement to develop constructive injury prevention and management strategies. Stress reduction.

DNCE 3487W. Dance and Citizenship: Land, Migration, and Diaspora. (WI; 3 cr.; Student Option; Every Fall)
Dance/performance as practiced/transformed by minority groups in the United States. Migration as a global phenomenon, particularly pertaining to land disputes, labor distribution, political asylum, refugee, and dislocation.

DNCE 3495. Dance and Global Tourism. (GP; 3 cr.; Student Option No Audit; Every Fall)
Political economy of the dancing body and its role in the representation of nation-states through global tourism. Dance and its relationship to belonging, nationalism, and the politics of art and tradition. prereq: Jr or sr

DNCE 3500. Topics in Dance. (2 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

DNCE 3601. Dance Composition 1. (3 cr.; Student Option; Periodic Spring)
Movement, vocabulary in relation to theme, space, time, energy, and body parts; solo, duet, and trio forms. prereq: 1020, 1601, concurrent regis in a modern dance technique course, dept consent

DNCE 3602. Dance Composition 2. (3 cr.; Student Option; Every Fall)
Movement, vocabulary in relation to theme, space, time, energy, and body parts. Solo, duet, and trio forms. prereq: 3601, dept consent, concurrent regis in a modern dance technique course

DNCE 3621. Dance Production I. (2 cr.; A-F or Audit; Every Fall)
Technical/administrative aspects of dance production. Lighting, costumes, sound, marketing, stage management, fundraising, publicity. Emphasizes practical project management and personal management skills. prereq: Dance major, dept consent

DNCE 3622. Dance Production II. (2 cr.; A-F or Audit; Every Spring)
Continuation of 3621. Students produce the spring Student Dance Concert. prereq: 3621, dance major, dept consent

DNCE 3700. Performance. (1 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Creation or reconstruction of a dance theatre work under the direction of a guest artist or faculty member. Work is performed at the end of the rehearsal period. prereq: Concurrent enrollment in a technique course, audition, dept consent

DNCE 3701. Summer Dance Intensive. (1-3 cr. [max 6 cr.]; Student Option No Audit; Every Summer)
Real-world experience with a professional dance company. Students participate in daily technical and repertory classes culminating in an informal performance. Artists are arranged year-by-year.

DNCE 3901. Survival Strategies in Dance. (3 cr.; A-F or Audit; Periodic Spring & Summer)
Strategies fundamental to a dancer's survival. Injury prevention/ care. Development of healthy
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Offered</th>
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</thead>
<tbody>
<tr>
<td>DNCE 4443. Theorizing Dancing Bodies.</td>
<td>(3 cr.; Student Option; Every Fall) Major developments in Western philosophic thought on dance and dance theory, from its beginnings to present.</td>
<td>3 cr.</td>
<td>Dept consent</td>
<td>Fall, Spring</td>
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<tr>
<td>DNCE 4544.</td>
<td>Writing the Dancing Body.</td>
<td>(3 cr.; Student Option; Every Spring) Modes of writing found in dance studies. Oral histories, historical documentation, performance reviews, performances, ethnographies, scholarly essays. Discussion/critique of existing modes of writing. Writing/rewriting practice.</td>
<td>3 cr.</td>
<td>Dept consent</td>
</tr>
<tr>
<td>DNCE 4901. Senior Seminar.</td>
<td>(2 cr.; S-N or Audit; Every Fall) Development of senior project, alone or in groups, under guidance of faculty members.</td>
<td>2 cr.</td>
<td>Sr, Dnce or Th major</td>
<td>Fall, Spring, Summer</td>
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<tr>
<td>DNCE 5010. Modern Dance Technique 7.</td>
<td>(2 cr. [max 4 cr.]; Student Option; Every Fall) Continuation of 5010. Movement vocabulary through improvisation, analysis of form and structure, experimentation with tone and performance persona. Effects of lights/costumes/text/props/music; development of larger ensemble works.</td>
<td>2 cr.</td>
<td>Dept consent, Audition</td>
<td>Fall, Spring, Summer</td>
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<tr>
<td>DNCE 5020. Modern Dance Technique 8.</td>
<td>(2 cr. [max 4 cr.]; Student Option; Every Spring) Continuation of 5020. Movement vocabulary through improvisation, analysis of form and structure, experimentation with tone and performance persona. Effects of lights/costumes/text/props/music; development of larger ensemble works.</td>
<td>2 cr.</td>
<td>Dept consent, Audition</td>
<td>Fall, Spring, Summer</td>
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<tr>
<td>DNCE 5110. Ballet Technique 7.</td>
<td>(1 cr. [max 2 cr.]; Student Option; Every Fall) Continuation of ballet technique. Muscularity, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet.</td>
<td>1 cr.</td>
<td>Dept consent, Audition</td>
<td>Fall, Spring, Summer</td>
</tr>
<tr>
<td>DNCE 5120. Ballet Technique 8.</td>
<td>(1 cr. [max 2 cr.]; Student Option; Every Spring) Continuation of 5110. Musicality, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet.</td>
<td>1 cr.</td>
<td>Dept consent, Audition</td>
<td>Fall, Spring, Summer</td>
</tr>
<tr>
<td>DNCE 5334. Introduction to Dance/Movement Therapy.</td>
<td>(2 cr.; Student Option; Every Spring) Historical/theoretical perspectives on use of movement/dance in relationship to psychology/healing. D/MT pioneers/techniques. Applications of D/MT with various populations/settings. Experiential course.</td>
<td>2 cr.</td>
<td>Dept consent</td>
<td>Spring</td>
</tr>
</tbody>
</table>

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
DIS 3213. History of European Film. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Emphasizes post-World War II film history of France, Italy, Germany, Great Britain, the Soviet Union, and Scandinavia. Basic facts/methods of film comprehension, film analysis, and general film history.

DIS 3214. Contemporary European Film: the Individual and Society. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Representative themes in contemporary European film concerning attitudes in social, political, and artistic issues in France, Germany, Great Britain, Italy, Sweden, and other countries.

DIS 3230. History of European Ballet. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Main facets of European ballet from Renaissance to present. Its development in social/artistic context. Visits to Royal Danish Ballet.

DIS 3320. Dickens and Andersen: Romanticism, Realism, and Modernism. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Comparative reading of Dickens and Andersen. Touches on European literary romanticism, realism, and modernism.

DIS 3321. Hans Christian Andersen. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Life/works of Andersen. Analysis of selected texts. Andersen as writer in European romantic tradition.

DIS 3322. Masterpieces in Modern Scandinavian Literature. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Introduction to major figures in Scandinavian literature since 1870. "Modern breakthrough." Literature as vehicle raising social/human problems and as expression of Scandinavian character and world view.

DIS 3331. Nationalism and Minorities in Europe. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Causes/impacts of nationalism. Proliferation of ethnic/national minority conflict in post-Cold War Europe. Models to explain nationalism. Instruments/policies to deal with nationalism. Discussion on European integration, from ecological perspective. Theories of environment as determining factor in historical development.

DIS 3344. 20th Century European History. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Main periods/trends in European history, from end of 19th century to present. Interplay of political, social, and ideological developments.

DIS 3421. Kierkegaard: Philosophy and the Meaning of Life. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Kierkegaard's view on relationship of personal existence to art, society, philosophy, and religion.

DIS 3422. Making of the Modern Self. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Introduction to Kant, Hegel, Nietzsche, Heidegger, and others. Discussion on meaning in a world that no longer offers one answer to the question, "What is a human being?"

DIS 3423. Biomedical Ethics. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) What are ethical criteria for evaluating biotechnology? How far do we want to legislate "life"? How can such legislation be enforced?

DIS 3431. Danish Politics and Society. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Analyzes politics, economics, and society of contemporary Denmark.

DIS 3433. The European Union. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) European unification, from its inception in early 1990s to its ongoing development today.

DIS 3441. Brain Functioning and the Experience of Self. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Relationship between biological, psychological, and social factors that contribute to human functioning and the individual's experience of self-in-the-world.

DIS 3442. Developmental Psychopathology. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Risk, resilience, and psychopathology in children's development. Bridges gap between developmental psychology and abnormal psychology.

DIS 3451. Nordic Mythology. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Myths, cults, and traditions of pre-Christian Nordic peoples as expressed in contemporary literature, eye-witness reports, and art. Emphasizes Viking period. All readings in modern English translations.

DIS 3511. Criminal Justice in Scandinavia. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Ideology of crime control and criminal justice administration in Scandinavia, with a North American point of reference. Emphasizes Scandinavia's liberal criminal policy and fairly modest crime rate.

DIS 3620. Architecture Foundations Studio. (6 cr.; A-F or Audit; Every Fall, Spring & Summer) Elements of architectural design: principles of structure, process of design, composition of form, functional resolution, language of architectural graphics, presentation of projects in drawings/models.

DIS 3621. Architectural Design Studio. (6 cr.; A-F or Audit; Every Fall, Spring & Summer) Builds on Architectural Design Studio I, with increasing independence in programming/evaluating projects.

DIS 3623. 20th Century Danish Architecture. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Danish architecture in historical, political, and social/architectural context. Relation of Danish architecture to Scandinavian/international architecture.

DIS 3624. Contemporary European Architectural Theories. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Complexity of contemporary architecture. Comprehensive foundation for students' own work.


DIS 3626. Visual Journal. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Seminar. Students develop Journal as tool for analyzing (e.g., architectural solutions, urban spaces). Skill-building in observation, and in recordings of physical environment and individual objects.

DIS 3627. Urban Design Journal. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Experiencing, analyzing, and recording urban landscape, its fabric, spatial elements, and individual components, through a journal.
DIS 3628. Scandinavian Design and Architecture. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Overview of Scandinavian design/architecture. Historical/current conditions of architecture, urban design, and planning from architectural, social, and political points of view.

DIS 3630. Furniture Design Studio and Workshop. (6 cr.; A-F or Audit; Every Fall, Spring & Summer)
Process of furniture making. Students develop/refine a concept, produce working drawings, and build a wood or steel model.

DIS 3631. Furniture Design in Scandinavia. (3-6 cr.; A-F or Audit; Every Fall, Spring & Summer)
Introduction to furniture design in Scandinavia. Focuses on Denmark. Current/historical conditions of furniture. Design theories/methodologies.

DIS 3641. Digital Design in Scandinavia. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Aspects of history, theory, and practice of Scandinavian design. Philosophical, economic, and political trends that affect practice of design in a global perspective.

DIS 3730. International Finance in a European Context. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Exchange rate determination, inflation rates, interest rates. Managing exchange-rate risk. Financial/investment decisions made by multinational companies. Issues related to European Economic and Monetary Union.

DIS 3740. European Business Environment: the EU. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
European Union in terms of basic business-related functions, institutions, policies, issues, and implications for international business operations/competitiveness. Required study tours.

DIS 3742. Environmental Business Strategy. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
“Green management” experience. Action of advanced European companies in face of international environmental regulation, EU opportunities/instruments for industry, and management theory.

DIS 3760. Global Business Strategy: European Approaches. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Strategic response of European business managers to recent international economic developments.

DIS 3761. Human Resource Management in Europe. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Analysis/interpretation of the way human resources are dealt with in various European countries.

DIS 3820. European Business Environment: the EU. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
European Union in terms of basic business-related functions, institutions, policies, issues, and implications for international business operations and competitiveness. Includes required study tours.

DIS 3821. Marine Biological Research Project. (6 cr.; A-F or Audit; Every Fall, Spring & Summer)
Research project with practical field components. Students use scientific libraries of various research institutions, engage in discussions/seminars with leading Danish/German scientists, and conduct experiments on research ship and at marine biological laboratory.

DIS 3822. Ecology and Human Impact in the North and Baltic Seas. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Ecosystems of North/Baltic Seas. How natural/human activities threaten their integrity. Given in Copenhagen area, with study tour in northern/western Denmark.

DIS 3823. Biology of Marine Mammals. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)

DIS 3824. Ecotoxicology: Principles and Practice. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Introduction to fate/effects of toxic chemicals in ecological systems.

DIS 3825. Intensive Ecotoxicology Laboratory: Introduction to International Tests and Assays. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Hands-on experience of standard ecotoxicological test methods used internationally.

DIS 3826. Biophysical Basis of Ecophysiology. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Introduction to biophysics and biophysical chemistry as basis for biologist’s understanding of physiological processes.

DIS 3827. Element and Energy Cycling in Ecosystems. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Major element cycles/processes that regulate flow/transformation of elements/energy in ecosystems.

DIS 3828. Intensive Field Course: Carbon Cycling in Danish Forest and Fjord Ecosystems. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Students use/evaluate classic ecological techniques for measuring carbon flow/transformation in terrestrial/aquatic ecosystems on coast of Denmark.

DIS 3830. Marine Biology of European Coastal Waters. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Marine biology of Baltic/North Seas. Coastal waters, interactions between organisms and their environment, methods to investigate biological systems. Students conduct simple experiments during field trips in Denmark.

DIS 3901. Religion in Crisis. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3902. New Members of the European Union. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3903. International Marketing and Branding Field Project. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3904. Economic Theories of Globalization. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3905. The Context of Danish History. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3906. Children in a Multicultural Context: Practicum. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3907. Children in Multicultural Context: Theory. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3908. Migrants, Minorities, and Multiculturalism. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3909. American Popular Culture. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3910. Health Care in Scandinavia. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3911. Human Health and Disease. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3912. Muslims in the West. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3913. Sociology of European Families. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3914. International Law in a European Perspective. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3915. Independent Study. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3917. Masterpieces of Russian Literature. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3918. Communication Across Cultures in Europe. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3919. Decision Making in the European Union. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3920. Sustainable by Design. (3 cr.; A-F only; Every Fall, Spring & Summer)

DIS 3921. European Urban Design Theories. (3 cr.; A-F only; Every Fall, Spring & Summer)
DH 2111. Dental Anatomy. (1 cr.; A-F only; Every Fall)
All deciduous/permanent teeth, including tooth form, function, and relationship to oral health. Classification, eruption, exfoliation patterns. Ideal static occlusion, dental terminology, tooth annotation systems. Lab includes identification/annotation of teeth. prereq: DH student

DH 2121. The Dental Hygiene Care Process Clinical Application I. (1 cr.; A-F or Audit; Every Fall)
Dental hygiene care process, assessment principles related to medical and oral health status, dental hygiene clinical procedures, and development of instrumentation skills. prereq: DH student

DH 2132. Head and Neck Anatomy. (2 cr.; A-F or Audit; Every Fall)
Anatomical structures of head and neck as they relate to the practice of dental hygiene.

DH 2212. Communication for Oral Health Providers. (2 cr.; A-F only; Every Spring)
Effective communication strategies within health care settings with emphasis on oral health provider-patient relationship. Application of health literacy concepts, behavior change theory as components of evidence-based decision making in clinical setting. prereq: DH student

DH 2215. Oral Histology and Embryology. (2 cr.; A-F or Audit; Every Spring)
Development of orofacial region. Structural microscopic anatomy of oral hard/soft tissues applicable for rendering clinical treatment. prereq: DH student

DH 2221. Periodontology. (2 cr.; A-F only; Every Spring)
Periodontal diseases, etiology, assessment, treatment options. Clinical experience in debridement/root planing with ultrasonic/hand instruments. prereq: DH student

DH 2222. Dental Hygiene Care Process Clinical Application II. (3 cr.; A-F or Audit; Every Spring)
Techniques. Evaluation of products used in treatment of dental caries and periodontal diseases. prereq: DH student

DH 2231. Cariology and Applied Nutrition in Dental Hygiene Care. (3 cr.; A-F or Audit; Every Spring)
Study of dental caries etiology, pathology, prevention, applied principles of diet/nutrition to dental hygiene patient care with skills in dental dietary counseling. prereq: DH student

DH 3100. Dental Professional Development I. (1 cr. [max 2 cr.]; A-F only; Every Fall)
The purpose of this course is to introduce dental hygiene students to organizational, managerial, and financial systems that impact dental practice.

DH 3120. General and Oral Pathology. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
Topics in pathology related to dentistry and oral cavity. Oral benign/malignant tumors. Infectious, inflammatory, and immunologically mediated lesions/diseases. prereq: DH student

DH 3121. Local Anesthesia and Pain Management. (2 cr.; A-F only; Every Summer)

DH 3123. Pharmacology. (2 cr.; A-F or Audit; Every Summer)
Principles of pharmacology, physical/chemical properties of drugs, modes of administration, therapeutic/adverse effects, drug actions/interactions. prereq: DH student

DH 3133. Pediatric Dentistry. (1 cr.; A-F or Audit; Every Summer)
Knowledge, skills, and attitudes required for providing dental hygiene care for pediatric patients. prereq: DH student

DH 3151. Oral and Maxillofacial Radiology. (2 cr.; A-F or Audit; Every Spring)
General principles of radiology, radiation physics, dosimetry, biology, radiation protection, regulations, recent concepts of imaging. prereq: DH student

DH 3191. Independent Study. (0 cr.; A-F or Audit; Every Summer)
Clinical experience in dental hygiene care. prereq: DH student

DH 3211. Biomaterials and Principles of Restorative Techniques I. (4 cr. [max 8 cr.]; A-F only; Every Summer)
Principles of biomaterials, restorative techniques. Lecture, preclinical experiences. prereq: DH student

DH 3224W. Dental Hygiene Care Process: Clinical Application IV. (WI; 6 cr.; A-F only; Every Fall)
Knowledge, skills, and attitudes required for providing dental hygiene care for the medically compromised patient, gerodontic patient, and patient with a disability. prereq: Dental hygiene student

DH 3227. Oral and Maxillofacial Radiology Clinic II. (0 cr.; A-F or Audit; Every Fall)
Exposing patient radiographs, interpretation, panoramic/extraoral technique, and quality assurance procedures. prereq: DH student

DH 3228. Ethics and Jurisprudence for the Dental Hygienist. (1 cr.; A-F only; Every Fall)
Ethical decision making, jurisprudence. prereq: Dental hygiene student

DH 3234. Oral and Maxillofacial Radiology: Theory, Principles, and Radiographic Analysis. (1 cr.; A-F only; Every Fall)

DH 3238. Dental Public Health and Academic Service Learning. (3 cr.; A-F only; Every Fall)
Epidemiological methods of investigation, patterns of oral diseases. Scope/content of specialty of dental public health. Emphasizes impact on oral promotion and public health policy. prereq: Matriculated into DH

DH 4100. Dental Professional Development. (2 cr.; A-F only; Every Spring)
Skills to effective practice management and strategic decision-making, promoting mutual trust and respect in all interpersonal interactions, with an emphasis on the roles of a collaborative dental team. prereq: Student must be enrolled in the dental hygiene program.

DH 4125W. Dental Hygiene Care Process: Clinical Application V. (DSJ, WI; 6 cr.; A-F only; Every Spring)
Social justice of health/oral health care in U.S. How race/class/gender impact resources. Dental hygiene treatment to diverse patient populations. prereq: DH student

DH 4128. Oral and Maxillofacial Radiology Clinic III. (0 cr.; A-F or Audit; Every Fall & Spring)
Exposing patient radiographs, interpretation, panoramic/extraoral technique, quality assurance procedures. prereq: DH student

DH 4130. Management and Supervision of a Dental Practice. (2 cr.; A-F only; Every Spring)
Planning, organizing, leading, and controlling clinical, business, and human aspects of dental practice. prereq: Current Dental Hygiene Program student

DH 4135W. Research Methods in Dental Hygiene. (WI; 3 cr.; A-F only; Every Spring)
Scientific method/critiquing scientific literature. Evidence-based decision making, types of research/research design, problem identification/hypothesis development. Analyzing individual components of journal articles, writing lit review. prereq: DH

DH 4136. Periodontology III Lecture. (1 cr.; A-F or Audit; Every Spring)

DH 4139. Dental Public Health and Academic Service Learning II. (2 cr.; A-F only; Every Spring)
Academic service-learning in various community health care settings. Assessment, planning, implementation, and evaluation of a community oral health program. prereq: DH student

**DH 4191. Independent Study.** (0-6 cr.; Student Option; Every Fall, Spring & Summer) Individually arranged study, instruction, or research with faculty to meet student needs/interests. prereq: DH student

**DH 4211. Principles of Restorative Techniques II.** (3 cr.; S-N only; Every Summer) Restorative Techniques. Clinical experiences.

**DH 4226. Dental Hygiene Care Process Clinical Application VI.** (6 cr.; A-F only; Every Spring & Summer) Advanced dental hygiene care process in Comprehensive Care Clinic and service-learning/outreach sites. Students will complete a Capstone project consisting of a comprehensive oral case presentation and written case report. prereq: DH student

**DH 4229. Oral and Maxillofacial Radiology Clinic IV.** (3 cr.; A-F or Audit; Every Summer) Exposing patient radiographs, interpretation, panoramic/extraoral technique, quality assurance procedures. prereq: DH student

**DH 4234. Leadership and Professional Development.** (2 cr.; A-F only; Every Summer) Explore dental hygienist in health care delivery organizations or public health organizations/programs. Current issues that influence practice of dental hygiene. Health care delivery systems, workforce needs, professional associations, state practice acts, legislative process. prereq: 2nd yr student in dental hygiene

**DH 4300. Elective Academic Service Learning Experiences and Internships.** (0-13 cr. [max 78 cr.]; S-N only; Every Fall, Spring & Summer) Volunteer short-term community service experience. Focus on particular aspect of oral health or opportunity to participate in approved international exchange program. prereq: Dental hygiene student

**DH 4310. Foundations of Interprofessional, Professionalism, Communication, and Collaboration.** (1 cr. [max 2 cr.]; S-N only; Every Fall & Summer) Professionalism, communication/collaboration across health professions. Online independent/group work followed by facilitated interprofessional small group discussion of case narratives. prereq: Dental hygiene student

**DH 5201. Management Internship.** (5 cr.; S-N only; Every Fall, Spring & Summer) Supervised experience in oral health care industry. Experience in corporations, health care management organizations, long-term care facilities, publishing firms, or professional organizations. prereq: Dental hygiene grad student

**DH 5203. Capstone Project.** (3 cr.; S-N only; Every Fall, Spring & Summer) Formulation of extensive business plan/project related to area of interest based on coursework taken or internship experience. prereq: Dental hygiene grad student

**DH 5401. Research Methods in Health Sciences.** (3 cr.; A-F only; Every Summer) Developing skills in scientific method. Analyzing research findings. Types of research, problem selection, hypothesis writing, research planning/design, data collection/measuring techniques, analysis/interpretation of data. Ethics. prereq: Dental hygiene grad student

**DH 5403. The Discipline of Dental Hygiene.** (2 cr.; A-F only; Every Summer) Dental hygiene practice grounded in science and guided by research evidence. Etiology, prevention, and treatment of dental caries, periodontal diseases, oral cancer, and other conditions. Advances in technology. prereq: Dental hygiene grad student

**DH 5405. Curriculum and Course Development.** (2 cr. [max 4 cr.]; A-F only; Every Fall) Curriculum/course development/management, competency-based education/outcomes assessment. Role of accreditation in dental hygiene education. Students develop competency-based dental hygiene curriculum/course. prereq: Dental Hygiene grad student

**DH 5407. Instructional Strategies for Effective Teaching.** (2 cr.; A-F only; Every Fall) Application of principles of learning. Learning/teaching styles, student-centered teaching, instructional strategies. Microteaching selected strategies. prereq: Dental hygiene grad student

**DH 5409. Dental Hygiene Clinic Administration.** (2 cr.; A-F only; Every Spring) Theory/practice of dental hygiene preclinic/clinic instruction. Administration of clinic. Developing protocols, calibrating faculty, monitoring student progress, Central Regional Dental Testing Service exam, clinic evaluation mechanisms, quality assurance, prereq: Dental hygiene grad student

**DH 5411. Administrative Leadership and Professional Development.** (2 cr.; A-F only; Every Spring) Application of leadership theory. Models of administrative roles in education, health care, research, and corporate health care settings. Education/organization culture, strategic planning, human resource management/budgeting. Professional development/advancement. prereq: Dental hygiene grad student


**DH 5415. Dental Hygiene Supervised Didactic Course Student Teaching.** (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer) Observation/participation in supervised teaching experience in dental hygiene education under faculty mentorship.

**DH 5420. Master of Dental Hygiene Independent Study.** (0-5 cr. [max 10 cr.]; S-N or Audit; Every Fall, Spring & Summer) Directed study with dental hygiene faculty member on selected topic. prereq: Enrolled master of dental hygiene student

**DH 5421. Grant Writing for Health Professionals.** (1 cr.; A-F only; Every Spring) Introduction to grant writing for health care professionals. Grant sourcing, matching goals/objectives to funding sources, developing evaluation plan, writing proposals, responding to critiques. Effect of economic environment/social responsibility of non-profits. prereq: Enrolled in Dental Hygiene grad program

**DH 7000. Thesis/Capstone Independent Study.** (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Students currently working on thesis or capstone paper. prereq: Dental hygiene grad student

**DH 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

### Dental Therapy (DT)

**DT 3429. Introduction to Psychomotor Skill Development.** (1 cr.; S-N only; Every Fall) Reality based training for psychomotor skills required in prosthodontic/operative courses. Eye-hand/mirror skills, ergonomics used while preparing teeth for restoration. Prereq-Dental therapy student.

**DT 3432. Operative Dentistry I.** (2 cr.; A-F only; Every Summer) How to treat dental caries. Therapeutic treatment of early caries lesion. prereq: 2d yr dental therapy student

**DT 3433. Operative Dentistry I Pre-Clinic Laboratory.** (2 cr.; A-F only; Every Summer) How to treat dental caries. Therapeutic treatment of the underlying pathology. Surgical treatment of early caries lesion. Hands-on projects working with models simulating teeth and surrounding structures. prereq: 2d yr dental therapy student

**DT 3471. Prosthodontic Topics for Dental Therapy.** (2 cr.; S-N only; Every Fall) Lectures, lab projects of selected prosthodontic techniques to enable the dental therapist to provide/cement quality pre-fabricated metal or resin provisional crowns and other procedures in the scope of DT practice.

**DT 3521. Foundations of Interprofessional Professionalism, Communication and Collaboration.** (1 cr.; S-N only; Every Fall, Spring & Summer)
DT 4360. Outreach Experiences in Dental Therapy. (1 cr. [max 2 cr.]; S-N only; Every Fall & Summer)
Students complete six-eight weeks of outreach service at combination of following: Hibbing Community College Dental Clinic; Mobile Dental Unit; NorthPoint Health/Wellness Center; Prairie Winds Dental Clinic; Rice Regional Dental Clinic, or Walker Dental Clinic.

DT 4460. Essentials of Clinical Care I For the Dental Therapist. (3 cr.; S-N only; Every Spring)
Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, pediatric care, and health promotion. Limited care may be given on rotations to oral surgery clinics.

DT 4960. Essentials of Clinical Care II for Dental Therapists. (5-10 cr. [max 20 cr.]; S-N only; Every Summer)
Comprehensive clinical care of assigned patients that may include treatment encompassing periodontics, operative, prosthodontics and endodontics, health promotion disciplines.

DT 5000. Dental Therapy Capstone Project. (0-1 cr.; S-N only; Every Fall & Spring)
In-depth, independent, project-based research topic from interests in oral health. Intensive, active-learning initiative requiring significant effort in planning/implementation. Final written product/oral presentation mandatory, demands extensive systematic investigation/research.

DT 5110. Periodontology I. (; 1 cr.; A-F only; Every Summer)

DT 5130. Preclinical Pediatric Dentistry. (2 cr.; A-F only; Every Fall, Spring & Summer)

DT 5140. Preventive Pediatric Dental Clinic. (1 cr.; A-F only; Every Fall)
Oral health promotion of pediatric patients. Brushing techniques, fluoride application, dietary analysis/counseling. Students interact with parents of pediatric patients.

DT 5141. Clinical Pediatric Dentistry III. (2 cr.; A-F only; Every Fall, Spring & Summer)
Early childhood development, dental care for children. prereq: Must be in the dental therapy program, passed basic foundation competencies

DT 5162. Principles of Exodontia and Minor Oral Surgery. (1 cr.; A-F only; Every Fall & Spring)
Develop knowledge/skill for exodontia/minor oral surgery.

DT 5210. Head and Neck Anatomy. (; 1 cr.; A-F only; Every Fall)
Anatomical nomenclature in head/neck anatomy as they relate to dental therapy treatment. prereq: Accepted into master's dental therapy program

DT 5211. Applied Pharmacology for the Dental Therapist. (2 cr.; A-F only; Every Summer)
Principles of pharmacological drugs used in dentistry, modes of drug administration, therapeutic/adverse effects of drugs. Preparation for pharmacology of local anesthetics. Nitrous oxide sedation, prescription writing.

DT 5212. Local Anesthesia and Pain Management. (2 cr.; A-F or Audit; Every Summer)

DT 5230. Oral and Maxillofacial Radiology. (2 cr.; A-F only; Every Spring)
Production/utilization of radiographs in accordance with good professional judgement, as well as state/federal radiation regulations. Processing radiographs in darkroom. Processing a digital image. Prerequisite: DT 5211.

DT 5231. Oral and Maxillofacial Radiology II. (1 cr.; A-F only; Every Fall)
Use of X-rays in accordance with state/federal radiation regulations. Radiographic assessment of developmental and acquired anomalies of teeth, osseous structures, and maxillary sinus.

DT 5232. Oral and Maxillofacial Radiology Preclinical Laboratory. (; 0 cr.; S-N only; Every Summer)
Preclinical demonstration-participation phases using mounted human skulls.

DT 5241. Oral Radiology Clinic II. (1 cr.; A-F only; Every Fall)
Clinical instruction in oral radiography. Intraoral/extraoral radiographic procedures, evaluations. Prerequisite: Must be in dental therapy masters program

DT 5250. Oral Histology and Embryology. (2 cr.; A-F only; Every Spring)

DT 5251. General and Oral Pathology. (1 cr.; A-F only; Every Summer)
Principles of general and oral pathology with focus on etiology, progression, recognition, and treatment. Overview of diagnostic process and normal clinical findings.

DT 5315. Dental Professional Development. (2 cr.; A-F only; Every Spring)
The purpose of this course is to introduce Dental Therapy students to the multitude of organizational, managerial, and financial systems that impact on the successful dental practice. prereq: Must be in the School of Dentistry DT Program

DT 5320. Comprehensive Care Clinic. (4 cr.; S-N only; Every Spring)
Assessment, treatment, and management of patients. Concepts/principles of evidence-based dentistry as applied to clinical practice.

DT 5321. Treatment Planning for the Dental Therapist. (1 cr.; S-N only; Every Fall, Spring & Summer)
Formal lecture presentations regarding fundamentals of assessment/treatment planning of dental cases. Prepare student to understand University of Minnesota School of Dentistry protocol in development of optimal, alternative, emergency treatment plans.

DT 5330. Clinical Application I. (3 cr.; A-F only; Every Fall)
Assessment principles related to medical/ oral health status. Dental therapy clinical procedures, instrumentation skills. Health assessment, parts of periodontium, dental deposits, toothwear, dental disease/prevention, plaque control. prereq: Accepted into master's dental therapy program

DT 5331. Provider Patient Relationships. (2 cr.; A-F only; Every Spring)

DT 5332. Cariology and Applied Nutrition in Dental Therapy Care. (3 cr.; A-F only; Every Spring)
Dental caries etiology, pathology/prevention. Applying principles of diet/nutrition to dental therapy patient care/counseling.

DT 5333. Dental Public Health and Academic Service Learning I. (3 cr.; A-F only; Every Fall)
Dental therapist as engaged with diverse communities and as professionally responsible and ethical health care provider. Public health approach to disease. Ways in which U.S. oral
health care is delivered. Factors impacting supply/demand. Outreach experiences, service learning.

DT 5334W. Dental Therapy Care Process: Clinical Application II. (WI; 4 cr.; A-F only; Every Fall) Providing dental care for gerodontic patients and patients with disabilities.

DT 5335. Dental Practice Management. (2 cr.; A-F only; Every Spring) Interprofessional course. Organizational, managerial, and financial systems that affect successful dental practice. Prereq: 2nd yr dental therapy student


DT 5337. Dental Public Health and Service Learning II. (2 cr.; A-F only; Every Spring) How to assess, plan, implement, obtain funding for, and evaluate a public health program.


DT 5359. Introduction to Outreach Experiences. (0 cr.; S-N only; Every Fall, Spring & Summer) Provide dental care to underserved populations in various clinical settings throughout Minnesota.

DT 5360. Outreach Experiences I. (1 cr.; S-N only; Every Summer) Students work in clinics outside of U of M with underserved patients.

DT 5361. Outreach Experiences II. (2 cr.; S-N only; Every Fall, Spring & Summer) Experiences that reinforce principles of delivering dental health care/services to patients, including underserved patient populations, in contemporary off-site clinical settings.


DT 5429. Introduction to Psychomotor Skill Development. (1 cr.; S-N only; Every Fall) Virtual reality based training for psychomotor skills required in prosthodontic/operative courses. Eye-hand/mirror skills, ergonomics used while preparing teeth for restoration. Prereq: In dental therapy program.

DT 5430. Oral Anatomy. (2 cr.; A-F only; Every Fall) Morphological characteristics of human dentition, associated contiguous structures. Foundational knowledge applied to situations encountered in general dental clinical practice. Prereq: Accepted into dental therapy masters program

DT 5431. Oral Anatomy Laboratory. (3 cr.; A-F only; Every Fall) Manual dexterity skills, anatomy of human dentition. Prereq: Accepted into masters in dental therapy program


DT 5433. Operative Dentistry I Pre-Clinic Laboratory. (2 cr.; A-F only; Every Fall, Spring & Summer) How to treat dental caries. Therapeutic treatment of underlying pathology. Surgical treatment of early caries lesion. Hands-on projects working with models simulating teeth and surrounding structures. Prereq: 2nd yr masters in dental therapy student

DT 5434. Operative Dentistry II Lecture. (1 cr.; A-F only; Every Fall) How to surgically manage more advanced caries lesions. Transition from pre-clinic lab to clinic setting. Prereq: Enrolled in master’s in dental therapy program

DT 5435. Operative Dentistry II for the Dental Therapist, Lab. (1 cr.; A-F only; Every Fall) More advanced caries lesions: diagnosis, structural preparation, decay removal and restoration.

DT 5436. Operative Dentistry III. (1 cr.; A-F only; Every Fall) Transition of students from the pre-clinic laboratory to the clinic setting. Demonstrate competency in the surgical treatment of dental caries prior to being certified ready for patient care.

DT 5443. Operative Clinic III. (4 cr.; A-F only; Every Fall, Spring & Summer) How to place restorations. Students place single-tooth restorations on patients.

DT 5460. Essentials of Clinical Care I For the Dental Therapist. (10 cr.; S-N only; Every Fall) Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, pediatric care, and health promotion. Limited care may be given on rotations to oral surgery clinics.

DT 5471. Prosthodontic Topics for Dental Therapy. (2 cr.; S-N only; Every Summer) Lectures, lab projects of selected prosthodontic techniques to enable the dental therapist to provide/cement quality pre-fabricated metal or resin provisional crowns and other prosthodontic procedures in the scope of DT practice.

DT 5521. Foundations of Interprofessional Professionalism, Communication, and Collaboration. (1 cr.; S-N only; Every Fall, Spring & Summer) Professionalism, communication/collaboration across health professions. Online independent/group work followed by facilitated interprofessional small group discussions of case narratives.

DT 5600. Dental Therapy Elective Regional Volunteer Experience. (0 cr.; S-N only; Every Fall, Spring & Summer) Elective course that offers various volunteer experiences to the dental therapy students. The course is designed to expose the students to different clinical settings outside of the School of Dentistry (e.g., school-A based care, Mission of Mercy). Participants will be allowed to complete dental services under the supervision of a Minnesota licensed dental practitioner with a faculty appointment. Experienced gained will broaden students’ perspective of public health needs, delivery care models and/or the impact of health policies. Students reflect on their experience and what they learned by writing a reflective paper.

DT 5960. Essentials of Clinical Care II for the Dental Therapist. (5-10 cr. [max 20 cr.]; S-N only; Every Summer) Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, pediatric care, and health promotion. Limited care may be given on rotations to oral surgery clinics.

DT 6164. Principles of Exodontia and Minor Oral Surgery for the ADT student. (1 cr.; [max 2 cr.]; A-F only; Every Fall, Spring & Summer) This course develops knowledge and skill in the advanced dental therapy (ADT) student in exodontia and minor oral surgery.

DT 6321. Treatment Planning. (2 cr.; A-F only; Every Fall) Fundamentals of assessment/dental treatment planning using University of Minnesota School of Dentistry protocol in developing optimal, alternative, emergency treatment plans. Case-based treatment planning/small group seminars utilized.

DT 6338. Research Methods. (3 cr.; A-F only; Every Spring) This course will prepare the dental therapist to identify research methods and find supporting evidence-based dentistry.

DT 6340. Advanced Dental Therapy Prep Clinic. (10 cr.; A-F only; Every Fall) Preparation for licensed dental therapists to be eligible for advanced dental therapy certification. Course has four requirements: completion of designated clinic hours, self-assessment records, faculty assessment records, final interview that can be completed with patients from student’s place of employment.

DT 6341. Advanced Dental Therapy Prep Lecture. (2 cr.; A-F only; Every Fall) Preparation for licensed dental therapists to become eligible for advanced dental therapy certification. Topics range from essential basic sciences to specific clinical procedures. Prereq: Must be a licensed dental therapist who was originally trained at the University of Minnesota, School of Dentistry.
DENT 6113. Oral Radiology Clinic III. ( ; 2 cr. ; A-F or Audit; Every Fall, Spring & Summer) This course consists of radiographing dental school patients, radiographic interpretations, panoramic and extraoral technique seminars and quality assurance procedures.

DENT 6225. Advanced Oral and Maxillofacial Surgery Elective. ( ; 1-5 cr. ; S-N or Audit; Every Fall) Diagnosis/treatment of dentoalveolar pathology. 25-125 contact hours.

DENT 6230. Oral and Maxillofacial Surgery Externship Elective. ( ; 0 cr. ; S-N or Audit; Periodic Fall & Spring) Students gain additional surgical experiences and determine if career in oral/maxillofacial surgery is desirable. prereq: Interview with externship dir, letter stating student registered in good standing at ADA-accredited dental school; experience in dentoalveolar surgery procedures preferred.

DENT 6231. Hospital Dentistry Clinic Rotation. ( ; 0 cr. ; S-N or Audit; Every Fall) Managing hospitalized patients, operating room protocol, patient admission and discharge, and ambulatory patients.

DENT 6232. Hospital Dentistry Clinic Rotation. ( ; 1 cr. ; S-N or Audit; Every Fall & Spring) Managing hospitalized patients, operating room protocol, admission/discharge of patients, ambulatory patients.

DENT 6319. Surgical and Clinical Oral and Maxillofacial Pathology. ( ; 1-10 cr. ; S-N or Audit; Periodic Fall & Spring) This elective involves spending time with Division of Oral and Maxillofacial Pathology faculty while they diagnose surgical pathology cases and see clinical oral pathology referral patients.

DENT 6470. Health Ecology Elective. ( ; 1-10 cr. ; Student Option; Every Fall & Spring) Highly motivated students earn academic credit for activities in special-interest areas.

DENT 6480. Advanced General Dentistry Elective. ( ; 1-10 cr. ; Student Option; Every Fall, Spring & Summer) Block rotations of 2 to 10 weeks in selected special clinics and programs such as prisons, regional treatment centers, and migrant worker health care programs.

DENT 6490. Health Ecology: Independent Study. ( ; 1-10 cr. ; Student Option; Every Fall & Spring) Arranged with any Health Ecology faculty member.

DENT 6591. Pediatric Dentistry Independent Study. ( ; 2 cr. ; Student Option;) Students may be assigned independent projects or additional clinical experiences in pediatric dentistry.

DENT 6713. Endodontics: Independent Study. ( ; 2 cr. ; A-F or Audit; Every Fall & Summer) Has three phases: case presentations, literature review, laboratory, prereq: Completion of 3rd yr of dental school, dept consent

DENT 6715. Advanced Endodontic Elective. ( ; 0 cr. ; S-N only; Every Fall) Current data relevant to methods/materials in endodontic dentistry.

DENT 6931. Application of Occlusal Apparatuses. ( ; 1 cr. ; S-N only; Every Fall & Spring) Focuses on fabrication, application, and adjustment of occlusal applicances. Clinical, lab, and practice issues.

DENT 7000. Dental Clinic. ( ; 1-6 cr. ; Student Option; Periodic Fall, Spring & Summer)

DENT 7021. Contemporary Diagnosis and Management of Orofacial Pain. ( ; 1 cr. ; A-F only; Every Spring) Pain mechanisms, pathways, and assessment of orofacial pain. Pharmacology of pain and strategies for effective pre- and post-operative pain management.

DENT 7031. Advanced Seminar in Clinical Geriatric Dentistry. ( ; 1-2 cr. ; S-N or Audit; Every Fall) Oral health problems in elderly, clinical implications of biological aging changes, geriatric medical concerns, medical risk assessment, medication issues, ethical/legal concerns, dental management of patients in long-term care settings. prereq: [Advanced or grad] student in [dentistry or other AHC discipline]

DENT 7032. Field Experience: Administration in a Multidisciplinary Health Center. ( ; 1-3 cr. ; Student Option; Every Spring & Summer) Administrative and management issues in a multidisciplinary health care environment. Student placement with faculty approval and oversight at the Amherst H. Wilder Senior Health Clinic or other sites. Project emphasis on strategic planning, organizational structure, budgeting and financial management, personnel management, communications, quality assurance activities, or other topics.

DENT 7033. Teaching and Evaluation in Dentistry. ( ; 3 cr. ; A-F or Audit; Every Spring) Application of educational and psychological principles to professional dental education. Design and implementation of curricular components based on principles of learning and instruction. Review of evaluation and measurement theories and practices in the context of student performance and assessment. Survey of program evaluation methods. prereq: Dent or QBio grad student or instr consent


DENT 7052. Oral and Maxillofacial Radiologic Interpretation. ( 2 cr. ; A-F or Audit; Periodic Fall & Spring) Use of oral/maxillofacial radiology as diagnostic tool. Recognizing radiographic patterns of normal tissues. Detecting/evaluating radiographic evidence of deviations from normal patterns. Using radiographs, other procedures, to develop differential/tentative/final diagnosis/treatment plan/prognosis. Emphasizes using concepts of oral/general pathology, basic biological science courses, to understand/evaluate disease process.

DENT 7061. Special Oral Pathology I. ( ; 1 cr. ; S-N only; Every Fall & Spring) Review of clinical, radiographic, and treatment aspects of oral disease and oral manifestations of systemic disease. prereq: Resident [or grad student] in discipline other than oral pathology

DENT 7062. Special Oral Pathology II. ( ; 1 cr. ; [max 2 cr.]; S-N only; Every Spring) Review of the clinical, radiographic, and treatment aspects of oral disease and oral manifestations of systemic disease. prereq-7061, resident [or grad student] in discipline other than oral pathology.

DENT 7071. Geriatric Dentistry Elective. ( ; 1 cr. ; S-N or Audit; Every Fall & Spring) Seminar on philosophy and techniques used in the administration and management of offices for dental specialists. prereq: Dentistry grad student

DENT 7072. Conscious Sedation. ( ; 2 cr. ; A-F only; Every Fall) Oral, inhalation, and intravenous sedation for dental patients. Topics include patient selection and physical risk assessment; selection and administration of sedative agents; and prevention, recognition, and management of medical emergencies. prereq: Dentistry grad student

DENT 7111. Current Literature Review in Dentistry. ( 2 cr. ; A-F only; Periodic Fall) Current literature in dentistry and related disciplines. Formal setting for students to meet and review current literature that is of significance to all. prereq: Grad student in [dentistry or oral biology] or instr consent

DENT 7112. Treatment Planning Seminar. ( ; 2 cr. ; [max 4 cr.]; A-F or Audit; Every Fall & Spring) Multidisciplinary format for discussion of complex dental patients. Evaluating, diagnosing, and developing a comprehensive treatment plan for complex dental patients.

DENT 7121. Psychological Issues in Medical and Dental Patient Management. ( ; 1 cr. ; Student Option; Every Fall & Spring)
Psychological issues in medical and dental evaluation and treatment, psychopathology, stress, and illness.

**DENT 7123. Temporomandibular Disorders and Orofacial Pain.** (1 cr.; A-F or Audit; Every Fall) Basic didactic information needed to recognize/manage patients with temporomandibular disorders. Overview of scope/complexity of clinical practice of TMD/Orofacial Pain management.

**DENT 7220. Prosthetically-Driven Implant Surgery and Treatment Planning.** (1 cr.; A-F only; Every Fall) Patient selection, treatment planning for implant therapy. Indications/contra-indications of various types of implants, treatment planning, implant surgery, bone grafting procedures. prereq: Prosthodontics resident

**DENT 7411. Dental Biomaterials in Prosthodontics.** (1 cr.; A-F only; Summer Odd Year) Understanding structure-properties relationship. Role/performance of synthetic materials in living environment.

**DENT 7991. Independent Study.** (; 1-4 cr. [max 8 cr.]; Student Option No Audit; Every Fall, Spring & Summer) Individualized study under supervision of graduate faculty member in MS-Dentistry Program. Focus determined by faculty and student. prereq: Enrolled in an advanced dental education program

**DENT 7993. Curricular Practical Training Elective.** (1 cr. [max 4 cr.]; S-N only; Every Fall, Spring & Summer) This course is an elective internship or employment to gain practical work experience, advance professional skills and explore career interests.

**DENT 8031. Topics and Problems in Dental Education.** (; 1-3 cr.; Student Option; Every Spring & Summer) Independent study in student learning, instructional development, curriculum planning, student testing and evaluation, and academic administration, where these areas and their interfaces are applied directly to professional dental education. Provides opportunity for applying and extending concepts learned in Dent 7033.

**DENT 8090. Evidence-based Clinical Pediatric Dentistry.** (; 2 cr.; A-F or Audit; Every Fall, Spring & Summer) Selected pediatric dentistry topics. In-depth literature review, seminar discussion.

**DENT 8091. Interdisciplinary Care of the Cleft Palate Patient.** (; 1 cr.; S-N or Audit; Every Summer) Comprehensive surgical, dental, and speech and hearing evaluation and management of patients with cleft lip and palate.

**DENT 8100. Topics in Advanced Periodontology: Literature Review.** (; 2 cr.; Student Option; Every Fall, Spring & Summer) State-of-the-art information on a variety of topics concerning risk factors and therapeutic modalities for periodontal disease.

**DENT 8101. Dental Implantology: A Multidisciplinary Approach.** (; 2 cr.; Student Option; Every Fall & Summer) Dental implant therapy from perspective of several dental disciplines.

**DENT 8120. Advanced Principles and Techniques of Orofacial Pain Disorders.** (3 cr.; A-F or Audit; Every Spring) Interdisciplinary study of theory, principles, epidemiology, mechanisms associated with TMJ/craniofacial pain disorders. Basis for scientific understanding of diagnostic/management strategies. prereq: Participation in TMJ, orofacial pain advanced education program

**DENT 8121. Current Literature in TMD and Orofacial Pain.** (1 cr.; A-F or Audit; Every Fall, Spring & Summer) Review of current literature/how it relates to past literature. Theories on pain, philosophies of management.

**DENT 8123. Advanced Topics in Orofacial Pain.** (; 3 cr.; A-F or Audit; Every Spring) Review of cutting edge research and clinical findings regarding etiology/treatment of acute/chronic orofacial pain conditions and related disorders. prereq: Grad student in dentistry or other health sciences grad student or instructor

**DENT 8200. Dental Clinic for Oncology Fellows.** (13 cr.; S-N only; Every Fall, Spring & Summer) Train oral/maxillofacial surgeons in principals/practice of head/neck oncology. Treatment of benign/malignant disease including salivary gland tumors. Training will emphasize multidisciplinary care of head/neck oncology patient.

**DENT 8333. FTE: Master’s.** (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

**DENT 8777. Thesis Credits: Master’s.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

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**Dermatologist (DERM)**

**DERM 7182. Hospital Preceptorship in Dermatology.** (2-3 cr.; H-N or Audit; Every Fall, Spring & Summer) Most of the teaching and learning is accomplished by daily patient care activities at one of four affiliated hospitals. Each student participates in the regularly scheduled weekly didactic conferences in the department. Independent study is expected and encouraged. This elective is useful to the student planning a career in a primary care specialty or dermatology.

**DERM 7183. Advanced Course in Dermatology.** (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This elective is a continuation of Derm 7-182. It provides the opportunity for increased experience in patient diagnosis and therapy both in outpatient and inpatient settings. This elective might be appropriate for the student considering a career in dermatology or who desires additional training for use in a primary care career. prereq: 7182

**DERM 7185. Research in Dermatology.** (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer) An introduction to research in dermatology. The student pursues a research project through clinical or laboratory research. The specific project is individually formulated by the student and faculty. As time permits during this course, the student is invited to attend research and teaching conferences conducted by the Department of Dermatology.

**DERM 7910. Dermatology Medical Residency.** (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer) Dermatology medical residency.

**DERM 7920. Medicine/Dermatology Medical Residency.** (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer) Medicine/dermatology medical residency.

**DERM 7930. Dermatology Medical Fellowship.** (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer) Dermatology medical fellowship.

**Design (DES)**

**DES 1000. D@MN: Design@Minnesota.** (AH; 3 cr.; A-F only; Every Spring) Applications of design thinking/design process. Understanding design as consumers, customers, possible future clients.

**DES 1101V. Honors: Introduction to Design Thinking.** (AH, WI; 4 cr.; A-F only; Every Fall & Spring) Theories/processes that underpin design thinking. Interactions between humans and their natural, social, and designed environments where purposeful design helps determine quality of interaction. Design professions. prereq: Honors student
DES 1101W. Introduction to Design Thinking. (AH;WI; 4 cr.; A-F only; Every Fall & Spring)

Theories/processes that underpin design thinking. Interactions between humans and their natural, social, and designed environments where purposeful design helps determine quality of interaction. Design professions.

DES 1111. Creative Problem Solving. (3 cr.; A-F only; Every Fall)

Development of creative capability applicable to all fields of study. Problem solving techniques. Theory of creativity/innovation.

DES 1111H. Honors: Creative Problem Solving. (3 cr.; A-F only; Every Fall)

Development of creative capability applicable to all fields of study. Problem solving techniques. Theory of creativity/innovation. prereq: Honors

DES 1202. Discovering Majors and Careers. (; 1 cr.; A-F only; Every Spring)

Five stages in the career discovery process: self-assessment, exploration, decision making, experiencing, and implementing. Determining next steps in academic/career process.

DES 1902. Freshman Seminar. (DS;L: 2-3 cr. [max 9 cr.]; A-F only; Periodic Fall & Spring)

Freshman Seminar

DES 1904. Freshman Seminar. (GP; 2-3 cr. [max 6 cr.]; A-F only; Periodic Fall & Spring)

Topics specified in Class Schedule. prereq: Fr

DES 1905. Freshman Seminar. (; 2-3 cr.; A-F only; Every Fall & Spring)

Topics in design.

DES 1909W. Freshman Seminar. (GP;WI; 2-3 cr. [max 6 cr.]; A-F only; Periodic Fall & Spring)

Topics in design. prereq: Fr

DES 1910W. Freshman Seminar. (WI; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)

Topics in design: building vision.

DES 2101. Design and Visual Presentation. (; 2 cr.; A-F only; Every Fall & Spring)

Introduction to visual design. Development of visual design skills. Visual presentation methods. Lectures, design exercises, discussion.

DES 3131. User Experience in Design. (4 cr.; A-F only; Every Fall)

Introduction to theories/principles of human interaction with designed objects. Focuses on affect/emotional quality of designs. Objects, interfaces, environments. Digitally mediated experiences.

DES 3132. Service Design Studio. (3 cr.; A-F or Audit; Every Fall)

Systems-based approach towards service design. Course emphasis placed on the articulation of a service through concept mapping, blueprints, and user touch points.

DES 3141. Technology, Design, and Society. (TS; 3 cr.; A-F only; Every Spring)

Explore/evaluate impact of technology/design on humans, societies. How design innovation shapes cultures. How people use technology to shape design, adoption, use of designed products/environments through consumerism/ethical values.

DES 3160. Topics in Design. (; 1-4 cr. [max 24 cr.]; A-F only; Every Fall, Spring & Summer)

Topics in Design.

DES 3170. Topics in Design. (; 1-4 cr. [max 32 cr.]; A-F or Audit; Every Fall, Spring & Summer)

In-depth investigation of specific topic.

DES 3196. Field Study: National or International. (; 1-10 cr.; A-F or Audit; Every Fall, Spring & Summer)

Faculty-directed field study in national or international setting.

DES 3201. Career and Internship Preparation for Design. (1 cr.; A-F only; Every Fall & Spring)

Research career opportunities and organizations related to industry. Set career goals based on skills and interests. Identify job search skills to secure internships. Implement transition from college to employment. prereq: Premaj.

DES 3309. Storytelling and Design. (3 cr.; A-F only; Every Fall & Spring)


DES 3311. Travels in Typography. (3 cr.; A-F only; Every Fall & Spring)

Using collection in James Ford Bell Library, students study rare book/map collections and undertake hands-on exercises on history of type, including developments in typesetting, calligraphy, and letterpress printing.

DES 3321. Furniture Design: Exploration. (3 cr.; A-F only; Every Fall)

Furniture design as discipline, not as method. Material. Objects that mediate our environment. History, design criteria, technology, craft. Group case study, research presentation, individual making/presenting of concept-prototype.

DES 3331. Street Life Urban Design Seminar. (3 cr.; A-F only; Every Spring)

The street as part of network of urban systems/fragments: sidewalks, private interiors, curbs, terraces, boulevards, parking lots, bus stops, public institutions, urban architectures, utility lines, storm/sewer systems, groundwater, satellite communication systems, gardens, and lighting. Readings in urban studies, geography, design, economics and art history. Students review case studies, envision possible transformations of streets/street life.

DES 3341. (un)Wrapping It Up: New Materials for Design. Design for New Materials. (3 cr.; A-F only; Periodic Spring)

New high-tech fabrics, foils, electrotextiles, "intelligent textiles" that respond to environmental stimuli. Hands-on materials research, testing of prototypes. Cross-disciplinary teams explore appropriate modeling/applications. Integrated project.

DES 3351. Phenomenon of Everyday Design. (3 cr.; A-F or Audit; Periodic Fall)

Examines the growing fascination with design in everyday life. From Target to IKEA, from TIME magazine to the New York Times Sunday supplement, interest in the designer and designed object are permeating popular culture. Implications of this phenomenon in the present and historical precedents for the "design in everyday life" concept.

DES 4160. Topics in Design. (; 1-4 cr. [max 24 cr.]; A-F only; Every Fall, Spring & Summer)

In-depth investigation of single specific topic announced in advance.

DES 4165. Design and Globalization. (DSJ; 3 cr.; A-F or Audit; Every Fall)

Movement of people, products, and ideas. Challenges brought by differences among us. prereq: Jr or sr

DES 4193. Directed Study in Design. (; 1-6 cr. [max 36 cr.]; A-F only; Every Fall, Spring & Summer)

Directed Study in Design prereq: dept consent.

DES 4301. Metaphor and Design. (3 cr.; A-F only; Every Fall & Spring)

Analyze role of metaphors/related tropes when conceptualizing meanings within designed environment. How fundamental/newly emerging metaphorical conceptualizations shape designed spaces, products, images. Create summary statement of significant learning insight.

DES 5160. Topics in Design. (; 1-4 cr. [max 24 cr.]; A-F only; Every Fall, Spring & Summer)

Topics in design

DES 5165. Design and Globalization. (; 3 cr.; A-F or Audit; Every Fall)

Movement of people, products, and ideas. Challenges brought by differences among us. prereq: Grad student

DES 5168. Evidence-Based Design. (3 cr.; A-F or Audit; Every Fall)

Origins of evidence-based design/possible benefits and detractors. Students learn various components as a process/ explore methods of integrating process via application to a design project in their area of expertise. Process, impact, influences, and anticipated outcomes are documented/ analyzed as compared to a typical design process approach. prereq: CDes grad student or instr consent

DES 5170. Topics in Design. (; 1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer)

In-depth investigation of single specific topic, announced in advance.

DES 5185. Human Factors in Design. (; 3 cr.; A-F or Audit; Periodic Fall)
Theories/methods that influence the assessment of physical, social, and psychological human factors. Development of user needs with application to designed products that interact with human body. prereq: Grad student or sr or instr consent

**DES 5193. Directed Study in Design.** (; 1-6 cr. ; max 36 cr.; A-F only; Every Fall, Spring & Summer)

Directed Study in Design prereq: dept consent

**DES 5196. Field Study: National/International.** (; 1-10 cr.; A-F or Audit; Every Fall, Spring & Summer)

Faculty-directed field study in a national or international setting.

**DES 5201. Career and Job Search Preparation for Graduate Students.** (1 cr.; S-N only; Every Fall & Spring)

Job search/career development tools. Goals, networking, job search, resume/CV, interviewing. Assignments include resume/CV, informational interview, career development plan. prereq: Grad student

**DES 8102. Quantitative Research Methods.** (; 3 cr.; A-F only; Fall Every Year)

Quantitative research methods for issues related to humans, their behaviors, and everyday living in the designed environment.

**DES 8103. Qualitative and Mixed Methods Research.** (; 3 cr.; A-F or Audit; Fall Odd Year)

A scientific approach to qualitative research. Methods/strategies combined to explore complex research questions.

**DES 8112. Design Theory.** (; 3 cr.; A-F or Audit; Spring Even Year)


**DES 8113. Teaching and Assessment.** (; 2 cr.; A-F or Audit; Fall Odd Year)


**DES 8114. Design Studio.** (; 4 cr.; A-F or Audit; Spring Even Year)

Advanced problem analysis, design solution. prereq: Design grad student or instr consent

**DES 8115. Grant Writing.** (; 2 cr.; A-F or Audit; Fall Even Year)

Interdisciplinary course.

**DES 8151. Product Development.** (; 3 cr.; A-F only; Spring Odd Year)

Product development theories/methods as applied in many design fields. Emphasizes retail setting. Seminar format discussion, case studies, observation/critique of hands-on industry product development project.

**DES 8164. Innovation Theory and Analysis.** (; 3 cr.; A-F or Audit; Spring Odd Year)

Theories and factors that influence adoption and diffusion of designed products.

Methodologies used in analysis of diffusion process.

**DES 8166. Material Culture and Design.** (; 3 cr.; A-F or Audit; Periodic Spring)

Research approaches to material culture study using artifacts from Goldstein Museum of Design. prereq: [DHA or DES] grad student or instr consent

**DES 8167. Aesthetics of Design.** (; 3 cr.; A-F or Audit; Periodic Spring)

How we perceive, analyze, value, and evaluate design outcomes/results.

**DES 8170. Topics in Design.** (; 1-3 cr.; max 6 cr.; A-F or Audit; Every Fall & Spring)

In-depth investigation of topic announced in advance.

**DES 8181. Research Ethics.** (; 1 cr.; S-N or Audit; Every Spring)

Overview of ethical concerns/questions in conducting/disseminating research. Mentoring relationships, use of human subjects, data handling, plagiarism, authorship, publishing, research funding, social responsibility of researchers, code of conduct. prereq: Grad student

**DES 8333. FTE: Master's.** (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)

No description prereq: Master's student, adviser and DGS consent

**DES 8444. FTE: Doctoral.** (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)

No description prereq: Doctoral student, adviser and DGS consent

**DES 8666. Doctoral Pre-Thesis Credits.** (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)

Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 50 combined cr

**DES 8777. Thesis Credits: Master's.** (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)

No description prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**DES 8888. Thesis Credit: Doctoral.** (; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)

No description prereq: Max 18 cr per semester or summer; 24 cr required

**DSSC 8111. Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change.** (3 cr.; S-N or Audit; Every Fall)

Approaches practiced by physical, biological, social science, and humanities scholars. "Ways of knowing" in different cultures/groups. Issues/methodological challenges facing interdisciplinary/international studies. Taught by faculty from biological, social sciences, and humanities. prereq: Grad DSSC minor or instr consent

**DSSC 8112. Scholarship and Public Responsibility.** (1 cr. [max 2 cr.]; S-N only; Every Spring)

Seminar. Concerns/themes relevant to public engagement in academic work. Diverse practices of reading, writing, and pedagogy. Privileged locations of knowledge. Tactics of civil society organizing. Politics of collaborative work. prereq: Grad DSSC minor or instr consent

**DSSC 8211. Doctoral Research Workshop in Development Studies and Social Change.** (; 2 cr.; S-N or Audit; Every Fall)

Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Taken during the year before undertaking field research, typically the third year of graduate study. prereq: Grad DSSC minor or instr consent

**DSSC 8212. Doctoral Research Workshop in Development Studies and Social Change.** (; 1 cr.; S-N or Audit; Every Spring)

Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Taken during the year before undertaking field research, typically the third year of graduate study. prereq: Grad DSSC minor or instr consent

**DSSC 8310. Topics in Development Studies and Social Change.** (; 1-3 cr. [max 9 cr.]; S-N only; Every Fall & Spring)

Seven-week to full semester seminar. Topical issues in development and social change.

**Doctor of Dental Surgery (DDS)**

**DDS 6111. Periodontology I Lecture.** (; 1.5 cr.; A-F only; Every Summer)


**DDS 6112. Periodontology II: Technique.** (; 2 cr.; A-F or Audit; Every Fall)

Presurgical procedures in periodontics. Clinical skills to examine, diagnose, prevent, and treat periodontal patients. Prereq-In DDS program.

**DDS 6113. Periodontology III Lecture.** (; 1.5 cr.; A-F only; Every Spring)

Clinical procedures associated with surgical phase of periodontal therapy, including implants. Evaluation of periodontal treatment, maintenance phase, relationship between periodontics and other disciplines in dentistry. Clinical research. Integrating periodontics into general practice.

**DDS 6114. Clinical Pharmacology Correlations in Dentistry.** (; 1 cr.; A-F only; Every Summer)

Pharmacologic therapeutic areas with potential clinical relevance in dentistry. Application to

DDS 6121. Periodontology Clinic. (2 cr.; A-F or Audit; Every Spring) Nonsurgical and surgical treatment of periodontal diseases, evaluation of periodontal therapy, implementation of maintenance programs.

DDS 6122. Periodontology Clinic. (4 cr.; A-F only; Every Spring) Nonsurgical and surgical treatment of periodontal diseases, evaluation of periodontal therapy, and implementation of maintenance programs.

DDS 6130. Introduction to Clinical Dentistry. (2.2 cr. [max 20 cr.]; S-N only; Every Summer) Methods/procedures consistent with preclinical teaching in traditional predental program. Prereq: Enrolled in PASS

DDS 6131. Pediatric Dentistry Pre-Clinic. (1.7 cr.; A-F or Audit; Every Spring & Summer) Physical, emotional, dental, and language development. Diagnosis, prevention, and management of oral diseases in children.

DDS 6141. Pediatric Dentistry Clinic. (3.6 cr.; A-F only; Every Fall, Spring & Summer) Preventive/clinical topics/techniques. Diagnosis, treatment planning, and clinical treatment of pediatric patients. Prereq-3rd yr DDS student.

DDS 6151. Pain and Anxiety Control. (1.2 cr.; A-F or Audit; Every Spring & Summer) Didactic/clinical aspects of pain/anxiety control as pertains to dentistry. Emphasizes use of local anesthetics, conscious sedation (nitrous oxide inhalation). Acute/chronic pain mechanisms, neuropathic pain, issues pertaining to narcotic/other drug abuse.

DDS 6152. Oral and Maxillofacial Surgery I. (1.1 cr.; A-F only; Every Fall) Introduction to concepts of oral/maxillofacial surgery. Emphasizes fundamental skills of oral surgery that apply to practice of general dentistry.

DDS 6153. Oral and Maxillofacial Surgery II. (1.2 cr.; A-F only; Every Spring) Fundamental clinical/diagnostic skills that apply to practice of general dentistry. Surgical procedures, complications, facial fractures, congenital abnormalities. Prereq-Oral Surgery I.

DDS 6161. Oral & Maxillofacial Surgery Clinic Rotation. (2.5 cr.; S-N or Audit; Every Spring) Oral Surgery Clinic experience.

DDS 6171. Orthodontics I. (2.7 cr.; A-F only; Every Fall) Supervision, guidance, and correction of growing or mature dentofacial structures. Growth/development of craniofacial structures. Diagnostic methods, biology of tooth movement and biomechanics. Clinical diagnosis, treatment planning.

DDS 6172. Orthodontics II. (1.5 cr.; A-F only; Every Spring) Lectures examine clinical management of specific orthodontic problems; and principles and procedures in preventative, interceptive, and corrective orthodontics examined through case analysis and treatment planning. Lab covers practical applications of developing occlusion phase; and fundamentals of orthodontic appliances.

DDS 6181. Orthodontic Clinic Rotation. (1 cr.; S-N or Audit; Every Fall & Spring) Diagnosis, treatment timing, and treatment objectives; skills required to perform orthodontic procedures.

DDS 6211. Introduction to Oral Biology. (0.6 cr.; S-N only; Every Spring) Biology of the mouth. Broad overview of current information on the following topics: plaque microbiology, bone growth and remodeling, oral diseases, bad breath, and amalgam fillings. Prereq-1st yr [DDS or DT student].

DDS 6212. Topics in Dental Biochemistry. (1.1 cr.; A-F only; Every Spring) Biological, chemical, and biochemical phenomena in oral cavity and their interrelationships. Biological/chemical basis of dental caries. How saliva, dental plaque, and plaque fluid interact with and impact caries process. Metabolic handling, anticaries mechanisms of fluoride. Prereq-1st yr [DDS or DT student].


DDS 6214. General Histology. (3 cr.; A-F or Audit; Every Fall) Structure/function of cells, tissues, and organs. Prereq-Accept into DDS program.


DDS 6231. Physical Evaluation I. (2.9 cr.; A-F only; Every Spring) Concepts of diagnosis and patient evaluation for exam of patients in various adult clinical programs in School of Dentistry. Prereq: 1st yr [DDS or DT student].

DDS 6232. Physical Evaluation II. (2.2 cr.; A-F or Audit; Every Fall) Lecture and case-based series designed to review physical evaluation of common medical/systemic problems of patient management and care based on principles of medical management, thorough evaluation, and recognition of the medically compromised patient. Includes acute management of medical emergencies in dental practice.


DDS 6234. Radiographic Interpretation. (2 cr.; A-F only; Every Fall) Dental record keeping. Documentation/analysis of medical/clinical findings. Patient's rights, informed consent. Radiographic interpretation of deviations from normal. Prereq-In DDS program.

DDS 6235. Oral Radiology Preclinical Lab I. (0.9 cr.; S-N only; Every Fall) Preclinical demonstration-participation phases in radiographic technique, using mounted human skulls. Prereq-In DDS program.


DDS 6243. Oral Radiology Clinic. (0.5 cr.; S-N only; Every Fall & Spring) Radiographing dental school patients, radiographic interpretations, panoramic/extraoral technique seminars, quality assurance procedures. Prereq-3rd yr DDS student.

DDS 6244. Oral Radiology Clinic II. (0.5 cr.; S-N only; Every Spring) This course consists of radiographing dental school patients, radiographic interpretations, panoramic and extraoral technique seminars and quality assurance procedures.

DDS 6251. Oral Histology and Embryology and Medical Genetics. (2.6 cr.; A-F only; Every Spring) Embryologic development and histologic structure of tissues in the head, face, and mouth with emphasis on clinical correlations, principles of medical genetics, complex traits of the orofacial region, and genetic contributions to oral diseases.

DDS 6252. Oral and Maxillofacial Pathology. (3.1 cr.; A-F or Audit; Every Fall & Spring) Recognizing, diagnosing, and managing diseases with maxillofacial, oral, or dental manifestations. Deductive approaches to identifying associated diseases.

DDS 6253. Pathology for Dental Students. (5 cr.; A-F only; Every Fall) Pathologic principles necessary for understanding oral pathology. Diseases that manifest in or around oral cavity/systemic diseases impacting health of patients.

DDS 6271. TMD & Orofacial Pain. (1 cr.; A-F or Audit; Every Fall & Summer)
Evaluation and differential diagnosis of temporomandibular and orofacial pain disorders. Rehabilitation treatment strategies for the most common TM disorders, including splints, physical therapy, behavioral therapy, and medications.

DDS 6310. Introduction to Dental Clinics. (1 cr. ; S-N only; Every Fall)
This course is designed to expose the first year doctor of dental surgery students to clinical activities early in their dental training. It will allow students to become oriented to the clinics, dispensary personnel, clinic supplies and patient communication. Students will be trained in infection control and the care of standard dental equipment and instruments. It will also provide modeling of appropriate professional demeanor, attitude and interactions with other dentists, student operators and patients. Each student will be assigned to 10 - 3 hours assisting sessions.

DDS 6312. Comprehensive Care Clinic I. (4 cr. ; S-N only; Every Spring)
Application of clinical knowledge, skills, and the principles of care to the comprehensive assessment, diagnosis, treatment planning, treatment, and management of patients.

DDS 6313. Comprehensive Care Clinic II. (4 cr. ; S-N only; Every Spring)
Patient management skills. Diagnosis, treatment planning, delivery of comprehensive care, efficient use of clinic time. Prereq: 6050.

DDS 6314. Treatment Planning and Introduction to Patient Care. (4.1 cr. ; S-N or Audit; Every Spring & Summer)

DDS 6322. Treatment Planning Clinic II. (1 cr. ; A-F or Audit; Every Spring)
device initial plan from established database; make case presentation; develop final treatment plan, informed consent and appointment plan; and make financial arrangements. Prereq: Patient Management II Resource Workbook

DDS 6325. Dental Professional Development I. (1 cr. ; S-N only; Every Fall & Spring)
First of a series that prepares the student in professionalism and practice management. Uses self-assessment and strategic planning to lead students to identify personal and professional aspirations. Four sequential levels of learning creating progressively higher levels of competence using a blended-learning format including online education, simulations and self-directed learning.

DDS 6326. Dental Professional Development II. (1 cr. ; S-N only; Every Summer)
Focuses on Career Planning, Personal Strategic Planning, Personal Finance and Debt Management. Students apply principles and tools learned to their future professional practice and career.

DDS 6327. Dental Professional Development III. (2 cr. ; S-N only; Every Spring)
This course focuses on preparing the student in professionalism, critical thinking, problem solving and practice management. It uses a blended-learning format that includes online education, simulations and self-directed learning. It lays the groundwork for students to develop day-to-day leadership skills needed to operate a successful dental practice.

DDS 6328. Dental Professional Development IV. (1 cr. ; S-N only; Every Summer)
Fourth and final course sequence in Dental Professional Development. Focuses on completing business plans and refining personal and professional strategic plans applying skills learned in the previous three courses.

DDS 6331. Dental Public Health I. (1.9 cr. ; S-N only; Every Fall)

DDS 6332. Dental Public Health II. (1 cr. ; S-N only; Every Spring)

DDS 6334. Professional Problem Solving. (0.8 cr. ; S-N only; Every Spring)
Forum for discussion of clinical dental cases in context of ethics/professionalism. Five workshops based on ADA principles of ethics and code of professional conduct. Prereq: DDS 3rd yr.

DDS 6335. Professional Problem Solving. (0.3 cr. ; S-N only; Every Fall)
Forum for discussion of clinical dental cases in context of ethics/professionalism. Given over fall/spring semester of 4th year. Three workshops on dental cases/ethics.

DDS 6336. Dental Practice Management. (2 cr. ; S-N only; Every Spring)
Skills in planning, organizing, leading, and controlling the clinical, business, and human aspects of dental practice.

DDS 6337. Current Legal Issues for the New Dentist. (2.1 cr. ; S-N only; Every Fall)
Legal issues: regulation of the profession, associations, purchasing a dental practice, starting a practice, dental risk management, contract law considerations. Prereq: In DDS program.

DDS 6338. Special Issues in Oral Health Care: Geriatric, Hospital, and Special Needs Patient Dentistry. (1.7 cr. ; A-F only; Every Summer)
Delivering optimal oral health care to older adults and patients with special needs. Clinical management of patients with social, psychological, physiological, and dental characteristics. Dentistry in hospital setting. Prereq: in DDS program student.

DDS 6339. Emergency Preparedness. (0.8 cr. [max 1.6 cr. ; S-N only; Every Spring])
Emergency preparedness for the dental office with emphasis on teamwork skills. Online module, lectures, and participation in simulated realistic disaster scenarios with interprofessional teams. Prereq: Must be enrolled in a School of Dentistry program.

DDS 6340. Medical Emergencies and Patient Safety in the Dental Clinical Environment. (0.5 cr. ; S-N only; Every Spring)

DDS 6360. Introduction to Outreach Experiences. (0.7 cr. ; S-N only; Every Spring)
Provide dental care to underserved populations in various clinical settings throughout Minnesota.

DDS 6361. Outreach Experiences I. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Dental care/involve in community health promotion/service events to under-served populations throughout Minnesota.

DDS 6362. Outreach Experiences II. (2 cr. ; S-N only; Every Fall)
Provide dental care/involve in community health promotion/service events to underserved populations in various clinical settings throughout Minnesota. Prereq: Doctor of Dental Surgery Program.

DDS 6363. Outreach Experiences III. (2 cr. ; S-N only; Every Spring)
Dental care/involve in community health promotion/service events to under-served populations throughout Minnesota.

DDS 6411. Applied Dental Biomaterials. (2 cr. ; A-F only; Every Spring)
Prosthodontics, operative dentistry. Students apply scientific principles to selection/utilization of biomaterials, and evaluate a recent research publication. Prereq: In DDS program.

DDS 6431. Oral Anatomy I. (2 cr. ; max 4 cr. ; A-F or Audit; Every Fall)
Morphological characteristics of human dentition and associated contiguous structures. Foundational knowledge applied to situations in general clinical practice. Lectures, lab. Prereq: 1st yr DDS student.

DDS 6432. Oral Anatomy Laboratory I. (2.9 cr. ; A-F only; Every Fall)

DDS 6433. Introduction to Psychomotor Skill Development I and II. (0.7 cr. ; max 1.4 cr. ; S-N only; Every Fall)
Virtual-reality-based training for psychomotor skills. Mirror skills, proper ergonomics. Preparation of intra-coronal activity. Prereq: 1st yr DDS student.

DDS 6434. Operative Dentistry I. (1.7 cr. ; A-F only; Every Fall & Summer)
Restoration of small caries lesions, cervical abrasion lesions, and attrition defects. Practical
aspects of caries risk assessment, lesion identification, and comprehensive caries management. Emphasizes indications for surgical intervention, principles of restoration design, and rationale for various design features.

DDS 6435. Operative Dentistry I Laboratory. (2.3 cr.; A-F or Audit; Every Fall & Summer) Restoration of small caries lesions, cervical abrasion lesions, and attrition defects in clinical simulation setting. Emphasizes designing/executing retentive/resistant restorations, conserving tooth structure, and operating in clinically relevant orientations. Self-evaluation techniques, discriminatory skills. Prereq—Dental Anatomy, Biomaterials.

DDS 6436. Operative Dentistry II. (2.1 cr.; A-F only; Every Fall) Diagnosis, treatment planning, and treatment of moderate to severe phase of dental caries. Use of dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modifications to teeth. Prereq—In DDS program.

DDS 6437. Operative Dentistry II Lab. (2.9 cr.; A-F only; Every Fall) Exercises in treatment of moderate to severe phase of dental caries utilizing dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modifications to teeth. Prereq—In DDS program.


DDS 6439. Operative Dentistry IV. (1.4 cr.; A-F only; Every Fall) Contemporary aspects of operative Dentistry. Students, working in groups, answer clinical questions. Evidence-based approach. Prereq—3rd yr DDS student.

DDS 6441. Operative Dentistry Clinic II. (4 cr.; A-F only; Every Fall & Spring) Students, under direction of instructor, place single tooth restorations on patients, perform dental exams, and prepare treatment plans for patients with consultation from Operative Dentistry Division faculty. Prereq—Operative Dentistry I, II, III, Operative Dentistry I, II Lab.

DDS 6442. Operative Dentistry Clinic V. (7.5 cr.; A-F only; Every Spring) Clinical application of operative dentistry diagnosis, treatment planning, clinical judgment, and technical skills. Prereq—Operative Dentistry I, II, III, Operative Dentistry I and II Lab.

DDS 6451. Introduction to Endodontics Lecture and Laboratory. (3.7 cr.; A-F or Audit; Every Summer) Study of morphology, physiology, and pathology of the human dental pulp and periradicular tissues.

DDS 6461. Endodontic Clinic D3. (2 cr.; S-N only; Every Fall & Spring) Clinical practice for endodontics.

DDS 6462. Endodontic Clinic. (2 cr.; A-F or Audit; Every Spring) Clinical practice for endodontics.

DDS 6471. Preclinical Prosthodontics Single Crown Restoration Lecture II. (1.5 cr. [max 3 cr.]; A-F or Audit; Every Spring) Provides fundamental knowledge/procedural skills necessary for managing simulated patient cases that require full crown restoration.

DDS 6472. Preclinical Prosthodontics Single Crown Restoration Technique Laboratory II. (3.3 cr. [max 6.6 cr.]; A-F or Audit; Every Spring & Summer) Lab techniques, fundamentals of tooth preparation.

DDS 6473. Preclinical Prosthodontic Technique Lecture III. (1.5 cr.; A-F or Audit; Every Fall & Summer) Fixed, removable, occlusion topics.

DDS 6474. Preclinical Prosthodontics Technique Laboratory III. (2.1 cr.; A-F or Audit; Every Fall & Summer) Fixed, removable, occlusion topics.

DDS 6475. Preclinical Prosthodontics Techniques Lecture IV. (1.8 cr.; A-F only; Every Fall) Theory/practice in complete denture construction. Diagnosis, treatment planning/sequencing for edentulous patient. Instruments, terminology, principles, technical/clinical procedures. Prereq—DDS program.

DDS 6476. Preclinical Prosthodontic Technique Laboratory IV, Complete Dentures. (2.3 cr.; A-F only; Every Fall) Technical/clinical laboratory procedures used for fabrication/replacement of teeth with complete dentures. Prereq—DDS program.

DDS 6477. Preclinical Prosthodontics Technique Lecture V. (2.5 cr.; A-F only; Every Spring) Principles/philosophies of removable partial denture prosthetics. Design/fabrication of removable prosthesis to replace teeth for partially edentulous patient. Lecture format, plus an interactive seminar.

DDS 6478. Preclinical Prosthodontics Technique Laboratory V, Partial Dentures. (2.2 cr.; A-F only; Every Spring & Summer) Technical/clinical laboratory procedures used for fabrication/replacement of teeth with partial dentures.

DDS 6479. Clinical Occlusion. (1.3 cr. [max 2.6 cr.]; A-F or Audit; Every Spring) Clinical variation in occlusion encountered in a typical clinical setting. Guides to manage this variation. Prereq—Enrolled in dentistry program.

DDS 6481. Fixed Prosthodontics Clinic II. (5 cr.; A-F or Audit; Every Fall & Spring) Diagnosis, design, construction of fixed prosthodontic cases.

DDS 6482. Removable Prosthodontics Clinic II. (5 cr.; A-F only; Every Fall, Spring & Summer) Clinical practice in complete/partial removable denture prosthetics.

DDS 6483. Fixed Prosthodontics Clinic IV. (7.5 cr.; A-F only; Every Spring) Diagnosis, design, construction of fixed prosthodontic cases.

DDS 6484. Removable Prosthodontics Clinic IV. (4 cr.; A-F only; Every Spring) Clinic practice in complete/partial removable denture prosthetics.

DDS 6485. Preclinical Removable Prosthetics Lectures for PASS. (2.5 cr.; A-F only; Every Spring) Principles and philosophies of removable partial denture prosthetics. Design and fabrication of removable prosthesis to replace teeth for partially edentulous patient. Lecture and interactive seminar.

DDS 6486. Removable Prosthetics Laboratory for PASS. (2.2 cr.; A-F only; Every Spring) Technical/clinical laboratory procedures used for fabrication/replacement of teeth with partial dentures.

DDS 6487. Fixed Prosthodontics for PASS (Program for Advanced Standing Students). (3 cr.; A-F only; Every Summer) Pre-clinical didactic and laboratory course designed to provide students with the knowledge and procedural skills necessary for managing simulated patient cases requiring full crown restoration.

DDS 6491. Preclinical Prosthodontics Technique Lecture VI. (1.9 cr.; A-F only; Every Summer) Implanting fixed/removable protocols. Principles of restoring damaged teeth. Prereq—5901 through 5910.

DDS 6492. Preclinical Prosthodontics Techniques Laboratory VI. (1 cr.; A-F only; Every Summer) Implanting fixed/removable protocols. Principles of restoring damaged teeth. Prereq—5901 through 5910.

DDS 6493. Prosthodontics I. (1.1 cr. [max 2.2 cr.]; A-F only; Every Spring) Links preclinical/clinical areas. Treatment planning for abutments, retainers, and pontics. Design principles for porcelain fused to metal restorations, pontic designs, occlusion. Prereq—Fundamentals of prosthodontics shape/color, aesthetics of anterior prosthodontics.

DDS 6494. Global and Integrated Competency Assessment Course. (1 cr.; S-N only; Every Spring) Global/integrated assessment of didactic/clinical competency for 4th year DDS students. Results of assessment shall be used to establish/maintain standards/competency of University of Minnesota, School of Dentistry.

DDS 6495. Oral & Maxillofacial Surgery Honors Elective Course. (1 cr.; S-N only; Every Fall, Spring & Summer) This course provides Doctor of Dental Surgery students the opportunity to participate in a week long externship experience in the Oral & Maxillofacial clinic at the University of MN, School of Dentistry. Students will be shadowing
the OMS Residents as they care for patients. This includes evaluation and management of a surgical patient, pre- & post- operative care, and treatment planning.

**DDS 6496. Predoctoral Prosthodontic Honors Course.** (1.13 cr.; S-N only; Every Fall & Spring)
Clinical, laboratory, and seminar based course for senior dental honors students. Theory and practice in complete denture construction and implant restoration.

**DDS 6511. Foundations of Interprofessionalism, Communication, and Collaboration.** (1 cr.; S-N only; Every Fall)
First of three phases of Center for Interprofessional Education’s health curriculum. Online work, face-to-face sessions. Professional identity, integrity. Relationships between professionals and those they serve. Social networking, tools for self/peer assessment.

**DDS 6570. Mission of Mercy Volunteer Elective Experience.** (0 cr.; S-N only; Every Summer)
Short term volunteer experience to learn public health aspects of oral health. Must be approved by School of Dentistry. Must have faculty supervision.

**DDS 6571. Special Smiles Volunteer Elective Experience.** (0 cr.; S-N only; Every Summer)
Short term volunteer experience with Special Smiles event. Public health initiatives of oral health. Must be approved by School of Dentistry. Must have faculty supervision.

**DDS 6572. Team Smiles Volunteer Elective Experience.** (0 cr.; S-N only; Every Summer)
Short term volunteer experience for Team Smiles event. Students experience public health initiative in oral health. Must be approved by School of Dentistry, have faculty supervision.

**DDS 6588. Common Hope: Short-term Clinical Experience in Guatemala Elective.** (0 cr.; S-N only; Every Summer)
Students spend up to two weeks working with Common Hope in Guatemala providing oral health care in cities of Antigua/San Rafael. Clinical care given under direct supervision of School of Dentistry faculty licensed dentist.

**DDS 6601. Phillips Neighborhood Elective Volunteer Experience.** (0 cr.; No Grade Associated; Every Fall, Spring & Summer)
Opportunity to observe/assist in provision of health care services to populations diverse in age, ethnicity, social environment. Experience unique clinical settings.

**DDS 6602. Harbor Lights Elective Volunteer Experience.** (0 cr.; No Grade Associated; Every Fall, Spring & Summer)
Short term volunteer experience to learn about particular aspect of oral health. Must be approved by School of Dentistry/have faculty supervision. prereq: Must be in DDS program

**DDS 6603. Elective Regional Volunteer Experience.** (0 cr.; S-N only; Every Fall, Spring & Summer)
Short term volunteer experience to learn particular aspect of oral health. Must be approved by School of Dentistry. Must have faculty supervision.

**DDS 6604. Elective Regional Volunteer Experience.** (0 cr.; S-N only; Every Fall, Spring & Summer)
Short term volunteer experience to learn particular aspect of oral health. Must be approved by School of Dentistry. Must have faculty supervision.

**DDS 6605. Advanced Practice Management Elective.** (0-2 cr.; S-N only; Every Spring)
Fundamentals of business management related to maintaining dental practice. Components include economics, planning practice philosophy, operational decisions, financial decisions, financial analysis, business taxation, evaluation.

**DDS 6606. Rural Dentistry Scholars Elective.** (0-1 cr.; S-N only; Every Fall, Spring & Summer)
The Rural Dentistry Scholars Elective course (RDSP) is for second and third year DDS students and Dental Therapy students selected to participate in the MN Collaborative Rural Oral Health Project (MN-CROHP) to address the rural dental workforce issues. Students spend 3.5 weeks in a rural dental practice in selected counties in MN under the mentorship of a rural dentist. During the same period they participate in community activities for oral health promotion and disease prevention instruction during community events and in K-12 schools and network with other health care providers in the community. Through a grant, students receive stipend and receive reimbursement for housing and travel costs.

**DDS 6607. Interprofessional Leadership and Facilitation Elective.** (1 cr.; S-N only; Every Fall)
Instruction on Kotter's 8-Step Process for leading change. Attend facilitator training associated with AHC course Foundations of Interprofessional Communication/Collaboration. Facilitate six small group sessions of first year students within AHC. prereq: Four-year DDS student

**DDS 6608. Elective Externship I.** (1-5 cr.; S-N only; Every Fall, Spring & Summer)
Short-term externship to become familiar with a particular aspect of oral health or participate in international exchange program.

**DDS 6609. Elective Externship II.** (1-5 cr.; max 10 cr. ; S-N only; Every Fall, Spring & Summer)
Short-term externship to become familiar with a particular aspect of oral health or participate in international exchange program.

**DDS 6610. Elective Externship III.** (1-5 cr.; S-N only; Every Fall, Spring & Summer)
Short-term externship to become familiar with a particular aspect of oral health or participate in international exchange program.

**DDS 6611. Study Abroad Externship.** (1-5 cr.; max 25 cr. ; S-N only; Every Fall, Spring & Summer)
Short-term externship to become familiar with a particular aspect of oral health or participate in international exchange program.

**DDS 6612. Union Gospel Mission Volunteer Outreach Opportunity.** (0 cr.; S-N only; Every Fall, Spring & Summer)
Volunteer at Union Gospel Mission in St. Paul, Minnesota under guidance of School of Dentistry faculty.

**DDS 6613. Endodontic Topics for the General Dentist.** (0 cr.; S-N only; Every Fall & Spring)
Presentations on scientific/biologic basis for root canal therapy.

**DDS 6614. Predoctoral Periodontal Honors.** (0 cr.; S-N only; Every Fall & Spring)
Surgical periodontics. Lab exercises, gingivectomy, modified widman flap, apically positioned flap with osseous recontouring, free gingival graft procedures. Surgically placed dental implants in aplastic mandible. Students assist senior perio residents in surgery, perform surgery on their own patient.

**DDS 6615. Oral and Maxillofacial Pathology Independent Study.** (1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Independent projects in oral and maxillofacial pathology designed by student and faculty. This elective covers primarily retrospective surgical pathology studies although active laboratory research may be possible.

**DDS 6616. Advanced Simulation Clinic Elective I.** (0.5 cr.; S-N only; Every Fall, Spring & Summer)
Operative dental procedures. Psycho-motor skills for performing basic operative preparations according to specifications of DentSim software. Prereq-DDS program.

**DDS 6617. Advanced Simulation Clinic Elective II.** (0.5 cr.; S-N only; Every Fall, Spring & Summer)
Additional operative dental procedures. Psycho-motor skills for performing basic operative preparations according to specifications of DentSim software. Prereq-DDS program.

**DDS 6619. Moderate Sedation Techniques.** (0 cr.; S-N only; Every Fall)
Planning/administration of moderate sedation via parenteral access (intravenous).

**DDS 6621. Introduction to CAD/CAM Restorations.** (2 cr.; S-N only; Every Fall, Spring & Summer)
CAD/CAM in restorative dentistry. Emphasizes clinical aspects. Students deliver CAD/CAM restorations to patients.

**DDS 6622. EBD: Advanced Dental Materials for Esthetic & Digital Applications.** (1 cr.; S-N only; Every Fall, Spring & Summer)
Advanced evidence-based aesthetic restorative materials/digital clinical modalities. Rationale of prescribing different aesthetic/adhesive/digital treatment modalities. Selection of various dental materials based on scientific rationale. Prereq: DDS program

**DDS 6623. Oral Disease Clinic Elective.** (0 cr.; S-N only; Every Fall, Spring & Summer)
Students experience clinical oral pathology diseases not normally seen during dental clinic rotations. Students observe operator protocol, management, and referrals.

**DDS 6624. Disaster 101 Elective.** (1 cr.; S-N only; Every Fall & Spring) Disaster preparedness. Timeliness/quality of response. Students participate in simulated disaster scenarios in interprofessional teams. Prereq: In DDS program.

**DDS 6625. Pediatric Dentistry Honors Elective.** (; 0.5 cr.; A-F only; Every Fall, Spring & Summer) Didactic discussions/clinical sessions with pediatric patients requiring advanced dental treatment and/or advanced behavioral management skills.

**DDS 6630. Dental Research Training.** (2-6 cr.; S-N or Audit; Every Summer) Research project, written report.

**DDS 6631. DDS/PhD Research Elective I.** (2 cr.; [max 6 cr.]; S-N only; Every Fall, Spring & Summer) Integrate research education with dental education. Attend labs one-half day per week, MNcResT seminar monthly, and oral biology student seminar weekly. Additional research time/credits may be permitted with approval of associate dean for academic affairs. Prereq: Students must be part of the MinnCResT program.

**DDS 6632. DDS/PhD Research Elective II.** (2 cr.; [max 6 cr.]; S-N only; Every Fall, Spring & Summer) Integrate research education with dental education. Attend lab one-half day per week, MinnCResT seminar monthly, and oral biology student seminar weekly. Additional research time/credits may be permitted with approval of associate dean for academic affairs. Prereq: Students must be part of the MinnCResT Program.

**DDS 6640. Curricular Practical Training Elective.** (1 cr.; [max 4 cr.]; S-N only; Every Fall, Spring & Summer) This course is an elective internship or employment to gain practical work experience, advance professional skills and explore career interests.

**DDS 6900. Dental Clinic.** (1-25 cr.; S-N or Audit; Every Fall, Spring & Summer) Elective clinical course for students and adult special students who want additional clinical training in comprehensive dental care.

**DDS 6901. Essentials of Clinical Care DDS2.** (0 cr.; S-N only; Every Fall, Spring & Summer) This course will introduce sophomore doctor of dental surgery students to the clinical care of patients. Students will assist in care provision in multiple care environments under the direction and supervision of experienced clinical faculty. This course will encompass clinical training over two semesters and a final grade is given at the end of the last semester. This course will also allow students to volunteer to assist at the Union Gospel Mission Dental Clinic in St. Paul. Prereq: Must be enrolled in the Doctor of Dental Surgery Program.

**DDS 6911. Essentials of Clinical Care: D3.** (0-18 cr.; [max 72 cr.]; S-N only; Every Fall, Spring & Summer) Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, prosthetics/ endodontics, and health promotion. Limited care may be given on rotations to oral surgery/endodontics clinics. Prereq-DDS 3rd yr.

**DDS 6918. Evidence Based Dentistry.** (; 1 cr.; A-F only; Every Summer) Background knowledge and skills to integrate the best research evidence with clinical expertise and patient preferences in making clinical decisions. Principles of evidence-based dentistry are discussed as well as their clinical application. Prereq: Must be in DDS program.

**DDS 6921. Essentials of Clinical Care: D4.** (0-18 cr.; [max 54 cr.]; S-N only; Every Fall, Spring & Summer) Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, prosthetics/endodontics, and health promotion. Limited care may be given on rotations to oral surgery and endodontics clinics. Prereq-DDS 4th yr.

**DDS 6931. Dental Clinic.** (1-15 cr.; S-N only; Every Fall, Spring & Summer) Elective clinical course. Clinical training in comprehensive dental care.

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**Dutch (DTCH)**

**DTCH 1001. Beginning Dutch.** (; 5 cr.; Student Option; Every Fall & Summer) Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

**DTCH 1002. Beginning Dutch.** (; 5 cr.; Student Option; Every Spring & Summer) Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and Dutch culture. Prereq: 1001

**DTCH 1003. Intermediate Dutch.** (; 5 cr.; Student Option; Every Fall) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments. Prereq: 1002

**DTCH 1004. Intermediate Dutch.** (; 5 cr.; Student Option; Every Spring) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments. Meets concurrently with 1003.

**DTCH 3011W. Conversation and Composition.** (WI; 3 cr.; Student Option; Every Fall) Practice/refinement of spoken/written Dutch. Composition, vocabulary, Reading, viewing, and discussion of Dutch/Flemish media reports. Grammar review, critical corrective grammatical skills. Prereq: 1004 or 4004 or instr consent

**DTCH 3012. Conversation and Composition.** (; 3 cr.; Student Option; Periodic Spring) Practice and refinement of spoken and written Dutch. Compositional skills, vocabulary, Reading, viewing, and discussion of Dutch and Flemish media reports. Grammar review. Development of critical corrective grammatical skills. Prereq: 3011 or 4011

**DTCH 3310. Studies in Dutch Literature.** (; 3 cr.; [max 9 cr.]; Student Option; Every Fall & Spring) In-depth study of authors or topics from various periods in Dutch literature (e.g., 19th-century Dutch novels, colonial novels, literature of Golden Age). All primary literature is read in the original. Prereq: Reading knowledge of Dutch

**DTCH 3510. Topics in Dutch Culture.** (; 3 cr.; [max 9 cr.]; Student Option; Every Fall, Spring & Summer) A single topic or theme of Dutch or Flemish culture explored in depth. Past topics have included Dutch national character, origin of the Batavian myth, and images of Dutchness. Prereq: No knowledge of Dutch required

**DTCH 3993. Directed Studies.** (1-5 cr.; [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Guided reading in or study of Dutch literature, culture, or advanced language skills. Prereq: instr consent, dept consent, college consent.

**DTCH 4001. Beginning Dutch for Graduate Research.** (; 5 cr.; Student Option; Every Fall & Summer) Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.). Meets concurrently with 1001.

**DTCH 4002. Beginning Dutch for Graduate Research.** (; 5 cr.; Student Option; Every Spring & Summer) Continues the presentation of all four language modalities (listening, reading, speaking, writing), with a proficiency emphasis. Topics include free-time activities, careers, and Dutch culture. Meets concurrently with 1002.

**DTCH 4003. Intermediate Dutch for Graduate Research.** (; 5 cr.; Student Option; Every Fall) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments. Meets concurrently with 1003.

**DTCH 4004. Intermediate Dutch for Graduate Research.** (; 5 cr.; Student Option; Every Spring) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with
authentic readings and essay assignments. Meets concurrently with 1004.

**DTCH 4011. Conversation and Composition for Graduate Research.** (; 3 cr.; Student Option; Every Fall) Practice/refinement of spoken/written Dutch. Composition, vocabulary. Reading, viewing, and discussion of Dutch/Flemish media reports. Grammar review, critical corrective grammatical skills. Meets with 3011W.

**DTCH 4012. Conversation and Composition for Graduate Research.** (; 3 cr.; Student Option; Periodic Spring) Practice/refinement of spoken/written Dutch. Compositional skills, vocabulary. Reading, viewing, and discussion of Dutch/Flemish media reports. Grammar review, development of critical corrective grammatical skills. Meets with 3012; prereq: 3011 or 4011

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**Early Modern Studies (EMS)**

**EMS 5500. Topics in Early Modern Studies.** (; 3 cr.; max 6 cr.; Student Option; Every Fall & Spring) Selected topics in early modern studies from various disciplinary perspectives/world regions. prereq: Grad student

**EMS 8100. Workshop in Early Modern Studies.** (; 1-3 cr.; S-N only; Every Fall & Spring) Lectures and workshops offered by various centers, departments, institutes, and libraries across disciplines on Twin Cities campus. Online reports and discussion. prereq: instr consent

**EMS 8250. Seminar in Early Modern Studies.** (; 3 cr.; max 6 cr.; Student Option; Every Fall & Spring) Current research and debates in early modern studies. Theoretical approaches to major questions shaping seminar's subject matter.

**EMS 8500. Topics in Early Modern Studies.** (; 3 cr.; max 6 cr.; Student Option; Every Fall & Spring) Selected topics in early modern studies from various disciplinary perspectives and world regions. prereq: Grad student

**EMS 8993. Directed Study.** (; 1-6 cr.; A-F or Audit; Every Fall, Spring & Summer) Students work on tutorial basis. Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

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**Earth Sciences (ESCI)**

**ESCI 1001. Earth and Its Environments.** (ENV;PHYS; 4 cr.; Student Option; Every Fall, Spring & Summer) Physical processes that shape the Earth: volcanoes, earthquakes, plate tectonics, glaciers, rivers. Current environmental issues/global change. Lecture/lab. Optional field experience.

**ESCI 1003. Dinosaur Evolution, Ecology, and Extinction: Introduction to the Mesozoic World.** (; 3 cr.; Student Option; Every Spring) Dinosaurs and the Mesozoic Earth are used to introduce evolution, plate tectonics, climate change, and Earth systems. Overview of the history of dinosaur interpretations illustrates the principles and social aspects of scientific investigation.

**ESCI 1005. Geology and Cinema.** (ENV;PHYS; 4 cr.; Student Option; Every Spring) Physical processes shaping the Earth, materials it comprises, its nearly five billion year history as told spectacularly, but often wrongly, by Hollywood movies.

**ESCI 1006. Oceanography.** (ENV;PHYS; 4 cr.; Student Option; Every Fall) How various processes in the ocean interact. Marine biology, waves, tides, chemical oceanography, marine geology, human interaction with the sea. Labs include study of live marine invertebrates, manipulation of oceanographic data, and discussion using videos showing unique aspects of ocean research.

**ESCI 1007. From Microbes to Mammath: History of Life on Earth.** (BIOL; 4 cr.; Student Option; Every Fall) Scientific evidence from biology, paleontology, and geology for origin/evolution of life over 4.5 billion years of Earth's history. Biochemical basis of life, biogeochemical cycles, natural selection, origin of species, genetics, phylogeny reconstruction, timescales for evolution.

**ESCI 1011. Volcanoes of the Earth.** (; 4 cr.; Student Option; Periodic Spring) Nonmathemtical introduction to volcanoes, their origin and distribution on Earth and through time; theory of plate tectonics, origin of magmas and the Earth's interior; products of volcanoes, types of eruptions and hazards, and impact on climate, vegetation, and society.

**ESCI 1012. Natural Hazards and Disasters.** (TS; 3 cr.; Student Option; Every Spring) Geological processes that give rise to natural hazards and the emerging technologies that allow societies to mitigate their effects.

**ESCI 1081. Conspiracies, Fraud, and Deception in Earth History.** (; 1 cr.; Student Option; Every Spring) Famous cases of geological deception from three centuries are presented in the intellectual context of their time and demonstrate the prevailing power of scientific reasoning.

**ESCI 1101. Introduction to Geology.** (ENV;PHYS; 3 cr.; Student Option; Every Fall, Spring & Summer) Physical processes that shape the Earth: volcanoes, earthquakes, plate tectonics, glaciers, rivers. Current environmental issues and global change. Lecture.

**ESCI 1105. Geology and Cinema.** (ENV; 3 cr.; Student Option; Every Spring) Physical processes shaping the Earth, materials it comprises, its nearly five billion year history as told spectacularly, but often wrongly, by Hollywood movies.

**ESCI 1106. Oceanography.** (ENV; 3 cr.; Student Option; Every Fall) How various processes in the ocean interact. Marine biology, waves, tides, chemical oceanography, marine geology, human interaction with sea.

**ESCI 1901. Freshman Seminar:** Environmental. (ENV; 3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics vary. See Class Schedule.

**ESCI 1905. Freshman Seminar.** (; 1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics vary. See Class Schedule.

**ESCI 1906W. Freshman Seminar: Writing Intensive and Environmental Theme.** (WI; 1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall) Topics vary; see freshman seminar topics. prereq: freshman

**ESCI 2201. Solid Earth Dynamics.** (; 4 cr.; A-F or Audit; Every Fall) Dynamics of solid Earth, particularly tectonic system. Seismology, internal structure of Earth. Earth's gravity, magnetic fields. Paleomagnetism, global plate tectonics, tectonic systems. Field trip. prereq: concurrent registration is required (or allowed) in PHYS 1301 or instr consent


**ESCI 2203. Earth Surface Dynamics.** (; 4 cr.; A-F or Audit; Every Spring) Earth's surface processes, drivers, and implications. Interactions between atmosphere, lithosphere, hydrosphere, and biosphere.

**ESCI 2301. Mineralogy.** (; 3 cr.; Student Option; Every Fall) Crystallography, crystal chemistry, physics. Physical/chemical properties, crystal structures, chemical equilibria of major mineral groups. Lab includes crystallographic, polarizing microscope, X-ray powder diffraction exercises, hand-specimen mineral identification. prereq: [concurrent registration is required (or allowed) in CHEM 1061, concurrent registration is required (or allowed) in CHEM 1065, concurrent registration is required (or allowed) in MATH 1271] or instr consent

**ESCI 2302. Petrology.** (; 3 cr.; Student Option; Every Spring) Magmatic and metamorphic processes, with an emphasis on plate tectonic interpretation of rock sequences. prereq: 2301 or instr consent

**ESCI 3001. Earth Materials.** (; 3 cr.; Student Option; Periodic Fall)
Common rocks/minerals and their geologic settings. Properties of these materials as basis for identification/use in industry/society.

ESCI 3002. Climate Change and Human History. (ENV; 3 cr.; A-F or Audit; Spring Every Even Year)
Causes of long-/short-term climate change. Frequency/magnitude of past climate changes; their geologic records. Relationship of past climate changes to development of agrarian societies and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years.

ESCI 3004. Water and Society. (ENV; 3 cr.; Student Option; Periodic Fall)
For non-science majors. Study of (1) the role of humans as agents influencing the composition (quality) of water resources through domestic, agricultural, industrial, and other land-use practices; (2) the role of water in various ecosystem services which may be at odds with the anthropocentric view of water as a resource; (3) how population increase and climate change, coupled with human actions, is affecting the quality and quantity of available water, leading to lack of access to clean water and decent sanitation, and to severe water shortages (e.g., for irrigation) in some areas, especially in developing nations and politically unstable regions; and (4) how the availability of water shapes a society's view of water as a resource and its view of the non-human demands for water (which is not uniform across the globe).

ESCI 3005. Earth Resources. (3 cr.; Student Option; Fall Odd Year)

ESCI 3006. Planets of the Solar System. (3 cr.; Student Option; Periodic Fall)

ESCI 3093. Problems in Earth Sciences: Junior. (1-4 cr.; max 6 cr.; Student Option; Every Fall & Spring)
Problems in earth sciences studied independently under the direction of a faculty member. prereq: instr consent

ESCI 3202. Fluid Earth Dynamics. (4 cr.; Student Option; Every Fall)
Dynamics of fluid Earth, mainly surface processes and convection. prereq: concurrent registration is required (or allowed) in CHEM 1061, concurrent registration is required (or allowed) in CHEM 1065 or instr consent

ESCI 3402. Science and Politics of Global Warming. (ENV; 3 cr.; Student Option; Every Spring)

ESCI 3425. Atmospheric Pollution: From Smog to Climate Change. (3 cr.; A-F or Audit; Every Fall)

ESCI 3870. Modeling Workshop. (1 cr. [max 2 cr.]; Student Option; Periodic Fall & Spring)
Modeling of geologic or geophysical systems. prereq: Geo or Geophys or GeoEng major or instr consent

ESCI 3880. Laboratory Workshop. (1 cr. [max 2 cr.]; Student Option; Every Fall & Spring)
Geologic or geophysical lab study. prereq: Geo or Geophys or GeoEng major or instr consent

ESCI 3890. Field Workshop. (1 cr. [max 2 cr.]; Student Option; Every Fall & Spring)
Earth sciences field study. prereq: Geo or ESCI or GeoEng major or instr consent

ESCI 3891. Field Methods. (2 cr. ; A-F only; Every Spring)
Methods in geologic field mapping.

ESCI 3911. Introductory Field Geology. (4 cr.; A-F or Audit; Every Summer)

ESCI 4010. Undergraduate Seminar: Current Topics in Earth Sciences. (1-4 cr. [max 12 cr.]; Student Option; Every Fall & Spring)
Topics in earth sciences investigated in a seminar format. prereq: instr consent

ESCI 4093. Problems in Earth Sciences: Senior. (1-4 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer)
Seniors engage in independent research under faculty supervision. prereq: instr consent

ESCI 4094. Senior Thesis. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer)
Senior-level majors engage in independent research under faculty supervision. Select problems according to individual interests and in consultation with faculty committee. Thesis and oral defense. prereq: Sr. Geo or ESCI major, instr consent

ESCI 4102W. Vertebrate Paleontology: Evolutionary History and Fossil Records of Vertebrates. (WI; 3 cr.; A-F or Audit; Spring Even Year)
Vertebrate evolution (exclusive of mammals) in phylogenetic, temporal, functional, and paleoecological contexts. Vertebrate anatomy. Methods in reconstructing phylogenetic relationships and origin/history of major vertebrate groups, from Cambrian Explosion to modern diversity of vertebrate animals. prereq: 1001 or 1002 or Biol 1001 or Biol 1002 or Biol 1009 or instr consent

ESCI 4103W. Fossil Record of Mammals. (WI; 3 cr.; A-F or Audit; Spring Odd Year)

ESCI 4203. Principles of Geophysical Exploration. (3 cr.; Student Option; Every Fall)
Seismic exploration (reflection and refraction); potential techniques (gravity and magnetics) and electrical techniques of geophysical exploration. prereq: Phys 1302

ESCI 4204. Geomagnetism and Paleomagnetism. (3 cr.; Student Option; Periodic Fall)
Present geomagnetic field at the Earth's surface, secular variation, geomagnetic field reversals. Physical and chemical basis of paleomagnetism: origin of natural remanent magnetization, mineralogy of magnetic minerals, magnetic polarity stratigraphy, apparent polar wander, and environmental magnetism. prereq: 2201, Phys 1302, Math 1272 or instr consent

ESCI 4211. Solid Earth Geophysics I. (3 cr.; A-F or Audit; Every Fall)
Basic elasticity, basic seismology, and physical structure of the Earth's crust and deep interior. prereq: 2201, Phys 1302

ESCI 4212. Solid Earth Geophysics II. (3 cr.; A-F or Audit; Every Spring)
Dynamics of the solid Earth, mostly mantle and core; seismic tomography, geothermal measurements, gravity, time-dependent deformation of the Earth, computer modeling. prereq: 2201, Phys 1302

ESCI 4401. Aquatic Environmental Geochemistry. (3 cr.; Student Option; Periodic Spring)
General principles of solution chemistry applied to geology. Solution-mineral equilibria. Redox processes in natural waters. Geochemistry of hydrothermal fluids. Environmental geochemistry. prereq: Chem 3501 or instr consent

ESCI 4402. Biogeochemical Cycles in the Ocean. (3 cr.; Student Option; Fall Even Year)
Marine biogeochemistry and chemical oceanography. Processes controlling chemical composition of oceans past/present. Cycles...
of major/minor constituents, including carbon, nitrogen, phosphorus, silicon, and oxygen and their isotopes. Role of these cycles in climate system. prereq: [CHEM 1021, CHEM 1022] or instr consent

ESCI 4501. Structural Geology. (; 3 cr.; Student Option; Every Fall)
Fundamental concepts related to deformation of Earth's crust. Processes associated with deformation, faulting, folding, fabric development. Lab/recitation include solving problems, conducting physical/numerical experiments. Field trips. prereq: 2201, 2302

ESCI 4502. Tectonic Styles. (; 3 cr.; Student Option; Periodic Fall)
Origin and nature of major types of tectonic disturbances affecting the crust and lithosphere, including analysis of the form and development of individual structural components and relationship to plate tectonics. Changes over geologic time in the nature of orogenic processes. prereq: 4501 or instr consent

ESCI 4503. Neotectonics. (; 3 cr.; Student Option; Periodic Fall)
Integration of diverse elements of geology, geodesy, and geophysics to examine recent and active tectonics of the Earth's lithosphere; extensional, compressional and wrench tectonic regimes with case studies around the world; modern global plate motions, geodetic techniques, seismic anisotropy, climatically driven tectonics. prereq: 4501 or instr consent

ESCI 4602. Sedimentology and Stratigraphy. (; 3 cr.; Student Option; Every Spring)
Interpretation of origin of sedimentary rocks through application of basic physical/chemical principles. Modern depositional environments, petrographic microscopy, basin dynamics, stratigraphy. prereq: [2203, 2301] or instr consent

ESCI 4701. Geomorphology. (; 4 cr.; Student Option; Fall Even Year)
Origin, development, and continuing evolution of landforms in various environments. Environmental implications. Weathering, slope and shore processes, fluvial erosion and deposition, and region processes, glacial processes. This course includes lecture and laboratory components, including field trips. prereq: ESCI 2201, 2203 and 3202; MATH 1272; and PHYS 1301; or instructor consent

ESCI 4702. General Hydrogeology. (; 3 cr.; Student Option; Every Spring)
Theory of groundwater geology, hydrologic cycle, water-rock interaction, Darcy's law, governing equations of groundwater motion, flow net analysis, analog models, groundwater resource evaluation/development. Applied analysis of steady and transient equations of groundwater motion and chemical transport. Chemistry of natural waters. prereq: [concurrent registration is required (or allowed) in CHEM 1062, concurrent registration is required (or allowed) in CHEM 1066, MATH 1271, PHYS 1201] or instr consent

ESCI 4703. Glacial Geology. (; 4 cr.; Student Option; Fall Odd Year)
Formation and characteristics of modern glaciers; erosional and depositional features of Pleistocene glaciers; history of quaternary environmental changes in glaciated and nonglaciated areas. Field trips and labs. prereq: 1001 or instr consent

ESCI 4801. Geomicrobiology. (; 3 cr.; Student Option; Every Spring)
Geosphere/biosphere interactions over temporal/spatial scales. Global biogeochemical cycling, microbe-metal interactions, microbial paleobiology, environmental geomicrobiology, life detection, habitability of planets. prereq: One semester college level biology

ESCI 4911. Advanced Field Geology. (; 4 cr.; A-F or Audit; Every Summer)
Geologic mapping; study of igneous, metamorphic, and sedimentary rocks; structures and surficial features; problem solving. Paper required. prereq: 3911, instr consent

ESCI 4971W. Field Hydrogeology. (WI; 4 cr.; Student Option; Every Summer)

ESCI 5093. Directed Studies in Earth Sciences. (; 1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Independent, directed study in earth sciences arranged by student/faculty member.

ESCI 5102. Climate Change and Human History. (; 3 cr.; Student Option; Spring Even Year)
Causes of long-term climate change. Frequency/magnitude of past climate changes, their geologic records. Relationship of past climate changes to development of agrarian societie and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years. prereq: 1001 or equiv or instr consent

ESCI 5201. Time-Series Analysis of Geological Phenomena. (; 3 cr.; A-F or Audit; Periodic Fall)
Time-series analysis of linear and nonlinear geological and geophysical phenomena. Examples drawn from ice age cycles, earthquakes, climatic fluctuations, volcanic eruptions, atmospheric phenomena, thermal convection and other time-dependent natural phenomena. Modern concepts of nonlinear dynamics and complexity theory applied to geological phenomena. prereq: MATH 2263 or instr consent

ESCI 5203. Mineral and Rock Physics. (; 3 cr.; Student Option; Periodic Spring)
Physical properties of minerals and rocks as related to the composition and dynamics of the Earth's crust, mantle, and core. prereq: 2201, PHYS 1302

ESCI 5204. Geostatistics and Inverse Theory. (; 3 cr.; Student Option; Fall Odd Year)

ESCI 5205. Fluid Mechanics in Earth and Environmental Sciences. (3 cr.; Student Option; Fall Even Year)

ESCI 5302. Isotope Geology. (; 3 cr.; A-F or Audit; Every Fall)
Theory and uses of radioactive, radiogenic, and stable isotopes in geology. Radiometric dating, geothermometry, and tracer techniques in geologic processes. prereq: 3003W or instr consent

ESCI 5351. Geochemical Modeling of Aqueous Systems. (; 3 cr.; Student Option; Spring Odd Year)
Using mass transfer reaction path models to assess chemical evolution of natural fluids, hydrothermal alteration processes, and formation of hydrothermal ore deposits. prereq: 4401

ESCI 5353. Electron Microprobe Theory and Practice. (; 3 cr.; Student Option; Periodic Fall)
Characterizing solid materials with electron beam instrumentation, including reduction of X-ray data to chemical compositions. prereq: [One yr chem, one yr physics] or instr consent

ESCI 5402. Science and Politics of Global Warming. (; 3 cr.; Student Option; Every Spring)

ESCI 5501. Advanced Structural Geology. (; 3 cr.; Student Option; Fall Odd Year)
Analysis of structures and fabric of deformed rocks. Determination of states of stress and strain in rocks and of evolution of these with time. Deformation mechanisms. Extensive reading in journal literature. Field trips. prereq: 4501 or instr consent

ESCI 5503. Advanced Petrology. (; 3 cr.; Student Option; Fall Odd Year)
Quantitative approach to modern igneous/metamorphic petrology. Emphasizes thermodynamics of minerals/melts and with applications to phase diagrams, thermobarometry, melting relationships, and energetics of petrologic mass transfer. prereq: 2302, CHEM 1061, CHEM 1065, [MATH 1372 or MATH 1272 or MATH 1572]
ESCI 5504W. Neotectonics. (WI; 3 cr.; Student Option; Fall Even Year) Integration of multidisciplinary elements of geology, geodesy, geodynamics, seismotectonics, tectonophysics to examine recent/active tectonics of Earth's lithosphere. Extensional, compressional, wrench-tectonic regimes with global case studies incorporating mantle to surface processes. prereq: [2201, 4501] or instr consent

ESCI 5601W. Advanced Sedimentology. (WI; 4 cr.; Student Option; Fall Odd Year) Principles/processes of sedimentary geology. Interactions among lithosphere, biosphere, atmosphere, hydrosphere. Detrital/carbone facies of modern/ancient systems, coastal processes, geobiology, tectonics, paleoclimate, structural diagenesis, paleo soils, volcanic sedimentation. prereq: 4602 or instr consent

ESCI 5705. Limnogeo and Paleoenvironment. (3 cr.; Student Option; Periodic Fall) Within-lake, hydrogeologic, and landscape (geological/biological) processes that lead to formation of various proxy records of paleoenvironment. Systems approach to physical, geochemical, biogeochemical, and biotic proxies. Basic principles, case studies. Emphasizes how proxy records relate to paleoclimate. prereq: instr consent

ESCI 5713. Tracers and Karst Hydrogeology. (3 cr.; Student Option; Periodic Fall) Karst hydrogeology and application of tracers to determine source, age, and mixing parameters of water in various natural reservoirs. Physical and chemical principles and processes operating in karst hydrogeology; use of natural and synthetic chemical and isotopic labels or tracers to follow movement and mixing of water through hydrologic cycle. prereq: 5701, instr consent


ESCI 5800. Seminar: Current Topics in Earth Sciences. (1-4 cr. [max 8 cr.]; S-N or Audit; Periodic Fall & Spring) Topics in earth sciences investigated in a seminar format.

ESCI 8001. Introductory Graduate Seminar. (2 cr.; S-N or Audit; Every Fall) Graduate level survey of important research, concepts, and methods in the earth sciences; familiarization with program faculty/facilities and basics of science writing and proposal craft. prereq: Grad student status in earth science.

ESCI 8203. Principles of Geophysical Exploration. (3 cr.; Student Option; Every Fall) Seismic exploration (reflection/refraction). Potential techniques (gravity/magnetics), electrical techniques of geophysical exploration. prereq: Phys 1302 or equivalent

ESCI 8204. Geomagnetism and Paleomagnetism. (3 cr.; Student Option; Spring Even Year) Present geomagnetic field at Earth's surface, secular variation, geomagnetic field reversals. Physical/chemical basis of paleomagnetism. Origin of natural remanent magnetization, minerology of magnetic minerals, magnetic polarity stratigraphy, apparent polar wander, environmental magnetism. prereq: 2201, Phys 1302, [Math 1272 or instr consent]

ESCI 8243. Principles of Rock Magnetism. (1-3 cr.; Student Option; Periodic Fall) Remanent magnetizations, their classification and origins. Fundamentals of fine particle magnetism; magnetic minerals; separation of multicomponent magnetizations; effects of chemical change on magnetization; magnetic proxies of climatic and environmental change; biogenic magnetism. prereq: 4204 or instr consent

ESCI 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

ESCI 8353. Phase Equilibrium in Mineral Systems. (3 cr.; Student Option; Periodic Fall) Principles of homogeneous and heterogeneous equilibria and their application to problems in petrology. Emphasis on derivations from first principles and formulation of algebraic and graphical methods essential to multicomponent systems. prereq: 4301, Chem 5501, Math 2243

ESCI 8354. Igneous Petrology. (3 cr.; Student Option; Periodic Fall) Igneous rocks and processes, emphasizing geochemistry of melts and minerals. Content varies with instructor and student interest. prereq: 4301 or instr consent

ESCI 8355. Metamorphic Petrology. (3 cr.; Student Option; Periodic Fall) Metamorphic processes; relation of theory and observation to current problems. Relation of fundamental concepts and techniques to progressive development of mineral assemblages. Term paper required. prereq: 8353

ESCI 8401. Aqueous Environmental Geochemistry. (3 cr.; Student Option; Periodic Spring) General principles of solution chemistry applied to geology. Solution-mineral equilibria. Redox processes in natural waters. Geochemistry of hydrothermal fluids. Environmental geochemistry. prereq: Chem 5501 or instr consent

ESCI 8402. Biogeochemical Cycles in the Ocean. (3 cr.; Student Option; Fall Even Year) Marine biogeochemistry/chemical oceanography. Processes controlling chemical composition of oceans past/present. Cycles of major/minor constituents, including carbon, nitrogen, phosphorus, silicon, oxygen/their isotopes. Role of cycles in climate system. prereq: [Chem 1021, Chem 1022] or instr consent

ESCI 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (no description) prereq: Doctoral student, adviser and DGS consent

ESCI 8501. Structural Geology. (4 cr.; Student Option; Every Fall) Fundamental concepts related to deformation of Earth's crust. Processes associated with deformation, faulting, folding, fabric development. Lab/recitation include solving problems, conducting physical/numerical experiments. Term Paper. Field trips. prereq: 2301 or instr consent

ESCI 8502. Tectonic Styles. (3 cr.; Student Option; Spring Odd Year) Origin/nature of major types of tectonic disturbances affecting crust/lithosphere, including analysis of form/development of individual structural components/relationship to plate tectonics. Changes over geological time in nature of orogenic processes. prereq: 4501 or 8501 or instr consent


ESCI 8601. Introduction to Stream Restoration. (3 cr.; A-F or Audit; Every Fall) Background material essential for participating in a stream restoration project. How to assimilate geologic, hydrologic, and ecological data at the watershed and reach scales to plan a restoration project and evaluate/critique existing stream restoration projects. prereq: Grad student in CE or ESCI or EEB or WRS or FW or BAE or FR or HORT or ENR or LA or SRSE or instr consent

ESCI 8602. Stream Restoration Practice. (2 cr.; S-N only; Every Summer) Field experience, group design project. Students provide a stream restoration context for each other's elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site. prereq: 8601 or CE 8601

ESCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ESCI 8712. Transport Phenomena and Analytical Geohydrology. (3-4 cr.; Student Option; Every Fall) Microscopic flow parameters, momentum, mass and energy transport through porous
media. Geologic factors in aquifer performance, equations for groundwater flow, and analysis of pump tests. prereq: 5701 or CE 3502 or instr consent

ESCI 8718. Numerical Methods in Hydrogeology. (3 cr.; A-F or Audit; Periodic Fall) Introduction to finite difference and finite element methods in hydrogeology. Students develop one- and two-dimensional models of diffusion and advection-dispersion equations. prereq: 5701, GSCI 1107 or instr consent

ESCI 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Approved; Every Fall, Spring & Summer) (no description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ESCI 8801. Geomicrobiology. (3 cr.; Student Option; Every Spring) Geosphere/biosphere interactions over temporal/spatial scales. Global biogeochemical cycling, microbe-metal interactions, microbial paleoenvironment, environmental geomicrobiology, life detection, habitability of planets. prereq: One semester college level biology

ESCI 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Approved; Every Fall, Spring & Summer) (no description) prereq: Max 18 cr per semester or summer; 24 cr required

ESCI 8970. Seminar: Current Topics in Earth Sciences. (1-4 cr. [max 32 cr.]; A-F or Audit; Periodic Fall & Spring) Seminar course. Individual topics will be determined and added per semester. prereq: instr consent

ESCI 8980. Seminar: Current Topics in Earth Sciences. (1-4 cr. [max 30 cr.]; S-N or Audit; Every Fall & Spring) Selected seminar topics. prereq: instr consent

ESCI 8994. Research in Earth Sciences. (1-18 cr. [max 30 cr.]; A-F only; Plan A) Independent research under faculty supervision. prereq: instr consent

East Asian Studies (EAS)

EAS 3461. Introduction to East Asia I: The Imperial Age. (3 cr.; Student Option; Every Fall & Spring) Comparative overview of early history of China, Japan, Korea, and Vietnam; early Chinese thought; diffusion of Confucianism, Buddhism, and other values throughout East Asia; political and social history of region to 1600.

EAS 3462. From Subjects to Citizens: The History of East Asia From 1500 to the Present. (GP, HIS; 3-4 cr.; Student Option; Every Spring) How Asian states, societies, economies, and cultures linked with one another and with European powers. How period's historical effects still resonate. Covers India, China, Japan, Korea, and Indochina.

EAS 3462H. Honors: From Subjects to Citizens: The History of East Asia from 1500 to the Present. (GP, HIS; 3-4 cr.; A-F only; Every Spring) How Asian states, societies, economies, cultures linked with one another/European powers. Historical effects. Covers India, China, Japan, Korea, Indochina.

EAS 3468. Social Change in Modern China. (3 cr.; Student Option; Every Fall) Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women's movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC's entry into the world trading system.


EAS 3401. Ecology and Society. (ENV; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Basic concepts in ecology. Organization, development, function of ecosystem. Population growth/regulation. Human effect on ecosystems. prereq: [Gr or Sr] recommended; biological sciences students may not apply or toward major

EAS 3402. Sex, Evolution, and Behavior: Examining Human Evolutionary Biology. (4 cr.; A-F or Audit; Every Spring) Methods/theories to understand humans in evolutionary framework. What can be known only/primarily from evolutionary perspective. How evolutionary biology of humans might lead to better evolutionary theory. How physiology, development, behavior, and ecology coordinate/coevolve in humans.

EAS 3407. Ecology. (3 cr.; Student Option; Every Fall) Principles of ecology from populations to ecosystems. Applications to human populations, disease, exotic organisms, habitat fragmentation, biodiversity and global dynamics of the earth. prereq: [Math 1142, 1241, 1271 or equivalent]

EAS 3408W. Ecology. (WI; 3 cr.; Student Option; Every Spring) Principles of population growth/interactions, communities and ecosystem function applied to ecological issues. Regulation of populations, dynamics/impacts of disease, invasions by exotic organisms, biodiversity, global change. Lab. Scientific writing. prereq: [One semester college biology or instr consent], [MATH 1142 or MATH 1271 or Math 1241 or Math 1242 or MATH 1281 or Math 1282 or equiv]

EAS 3409. Evolution. (3 cr.; Student Option; Every Fall & Spring) Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution, including natural selection, sexual selection, genetic drift. Examples of ongoing evolution in wild/domesticated populations and in disease-causing organisms. Lab. prereq: One semester college biology

EAS 3411. Introduction to Animal Behavior. (3 cr.; Student Option; Every Fall) Biological study of animal behavior. Mechanism development, function, and evolution. Emphasizes evolution of adaptive behavior, social behavior in the natural environment. Lab. prereq: One semester of college biology

EAS 3412W. Introduction to Animal Behavior. (WI; 4 cr.; A-F only; Every Spring) Writing intensive course. Introduction to animal behavior. Feeding behavior, reproductive behavior, perception, learning, animal conflict, social behavior, parental care, communication. Scientific process. Formulate research questions. prereq: Undergrad biology course

EES 3503. Science, Protection, and Management of Aquatic Environments. (3 cr.; Student Option; Every Spring) Fundamentals of aquatic ecology. Case study approach to water problems faced by society (e.g., eutrophication, climate change, invasive species, acid rain, wetland protection, biodiversity preservation). Science used to diagnose/remEDIATE or remove problems. prereq: One semester college biology

EES 4068. Plant Physiological Ecology. (3 cr.; Student Option No Audit; Spring Even Year) Plant function, its plasticity/diversity in an ecological context. Impact of environmental stresses on major physiological processes of plants, including photosynthesis, respiration, water uptake/transport, and nutrient uptake/assimilation. Lab, field trip to Cedar Creek.

EEB 4129. Mammalogy. (4 cr.; A-F or Audit; Every Fall) Evolutionary and biogeographic history of mammals. Recognize, identify, and study natural history of mammals at the ordinal level, North American mammals at familial level, and mammals north of Mexico at generic level. Minnesota mammals at specific level. Includes lab. prereq: Biol 1001 or Biol 2012

EEB 4134. Introduction to Ornithology. (4 cr.; Student Option; Every Spring) Structure, evolution, classification, distribution, migration, ecology, habitats, identification of
birds. Lecture, lab, weekly field walks. One weekend field trip. prereq: Biol 1001 or Biol 2012

**EEB 4329. Primate Ecology and Social Behavior.** (3 cr.; A-F or Audit; Periodic Fall)
Primates as model system to explore animal/human behavior. Factors influencing social/group composition. Mating systems. Prevalence of altruistic, cooperative, and aggressive behavior. Strength of social bonds in different species. Evolution of intelligence/culture, prereq: BIOL 1009 or BIOL 2002 or BIOL 3411 or ANTH 1001 or instr consent

**EEB 4330W. Animal Communication.** (WI; 3 cr.; A-F or Audit; Fall Odd Year)

**EEB 4309W. Ecosystem Ecology.** (ENV, WI; 3 cr.; Student Option; Every Fall)
Principles of energy and elements cycling through ecosystems. Dependence of cycles on kinds/numbers of species within ecosystems. Effects of human-induced global changes on functioning of ecosystems. prereq: Biol 3407 or instr consent

**EEB 4411. Biogeochemical Processes.** (3 cr.; Student Option; Periodic Spring)
Application of biochemistry, ecology, chemistry, and physics to environmental issues. Issues in biogeochemistry. Impact of humans on biogeochemical processes in soils, lakes, oceans, estuaries, forests, urban/managed ecosystems, and extreme environments (e.g., early Earth, deep sea vents, thermal springs). prereq: [BIOC 2331, CHEM 2301, PHYS 1201] or instr consent

**EEB 4793W. Directed Studies: Writing Intensive.** (WI; 1-7 cr.; S-N or Audit; Every Fall, Spring & Summer)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature, Written report. prereq: instr consent, dept consent

**EEB 4794W. Directed Research: Writing Intensive.** (WI; 1-6 cr. [max 42 cr.]; S-N or Audit; Every Fall, Spring & Summer)
Laboratory or field investigation of selected areas of research, including written report. prereq: instr consent, dept consent

**EEB 4811. Biogeochemical Processes.** (4 cr.; A-F or Audit; Periodic Summer)
Application of biochemistry, ecology, chemistry, physics to global biogeochemical cycles. Human impacts on biogeochemical cycles. Lab. Meets at Itasca Biological Station & Laboratories. Lodging/meal costs in addition to tuition, prereq: CHEM 2301, [PHYS 1201 or instr consent]

**EEB 4839. Field Studies in Mammalogy.** (4 cr.; A-F or Audit; Every Summer)
Techniques for studying small mammals. Lectures/lab projects emphasize identification, distributions, community interactions, ecophysiology, population ecology. prereq: College-level biology course that includes study of animals or instr consent

**EEB 4844. Field Ornithology.** (4 cr.; A-F or Audit; Every Summer)
Biology of breeding birds through use of field techniques at Itasca Biological Station/Laboratories. Daily fieldwork emphasizes identification, behavioral observations, netting/censusing, prereq: One semester college biology or instr consent

**EEB 4993. Directed Studies.** (1-17 cr.; S-N or Audit; Every Fall, Spring & Summer)
Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature, report, instr consent, dept consent

**EEB 4994. Directed Research.** (1-6 cr. [max 42 cr.]; S-N only; Every Fall, Spring & Summer)
Laboratory or field investigation of selected areas of research. prereq: instr consent, dept consent

**EEB 5042. Quantitative Genetics.** (3 cr.; A-F; Every Fall)
Fundamentals of quantitative genetics. Genetic/environmental influences on expression of quantitative traits. Approaches to characterizing genetic basis of trait variation. Processes that lead to change in quantitative traits. Applied/evolutionary aspects of quantitative genetic variation. prereq: [BIOL 4003 or GCD 3022] or instr consent; a course in statistics is recommended

**EEB 5053. Ecology: Theory and Concepts.** (4 cr.; Student Option; Fall Odd Year)
Classical and modern mathematical theories of population growth, interspecific interactions, ecosystem dynamics and functioning, with emphasis on underlying assumptions and on effects of added biological reality on robustness of predictions, stability, interspecific interactions, ecosystem structure and functioning. prereq: Biol 3407 or instr consent

**EEB 5068. Plant Physiological Ecology.** (3 cr.; Student Option No Audit; Spring Even Year)
Plant function, its plasticity/diversity in ecological context. Impact of environmental stresses on major physiological processes of plants, including photosynthesis, respiration, water uptake/transport, and nutrient uptake/assimilation. Lab, field trip to Cedar Creek. prereq: BIOL 2022 or BIOL 3002 or BIOL 3407 or BIOL 3408W or instr consent

**EEB 5221. Molecular Evolution.** (3 cr.; A-F or Audit; Periodic Fall)
Molecular basis of evolutionary change. Selection, neutral evolutionary processes at molecular level. Evolution from gene to genome level: protein structure/function, multigene families, organelle genomes, genome organization. Lectures, current literature, workshops. prereq: [BIOL 4003 or GCD 3022, grad student] or instr consent

**EEB 5322. Evolution and Animal Cognition.** (3 cr.; Student Option; Periodic Fall)
Animal cognitive abilities. Learning, perception, memory, navigation, and communication from evolutionary/comparative perspective. Cognitive abilities as adaptations that solve specific environmental problems. Empirical methods for assessing cognitive abilities. Emphasizes parsimonious interpretations of data. Controversial topics such as animal intelligence, animal language and whether non-human animals have a "theory of mind." prereq: Biol 3411 or Psy 3061 or instr consent

**EEB 5327. Behavioral Ecology.** (3 cr.; Student Option; Spring Even Year)
Evolutionary principles applied to aggressive competition, mate choice, cooperation, and parental investment. Optimization models used to examine foraging strategies, predator/prey interactions, and territoriality. Evolution of sex, sexual selection, dispersal. Evolutionary game theory. prereq: Biol 3411 or instr consent

**EEB 5371. Principles of Systematics.** (3 cr.; Student Option; Spring Odd Year)
Theoretical/practical procedures of biological systematics. Phylogeny reconstruction. Computer-assisted analyses, morphological and molecular approaches, species concepts/speciation, comparative methods, classification, historical biogeography, nomenclature, use/value of museums. prereq: Grad student or instr consent

**EEB 5407. Ecology.** (3 cr.; Student Option; Every Fall)
Principles of ecology from populations to ecosystems. Applications to human populations, disease, exotic organisms, habitat fragmentation, biodiversity and global dynamics of the earth. prereq: [Math 1142, 1241, 1271 or equivalent]

**EEB 5409. Evolution.** (3 cr.; Student Option; Every Fall & Spring)
Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution, including natural selection, sexual selection, genetic drift. Examples of ongoing evolution in wild/domesticated populations and in disease-causing organisms. Lab. prereq: One semester college biology

**EEB 5601. Limnology.** (3 cr.; Student Option; Every Fall)
Advanced introduction to description/analysis of interaction of physical, chemical, and biological factors that control functioning of life in lakes and other freshwater aquatic environments. prereq: Grad student or instr consent

**EEB 5605. Limnology Laboratory.** (2 cr.; A-F or Audit; Every Fall)
Field/lab methods to obtain information on environmental conditions in aquatic environments and measure abundance of aquatic organisms, especially plankton. Field/lab instruments, sampling devices, microscopy, water chemistry, data analysis. prereq: 3603 or instr consent

**EEB 5609. Ecosystem Ecology.** (3 cr.; Student Option; Every Spring)
Regulation of energy and elements cycling through ecosystems. Dependence of cycles on...
ECON 1101. Principles of Macroeconomics. (GP, SOCS; 4 cr.; Student Option; Every Fall, Spring & Summer) Microeconomic behavior of consumers, firms, and markets in domestic and world economy. Demand and supply. Competition and monopoly. Distribution of income. Economic interdependencies in the global economy. Effects of global linkages on individual decisions. prereq: knowledge of plane geometry and advanced algebra

ECON 1202. Principles of Microeconomics. (; 4 cr.; Student Option; Every Fall, Spring & Summer) Aggregate consumption, saving, investment, and national income. Role of money, banking, and business cycles in domestic and world economy. International trade, growth, and development. U.S. economy and its role in the world economy. International interdependencies among nations. prereq: [1101 or equiv], knowledge of plane geometry and advanced algebra

ECON 1905. Freshman Seminar. (; 3 cr.; A-F only; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

ECON 3101. Intermediate Microeconomics. (; 4 cr.; A-F only; Every Fall, Spring & Summer) Behavior of households, firms, and industries under competitive/monopolistic conditions. Factors influencing production, price, and other decisions. Applications of theory. Economic efficiency. Distribution of well-being. prereq: [1101, 1102] or equiv, [MATH 1271 or equiv]

ECON 3102. Intermediate Macroeconomics. (; 4 cr.; A-F only; Every Fall, Spring & Summer) Determinants of national income, employment, and price level; effects of global linkages and fiscal policies; emphasis on a general equilibrium approach. Applications of the theory, especially to current macroeconomic policy issues. Students cannot take this course if they have taken ApEc 3006, however, ApEc 3006 does not contain all material in Econ 3102. Econ majors are encouraged to take ECON 3102 instead of ApEc 3006 prereq: 3101 or equiv

ECON 3951. Major Project Seminar. (; 2 cr.; A-F only; Every Fall, Spring & Summer) Students produce a significant written work in economics. Project demonstrate critical thinking, collection/analysis of data, problem...
solving, interpretation of findings. Modes of inquiry in economics. prereq: 3101, 3102, STAT 3011, [STAT 3022 or equiv]; two [3xxx or 4xxx] ECON courses, at least one 4xxx ECON writing intensive course, freshman writing requirement satisfied

ECON 3960. Topics in Economics. (; 3 cr. [max 6 cr.]; A-F Only; Every Fall & Spring) Topics specified in class schedule. prereq: [1101, 1102] or equiv

ECON 3991. Independent Study. (1-3 cr.; A-F or Audit; Every Fall, Spring & Summer) Students confirm topic of study with faculty supervisor or with director of undergraduate studies before beginning (otherwise no credit). prereq: 3101, 3102, dept consent

ECON 3993. Directed Studies. (1-3 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study in areas not available in regular course offerings. prereq: 3101, 3102, 4261, two semesters of statistics

ECON 4100W. Undergraduate Writing in Economics. (WI; 1 cr. [max 2 cr.]; A-F or Audit; Every Fall & Spring) Research essay. prereq: 3101, [concurrent registration is required (or allowed) in 4831 or concurrent registration is required (or allowed) in economics honors course]. concurrent registration is required (or allowed) in economics advanced courses; freshman writing practice completed, instn consent

ECON 4108. Advanced Game Theory and Applications. (4 cr.; A-F Only; Every Fall & Spring) For Econ B.S. students only. Games. Normal form, extensive form. Wars of attrition. Games of timing. Bargaining applications in international organization, macroeconomics, international economics. prereq: [[3101, 3102] or equiv], [[MATH 1271, MATH 1272] or equiv]; students should have successfully completed two 4xxx level UMNTC economics courses.

ECON 4113. Introduction to Mathematical Economics. (4 cr.; Student Option; Every Fall & Spring) Development of selected models of economic behavior in mathematical terms. Topics selected to illustrate advantages of mathematical formulation. prereq: [[3101, 3102] or equiv], [[MATH 1271, MATH 1272, MATH 2243] or equiv]

ECON 4161. Microeconomic Analysis. (2 cr.; Student Option; Every Fall) Theories of consumer demand, producer supply, and market equilibrium. General equilibrium and welfare. May include topics such as externalities, economics of information/uncertainty. Seven-week course. Meets with 8001, prereq: 3101, 3102, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent

ECON 4162. Microeconomic Analysis. (2 cr.; A-F or Audit; Every Fall) Theories of consumer demand, producer supply, and market equilibrium. General equilibrium and welfare. May include topics such as externalities, economics of information/uncertainty, and game theory. Seven-week course. Meets with 8002, prereq: 3101, 3102, 4161, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent

ECON 4163. Microeconomic Analysis. (2 cr.; Student Option; Every Spring) Theories of consumer demand, producer supply, and market equilibrium. General equilibrium and welfare. May include topics such as externalities, economics of information/uncertainty, and game theory. Seven-week course. Meets with 8003, prereq: 3101, 3102, 4162, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent

ECON 4164. Microeconomic Analysis. (2 cr.; Student Option; Every Spring) Theories of consumer demand, producer supply, and market equilibrium. General equilibrium and welfare. May include topics such as externalities, economics of information/uncertainty, and game theory. Seven-week course. Meets with 8004, prereq: 3101, 3102, 4163, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent

ECON 4165. Macroeconomic Theory. (2 cr.; Student Option; Every Fall) Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. Seven-week course. Meets with 8105, prereq: 3101, 3102, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent

ECON 4166. Macroeconomic Theory. (2 cr.; Student Option; Every Fall) Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, and prices. Seven-week course. Meets with 8106, prereq: 3101, 3102, 4165, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent

ECON 4167. Macroeconomic Theory. (2 cr.; Student Option; Every Spring) General equilibrium models with uncertainty, search, matching, indivisibilities, private information. Implications of theory for measurement and data reporting. Overlapping generations, dynasty models with money/government. Variational/recursive methods. Seven-week course. Meets with 8107, prereq: 3101, 3102, 4166, MATH 2243, MATH 2263, [[STAT 4101, STAT 4102] or equiv], dept consent


Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

ECON 4432W. International Finance. (WI; 3 cr.; Student Option; Every Spring & Summer) Balance of payments; international financial markets; exchange rate determination; international monetary system; international investment and capital flows; financial management of the multinational firm; open economy macroeconomic policy. prereq: 3101, 3102 or equiv, 4431 or 4439 or equiv recommended

ECON 4531. Labor Economics. (3 cr.; Student Option; Every Fall & Spring) Economic analysis of labor markets and their operations; population and labor force; labor market institutions; wage and employment theories; unions and collective bargaining; public policy. prereq: 3101, 3102 or equiv

ECON 4538. Advanced Labor Economics. (4 cr.; A-F only; Every Fall & Spring) For B.S. Econ majors only. Economic analysis of domestic and global labor markets; population and labor force; labor market institutions; wage and employment theories; unions and collective bargaining; public policy including immigration, outsourcing, living wages, earnings mobility, downsizing; special topics. prereq: 3101, 3102 or equiv, Calc 1 or equivalent


ECON 4631. Industrial Organization and Antitrust Policy. (; 3 cr.; Student Option; Every Fall, Spring & Summer) Relations between market structure, economic efficiency and welfare. Economic origins of monopoly and other restraints on competition. Purposes and effects of antitrust and related legislation. Industrial policy. prereq: 3101 or equiv

ECON 4721. Money and Banking. (; 3 cr.; A-F only; Every Fall, Spring & Summer) Theories of money demand and money supply. Financial intermediation and banking, banking practices and regulation, role of the Federal Reserve system. Monetary theory and policy. prereq: [3101, 3102] or equiv

ECON 4721H. Money and Banking. (; 3 cr.; A-F only; Every Fall, Spring & Summer) Theories of money demand and money supply. Financial intermediation and banking, banking practices and regulation, role of the Federal Reserve system. Monetary theory and policy. prereq: [3101, 3102] or equiv

ECON 4731. Macroeconomic Policy. (; 3 cr.; Student Option; Every Fall & Spring) Monetary vs. fiscal policy debate in the context of the underlying macroeconomic theory controversy. Comparison of Keynesian, Monetarist, and Classical theories; rational expectations; policy ineffectiveness; time inconsistency; rules vs. discretion; budget deficits; unemployment and inflation. prereq: 3101, 3102 or equiv

ECON 4738. Advanced Macroeconomic Policy. (4 cr.; A-F only; Every Fall & Spring) For Econ B.S. majors only. Monetary vs. fiscal policy debate in context of underlying macroeconomic theory controversy. Comparison of Keynesian, Monetarist, Classical theories. Rational expectations, policy ineffectiveness, time inconsistency, rules versus discretion, budget deficits. Unemployment/inflation. prereq: [3101, 3102] or equiv, Math 1271

ECON 4748. Advanced Quantitative Analysis of the Macroeconomy. (4 cr.; A-F only; Every Fall & Spring) For Econ B.S. majors only. Development/calibration of growth model. Effects of policies on output, employment, other aggregate variables. Determination and estimation of business cycle facts and costs. Real business theory. Prediction of business cycle facts. Course provides students some basic analytical and numerical tools that allows them to quantify the impact of fiscal and monetary policies on the macroeconomy. prereq: [Econ 3101, 3102] or equiv, [Stat 3011 or equiv]

ECON 4751. Financial Economics. (; 3 cr.; Student Option; Every Fall, Spring & Summer) Financial decisions of firms/investors. Determination of interest rates and asset prices. Role of risk/uncertainty. Emphasizes economic models. prereq: [3101 or equiv, Math 1271 or equiv], one sem statistics

ECON 4751H. Honors: Financial Economics. (; 4 cr.; A-F only; Every Fall & Spring) Efficiency of financial markets. Theoretical concepts, empirical evidence. prereq: 3101, 3102 or equiv, Math 1271 or equiv, [Stat 3011 or equiv]

ECON 4821. Public Economics. (3 cr.; A-F only; Every Fall, Spring & Summer) Competing views on proper role of government in economy. Effects of tax/spending policies, taking into account private agents’ response to governance actions/ways government officials may use powers. Optimal policies. Applications primarily to U.S. government. prereq: [3101, 3102] or equiv

ECON 4831. Cost-Benefit Analysis. (3 cr.; Student Option; Every Fall & Spring) Evaluation of benefits and costs of public projects and programs. Issues connected with definition and measurement of benefits and costs. Rate of return and discount. Market imperfections, risk, uncertainty. Case studies.

ECON 4960. Topics in Economics. (4 cr. [max 8 cr.]; A-F only; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: [3101 or 3102 or equiv], Math 1271

ECON 4960H. Honors: Topics in Economics. (; 4 cr. [max 8 cr.]; A-F only; Periodic Fall & Spring) Topics specified in Class Schedule prereq: [3101, 3102] or equiv, Math 1271; may change based on topic

ECON 4968. Advanced Topics in Economics. (; 4 cr. [max 8 cr.]; A-F only; Every Fall) Topics specified in Class Schedule. prereq: (3101, 3102) or equiv, Math 1271, (Stat 3011 or equiv), successfully complete at least two 4xxx level UMNTC economics courses.

ECON 4993. Directed Study. (; 1-4 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study in areas not available in regular course offerings. prereq: dept consent

ECON 4993H. Directed Study Honors Thesis. (; 3 cr.; A-F only; Every Fall, Spring & Summer) Honors Thesis.

ECON 5109. Game Theory for Engineers. (; 3 cr.; A-F only; Every Spring) Introduction to game theory. Utility theory, non-cooperative/cooperative games, bargaining theory. Games in normal/ extensive form. Nash equilibrium/refinements. prereq: [Math 2283, 2373, 2374, 3283] or Math 4606, [M.S./Ph.D. student in engineering or comp sci or info tech or operations mgmt] or instr consent

ECON 5890. Economics of the Health-Care System. (; 3 cr.; A-F or Audit; Every Fall) Economic analysis of U.S. health-care sector. Emphasizes problems of pricing, production, distribution. Health-care services as one factor contributing to nation's health. prereq: 3101 or instr consent

ECON 8001. Microeconomic Analysis. (; 2 cr.; Student Option; Every Fall) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4161. prereq: 5151 or equiv, Math 2243, Math 2263 or equiv or instr consent

ECON 8002. Microeconomic Analysis. (; 2 cr.; Student Option; Every Fall) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4162. prereq: 8001

ECON 8003. Microeconomic Analysis. (; 2 cr.; Student Option; Every Spring) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4163. prereq: 8002

ECON 8004. Microeconomic Analysis. (; 2 cr.; Student Option; Every Spring) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: economics of information and uncertainty, and game theory. This seven-week course meets with 4164. prereq: 8003
externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4164. prereq: 8003

ECON 8101. Microeconomic Theory. (2 cr.; Student Option; Every Fall)
Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course. prereq: 5151 or equiv, Math 2243, Math 2263 or equiv or instr consent

ECON 8106. Macroeconomic Theory. (2 cr.; Student Option; Every Fall)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4165. prereq: 5152 or equiv, Math 2243, Math 2263 or equiv or instr consent

ECON 8107. Macroeconomic Theory. (2 cr.; Student Option; Every Spring)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4166. prereq: 8105

ECON 8108. Macroeconomic Theory. (2 cr.; Student Option; Every Spring)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4167. prereq: 8106

ECON 8111. Introduction to Mathematical Economics. (2 cr.; Student Option; Every Fall & Spring)
Use of mathematical models in economic theory. Standard techniques. This seven-week course meets with 4168. prereq: 8107

ECON 8119. Cooperative Game Theory. (2 cr.; Student Option; Every Fall)
Basics of cooperative game theory, emphasizing concepts used in economics. Games with and without transferable utility; the core, the value, and other solution concepts. Recent results, including potentials, reduced games, consistency, and noncooperative implementation of cooperative solution concepts. Seven-week course. prereq: 8104, Math 5616 or equiv or instr consent

ECON 8181. Advanced Topics in Microeconomics. (2 cr. [max 4 cr.]; Student Option; Every Fall)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8104 or instr consent

ECON 8182. Advanced Topics in Microeconomics. (2 cr. [max 4 cr.]; Student Option; Every Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8108 or instr consent

ECON 8185. Advanced Topics in Macroeconomics. (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8108 or instr consent

ECON 8186. Advanced Topics in Macroeconomics. (2 cr. [max 4 cr.]; Student Option; Periodic Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8108 or instr consent

ECON 8191. Workshop in Mathematical Economics. (1-3 cr. [max 10 cr.]; Student Option; Every Fall)
Students conduct research and present papers under faculty supervision. prereq: 8104 or instr consent

ECON 8192. Workshop in Mathematical Economics. (1-3 cr. [max 10 cr.]; Student Option; Every Spring)
Students work on research and present papers under faculty supervision. prereq: 8104 or instr consent

ECON 8201. Econometric Analysis. (2 cr.; Student Option; Every Fall)
Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form games. Applications including bargaining and auctions. Seven-week course. prereq: Math 5616 or equiv or instr consent

ECON 81119. Noncooperative Game Theory. (2 cr.; Student Option; Every Fall & Spring)
Solution concepts for noncooperative games in normal form, including Nash and perfect equilibrium and stable sets of equilibria. Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form games. Applications including bargaining and auctions. Seven-week course. prereq: Math 5616 or equiv or instr consent
Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models. prereq: [[3101 or equiv], [Math 1272 or equiv], Stat 5102] or instr consent

ECON 8203. Econometric Analysis. ( ; 2 cr.; Student Option; Every Spring) Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models. prereq: 8202

ECON 8204. Econometric Analysis. ( ; 2 cr.; Student Option; Every Spring) Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models. prereq: 8202

ECON 8205. Applied Econometrics. ( ; 2 cr.; Student Option; Every Fall) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: Math 4242 or equiv, concurrent registration is required (or allowed) in Econ 8101, concurrent registration is required (or allowed) in Econ 8105, concurrent registration is required (or allowed) in Stat 5101 or instr consent

ECON 8206. Applied Econometrics. ( ; 2 cr.; Student Option; Every Fall) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: 8205, concurrent registration is required (or allowed) in 8102, concurrent registration is required (or allowed) in 8106, concurrent registration is required (or allowed) in Stat 5101 or instr consent

ECON 8207. Applied Econometrics. ( ; 2 cr.; Student Option; Every Spring) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: 8206, concurrent registration is required (or allowed) in 8103, concurrent registration is required (or allowed) in 8107, concurrent registration is required (or allowed) in Stat 5102 or instr consent

ECON 8208. Applied Econometrics. ( ; 2 cr.; Student Option; Periodic Spring) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: 8207, concurrent registration is required (or allowed) in 8104, concurrent registration is required (or allowed) in 8108, concurrent registration is required (or allowed) in Stat 5102 or instr consent

ECON 8211. Econometrics. ( ; 2 cr.; Student Option; Every Fall) Linear regression; general linear hypotheses; Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. prereq: 5151, 5152, Math 4242 or equiv, Stat 5102 or instr consent

ECON 8212. Econometrics. ( ; 2 cr.; Student Option; Every Fall) Linear regression; general linear hypotheses; Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. prereq: 8211

ECON 8213. Econometrics. ( ; 2 cr.; Student Option; Periodic Fall) Linear regression; general linear hypotheses; Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. prereq: 8212

ECON 8214. Econometrics. ( ; 2 cr.; [max 4 cr.]; Student Option; Periodic Fall & Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8312 or instr consent; offered when feasible

ECON 8215. Advanced Topics in Econometrics. ( ; 2 cr.; [max 4 cr.]; Student Option; Periodic Fall & Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8312 or instr consent; offered when feasible

ECON 8281. Advanced Topics in Econometrics. ( ; 2 cr.; [max 4 cr.]; Student Option; Periodic Fall & Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8213 or instr consent

ECON 8282. Workshop in Econometrics. ( ; 1-3 cr. [max 10 cr.]; Student Option; Every Fall) Workshop in Econometrics prereq: 8213 or instr consent

ECON 8283. Workshop in Econometrics. ( ; 1-3 cr. [max 10 cr.]; Student Option; Every Fall) Workshop in Econometrics prereq: instr consent

ECON 8311. Economic Growth and Development. ( ; 2 cr.; Student Option; Every Fall) Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course. prereq: 8311 or instr consent

ECON 8312. Economic Growth and Development. ( ; 2 cr.; Student Option; Every Fall & Spring) Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course. prereq: 8311 or instr consent

ECON 8313. Economic Growth and Development. ( ; 2 cr.; Student Option; Every Spring) Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course. prereq: 8312 or instr consent

ECON 8333. FTE: Master's. ( ; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

ECON 8381. Advanced Topics in Economic Development. ( ; 2 cr.; [max 4 cr.]; Student Option; Periodic Fall & Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8312 or instr consent; offered when feasible

ECON 8391. Workshop in Economic Growth and Development. ( ; 1-3 cr. [max 10 cr.]; Student Option; Every Fall) Workshop in Economic Growth and Development prereq: instr consent

ECON 8392. Workshop in Economic Growth and Development. ( ; 1-3 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) tbd prereq: instr consent

ECON 8401. International Trade and Payments Theory. ( ; 2 cr.; Student Option; Every Fall) Impact of trade on factor rentals. Stolper-Samuelson, Rybczynski, and factor price equalization theorems. Heckscher-Ohlin theorem. Derivation of offer curves and general international equilibrium. Transfer problem. Seven-week course. prereq: 8103, 8105 or instr consent

ECON 8402. International Trade and Payments Theory. ( ; 2 cr.; Student Option; Every Fall & Spring) Tariffs, quotas, and other barriers to trade; gains from trade; trading blocs; increasing returns; growth. This is a seven-week course. prereq: 8401 or instr consent

ECON 8403. International Trade and Payments Theory. ( ; 2 cr.; Student Option; Every Fall) International business cycles; exchange rates; capital movements; international liquidity. This is a 7-week course. prereq: 8402 or instr consent

ECON 8404. International Trade and Payments Theory. ( ; 2 cr.; Student Option; Periodic Fall) Theoretical models of international trade. Trade data, empirical work on trade. Seven week course. prereq: [8402, 8403] or instr consent

ECON 8444. FTE: Doctoral. ( ; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

ECON 8481. Advanced Topics in International Trade. ( ; 2 cr.; [max 4 cr.]; Student Option; Every Fall & Spring)
ECON 8482. Advanced Topics in International Trade. (2 cr. [max 4 cr.]; Student Option; Periodic Fall & Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8403 or instr consent

ECON 8491. Workshop in Trade and Development. (; 1-3 cr. [max 10 cr.]; Student Option; Every Fall) Workshop in Trade and Development prereq: instr consent

ECON 8492. Workshop in Trade and Development. (; 1-3 cr. [max 10 cr.]; Student Option; Every Spring) tbl prereq: instr consent

ECON 8501. Wages and Employment. (2 cr. [max 4 cr.]; Student Option; Every Fall) Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage and employment theories and practices. Economic impacts of unions. Seven-week course. prereq: 8102, 8106 or instr consent

ECON 8502. Wages and Employment. (; 2 cr. ; Student Option; Every Fall & Spring) Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage and employment theories and practices. Economic impacts of unions. Seven-week course. prereq: 8501 or instr consent

ECON 8503. Wages and Employment. (; 2 cr. [max 4 cr.]; Student Option; Every Spring) Economic analysis of labor markets and their operation under conditions of individual/collective bargaining. Implications of labor market operations for resource allocation, wage/price stability, income/employment growth. Wage structures and wage levels. Wage/employment theories/practices. Economic impacts of unions. Seven-week course. prereq: 8502 or instr consent

ECON 8581. Advanced Topics in Labor Economics. (; 2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8502 or instr consent

ECON 8582. Advanced Topics in Labor Economics. (; 2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8502 or instr consent

ECON 8601. Industrial Organization and Government Regulation. (; 2 cr. ; Student Option; Every Fall) Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course. prereq: 8102 or instr consent

ECON 8602. Industrial Organization and Government Regulation. (; 2 cr. ; Student Option; Every Fall) Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course. prereq: 8601 or instr consent

ECON 8603. Industrial Organization and Government Regulation. (; 2 cr. ; Student Option; Every Spring) Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course. prereq: 8602 or instr consent

ECON 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbl prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ECON 8681. Advanced Topics in Industrial Organization. (; 2 cr. [max 4 cr.]; Student Option; Periodic Fall & Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8603 or instr consent

ECON 8681. Workshop in Applied Microeconomics. (; 1-3 cr. [max 10 cr.]; Student Option; Every Fall) Workshop in Applied Microeconomics prereq: instr consent

ECON 8692. Workshop in Applied Microeconomics. (; 1-3 cr. [max 10 cr.]; Student Option; Every Spring) tbl prereq: instr consent

ECON 8701. Monetary Economics. (; 2 cr. ; Student Option; Every Fall) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course. prereq: 8103, 8106 or instr consent

ECON 8702. Monetary Economics. (; 2 cr. ; Student Option; Every Fall & Spring) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course. prereq: 8701 or instr consent

ECON 8703. Monetary Economics. (; 2 cr. [max 4 cr.]; Student Option; Every Spring) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course. prereq: 8702 or instr consent

ECON 8704. Financial Economics. (; 2 cr. ; Student Option; Every Fall) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course. prereq: 8103, 8106 or instr consent

ECON 8705. Financial Economics. (; 2 cr. ; Student Option; Every Fall & Spring) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course. prereq: 8704 or instr consent

ECON 8706. Financial Economics. (; 2 cr. ; Student Option; Every Spring) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course. prereq: 8705 or instr consent

ECON 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ECON 8781. Advanced Topics in Monetary Economics. (; 2 cr. [max 4 cr.]; Student Option; Every Spring) Faculty and student presentations based on recent literature. Seven-week course. prereq: 8702 or instr consent

ECON 8791. Workshop in Macroeconomics. (1-3 cr. [max 10 cr.]; Student Option; Every Fall) Workshop in Macroeconomics prereq: instr consent

ECON 8792. Workshop in Macroeconomics. (; 1-3 cr. [max 10 cr.]; Student Option; Every Spring) Workshop in Macroeconomics prereq: instr consent

ECON 8801. Public Economics. (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring) Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course. prereq: 8103, 8106 or instr consent

ECON 8802. Public Economics. (; 2 cr. ; Student Option; Every Fall & Spring)
Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course. prereq: 8801 or instr consent

ECON 8803. Public Economics. (3 cr.; Student Option; Periodic Spring)
Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course. prereq: 8802 or instr consent

ECON 8881. Advanced Topics in Public Economics. (2 cr. [max 4 cr.]; Student Option; Every Fall)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8803 or instr consent

ECON 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ECON 8891. Workshop in Public Economics and Policy. (1-3 cr. [max 10 cr.]; Student Option; Periodic Fall & Spring)
Workshop in Public Economics and Policy prereq: instr consent

ECON 8892. Workshop in Public Economics and Policy. (1-3 cr. [max 10 cr.]; Student Option; Periodic Fall & Spring)
Workshop in Public Economics and Policy prereq: instr consent

ECON 8899. Individual Graduate Research. (1-7 cr.; Student Option; Every Fall, Spring & Summer)
Individual Graduate Research prereq: instr consent

Ecuador (ECDR)

ECDR 1004. Intermediate Spanish IV. (4 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ECDR 3001. Social Determinants of Health - Ecuador Case Study. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ECDR 3011. Advanced Spanish. (4 cr.; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ECDR 3015. Spanish Composition and Communication. (4 cr.; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ECDR 3021. Advanced Spanish. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

Education (EDUC)

EDUC 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

EDUC 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

EDUC 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

EDUC 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

EDUC 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Educational Psychology (EPSY)

EPSY 1261. Understanding Data Stories through Visualization & Computing. (3 cr.; A-F only; Every Fall & Spring)
Academics and researchers have long used data & visualization to support and illuminate particular narratives in their scholarship. Today, data visualizations are found not only in the pages of academic journals; many non-academics, including journalists and activists, use increasingly complex data visualizations and statistical summaries to convey salient information and storylines. This course will help students build on their statistical thinking and understanding learned in high school to think critically about the use of summaries and visualization and their role in the data narrative. It will also cover the use of computational tools and methods for creating data summaries and visualization that facilitate seeing patterns and relationships in data, and producing better narrative through communicating with data. Students will learn course material through in-class activities and projects conducted in cooperative learning groups and through assignments requiring the application of concepts and technology presented in class to additional real-world examples of data visualization.

EPSY 1281. Psychological Science Applied. (SOCS; 4 cr.; A-F only; Every Fall, Spring & Summer)
The course introduces students to applied psychology as a discipline and reviews fundamental principles of psychology through the lenses of applied and professional areas that are the foci of CEHD majors. Specifically, through the lenses of education, we review principles of learning, memory, development, intelligence, and interventions; through the lenses of health and wellness, we review personality, biological, social, and cognitive bases of normal and abnormal behavior, as well as treatments; and, through the lenses of business and organizations, we review principles of motivation, sensation perception, and social behavior. Thus, these psychological principles are considered theoretically, empirically, and through examples for application, with lab discussions and projects emphasizing education, business, health and wellness. The course serves as a foundation for future coursework in education, health sciences, and psychology, and is consistent with the APA’s public education effort to demonstrate how the science and application of psychology benefits society and improves lives.

EPSY 1905. Freshman Seminar. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall)
Interdisciplinary seminar. Topics specified in Class Schedule.

EPSY 1942. Freshman Seminar: Technology and Society. (TS; 3 cr.; Student Option; Periodic Fall)
Interdisciplinary seminar. Topics specified in Class Schedule.

EPSY 2601. Understanding Differences, Disabilities and the Career of Special Education. (4 cr.; A-F only; Every Fall & Spring)
Impact of disabilities on individual/family. Support systems for persons with disabilities, approaches for advocacy. Employ reflective practices when considering concept of disability.

EPSY 3101. Creativity and Intelligence: an Introduction. (3 cr.; Student Option No Audit; Periodic Fall)
Classic/contemporary theories of creativity/ intelligence, their development, implications for behavioral/social sciences and psychological/ educational practices.

EPSY 3119. Learning, Cognition, and Assessment. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, and assessment. Topics: behaviorism, cognitive and social constructivism, human information processing theory, intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability, validity, student evaluation, performance assessment, and portfolios.

EPSY 3132. Psychology of Multiculturalism in Education. (DSJ; 3 cr.; A-F or Audit; Every Fall)
Course critically examines social and cultural diversity in the United States, confronting social issues of poverty, handicappism, homophobia, racism, sexism, victim-blaming, violence, and so on, and presenting models for change.
Students examine how and why prejudices develop.

**EPSY 3133. Practicum: Service Learning, Psychology of Multiculturalism in Education.** (1-3 cr.; Student Option; Periodic Fall)
Thirty hours of service learning in multicultural communities. Students work with children, youth, or adults in ESL tutoring or after-school youth programs. Sensitivities/competencies related to multicultural issues in U.S. society. prereq: [3132 or concurrent registration is required (or allowed) in 3132], instr consent, enrollment in APECS minor

**EPSY 3264. Basic and Applied Statistics.** (MATH; 3 cr.; Student Option; Every Fall, Spring & Summer)

**EPSY 3300. Special Topics in Educational Psychology.** (1-4 cr.; max 9 cr.; Student Option; Periodic Fall)
Current issues in educational psychology or related coursework in areas not normally available through regular curriculum offerings.

**EPSY 3301. Introduction to Educational Psychology.** (SOC; 3 cr.; Student Option No Audit; Every Fall)
History, current work. Future promise of educational psychology. Major topics in educational psychology. Focuses on interplay between theory, empirical research, and practical applications.

**EPSY 3302. Introduction to Communication Skills for Educational and Community Settings.** (3 cr.; Student Option No Audit; Every Fall)
Working with diverse individuals/groups in educational/community settings. Communication skills/concepts. Self-reflection on communication style.

**EPSY 3303. Educational Psychology Undergraduate Research Practicum.** (3 cr.; max 6 cr.; A-F or Audit; Every Fall & Spring)
Supervised research experience. Students are matched with University faculty members and their research projects. prereq: 3264, minor in applied psychology for educational/community settings

**EPSY 3701. Practicum: Field Experience in Special Education.** (1-2 cr.; max 24 cr.; S-N only; Every Fall & Spring)
Observations and supervised support of teaching practice in schools or agencies serving children with disabilities in integrated programs.

**EPSY 4001. Teaching Students with Special Needs in Inclusive Settings.** (1 cr.; A-F only; Every Spring)
Historical perspectives, definitions/professional language, characteristics, needs, service delivery systems for each area of exceptionality. prereq: Must be enrolled in either the initial teaching licensure program for music education or agricultural education students. All other initial teaching licensure candidates should enroll in 5015 and 5016.

**EPSY 5001. Learning, Cognition, and Assessment.** (3 cr.; Student Option; Every Fall, Spring & Summer)
Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, assessment. Behaviorism, cognitive/social constructivism, human information processing theory. Intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability/validity, student evaluation, performance assessment, portfolios, demonstrations. Applications to instruction/organization of curricular materials. prereq: MED/initial licensure student or CLA music ed or preteaching major or instr consent; psych course recommended

**EPSY 5015. Teaching Students with Special Needs in Inclusive Settings.** (1 cr.; A-F only; Every Summer)
Areas of exceptionality defined in federal/state regulations. Historical perspectives, definitions, etiology, characteristics, needs, and service delivery systems. Collaborating with special education personnel. prereq: Enrolled in a teacher initial licensure program

**EPSY 5016. Teaching Students with Special Needs in Inclusive Settings.** (1 cr.; A-F only; Every Fall)
Attending to constant transitions/development in which children/adolescents negotiate their road to adulthood. How to foster learning/positive development. prereq: Enrolled in a teacher initial licensure program

**EPSY 5101. Intelligence and Creativity.** (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Contemporary theories of intelligence and intellectual development and contemporary theories of creativity and their implications for educational practices and psychological research.

**EPSY 5112. Knowing, Learning, and Thinking.** (4 cr.; A-F or Audit; Every Spring & Summer)
Principles of human information processing, memory, and thought; mental operations in comprehension and problem solving; developing expertise and automaticity; emphasis on applied settings.

**EPSY 5113. Psychology of Instruction and Technology.** (3 cr.; Student Option; Periodic Spring)
Introduction to adult learning and instructional design. Application of core foundational knowledge to development of effective learning environments for adults. Topics include philosophy, learning theories, instructional models, development and experience, individual differences, evaluation, assessment, and technology.

**EPSY 5114. Psychology of Student Learning.** (3 cr.; A-F or Audit; Every Fall & Spring)
This course is designed for students to engage in advanced study in the psychology of student learning, cognition, and development as it applies to educational psychology. Topics include: principles of learning, cognitive development, behaviorism, motivation, intelligence, reasoning, instruction, and assessment.

**EPSY 5115. Psychology of Adult Learning and Instruction.** (3 cr.; Student Option; Every Fall)
Survey of adult learning/instruction. Emphasizes instructional design, learning theories, experience, individual differences, evaluation, tests/measurement, technology. Implications for curricular/instructional design in higher education, continuing education, professional/business related training.

**EPSY 5119. Mind, Brain, and Education.** (3 cr.; Student Option No Audit; Spring Odd Year)
How educationally relevant skills/concepts develop in both typical/atypical children. prereq: 3301 or equiv

**EPSY 5135. Human Relations Workshop.** (4 cr.; Student Option; Every Fall & Summer)
Experiential course addressing issues of prejudice and discrimination in terms of history, power, and social perception. Includes knowledge and skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, effective leadership, judgment and decision-making, prejudice reduction, conflict resolution.

**EPSY 5151. Cooperative Learning.** (3 cr.; Student Option; Every Spring)
Participants learn how to use cooperative learning in their setting. Topics include theory and research, teacher’s role, essential components that make cooperation work, teaching social skills, assessment procedures, and collegial teaching teams.

**EPSY 5157. Social Psychology of Education.** (3 cr.; A-F or Audit; Every Fall)
Overview of social psychology and its application to education. Participants study the major theories, research, and major figures in field. Class sessions include lectures, discussions, simulations, role-plays, and experiential exercises.

**EPSY 5191. Education of the Gifted and Talented.** (3 cr.; A-F or Audit; Every Spring & Summer)
Theories of giftedness, talent development, instructional strategies, diversity and technological issues, implications for educational practices and psychological inquiry, and international considerations.

**EPSY 5216. Introduction to Research in Educational Psychology and Human Development.** (3 cr.; A-F or Audit; Every Fall)
Designing/conducting a research study. Reviewing literature, formulating research problem, using different approaches to gather data, managing/analyzing data, reporting results. prereq: 5261 or intro statistics course

**EPSY 5221. Principles of Educational and Psychological Measurement.** (3 cr.; Student Option; Every Fall)
Concepts, principles, and methods in educational/psychological measurement.
### EPSY 5243. Principles and Methods of Evaluation. (3 cr.; Student Option; Every Fall, Spring & Summer)
Introductory course in program evaluation; planning an evaluation study, collecting and analyzing information, reporting results; overview of the field of program evaluation.

### EPSY 5244. Survey Design, Sampling, and Implementation. (3 cr.; Student Option; Every Fall)
Survey methods, including mail, phone, and Web-based/e-mail surveys. Principles of measurement, constructing questions/forms, pilot testing, sampling, data analysis, reporting. Students develop a survey proposal and a draft survey, pilot the survey, and develop sampling/data analysis plans. prereq: [5221 or 5231 or 5261 or equiv], [CEHD grad student or MEd student]

### EPSY 5245. Advanced Survey Data Analysis for Categorical and Rating Scale Data. (1 cr.; Student Option: Every Spring)
Practical course. Specific nature of survey data (typically categorical or ordinal). Appropriate data analytic methods. prereq: 5244, 5261

### EPSY 5246. Evaluation Colloquium: Psychological Foundations. (1 cr. [max 8 cr.]; S-N or Audit; Periodic Fall & Spring)
Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation. prereq: 5243 or EdPA 5501

### EPSY 5247. Qualitative Methods in Educational Psychology. (3 cr.; Student Option; Every Fall)
Introduction to qualitative methods of inquiry. Contrasting different research traditions (e.g., case study, phenomenology, ethnography, social constructionism, critical theory). Practice with field notes, observations, and interviewing. Use of NVIVO to track/code data. prereq: Grad student

### EPSY 5261. Introductory Statistical Methods. (3 cr.; Student Option: Every Fall, Spring & Summer)

### EPSY 5262. Intermediate Statistical Methods. (3 cr.; Student Option: Every Fall & Spring)
Application of statistical concepts/procedures. Analysis of variance, covariance, multiple regression. Experimental design: completely randomized, block, split plot/repeated measures. prereq: 3264 or 5261 or equiv

### EPSY 5271. Becoming a Teacher of Statistics. (3 cr.; Student Option; Periodic Fall & Spring)
Current methods of teaching first courses in statistics. Innovative teaching methods, materials, and technological tools. Types of first courses, reform recommendations, goals for student learning, recommended content, teaching methods, technology, student assessment. prereq: 5261 or equiv

### EPSY 5272. Statistics Teaching Internship. (1-3 cr.; S-N only; Every Fall & Spring)
Supervised teaching experience. prereq: Grad student, instr consent

### EPSY 5400. Special Topics in Counseling Psychology. (1-4 cr. [max 8 cr.]; Student Option: Every Fall, Spring & Summer)
Theory, research, and practice in counseling and student personnel psychology. Topics vary.

### EPSY 5401. Counseling Procedures. (3 cr.; Student Option: Every Fall, Spring & Summer)
Emphasis on the counseling relationship and principles of interviewing. Case studies, role playing, and demonstration. For individuals whose professional work includes counseling and interviewing. prereq: Upper div student

### EPSY 5415. Child and Adolescent Development and Counseling. (4 cr.; A-F or Audit; Every Fall & Summer)
Development, issues, and needs of children, kindergarten through high school ages. Counseling/developmental theory/strategies, family/social environment, Cultural diversity, legal/ethical issues in counseling children/adolescents. prereq: Grad student or MEd student or K-12 [counseling endorsement or licensure] student

### EPSY 5417. Leadership and Administration of Student Affairs. (3 cr.; Student Option; Every Fall, Spring & Summer)
Theoretical approaches, administrative structure, and evaluation methods used in college/university student affairs.

### EPSY 5421. Foundations of Individual/Organizational Career Development. (3 cr.; Student Option: Spring Even Year)
Introduction to individual and organizational career development theory and practice. Examines critical issues in work patterns, work values, and workplaces in a changing global society, with implications for career planning, development, and transitions, emphasizing personal and organizational change. For nonmajors: student in school counselor program or instr consent

### EPSY 5435. Introduction to School Counseling. (3-6 cr.; A-F only; Every Fall & Spring)
History/evolution of school counselor role in schools. Duties/demands of school counselor. Examine comprehensive guidance programming in K-12 schools. Issues in school counseling profession. prereq: CSPP grad student in school counselor prog or instr consent

### EPSY 5436. Crisis Management and Consulting in Schools. (3 cr.; A-F or Audit; Every Fall)
Issues, topics, problems. Diversity in school counseling. Review, discussion, analysis of current literature. Students develop prevention, intervention, guidance programs for K-12 schools. prereq: CSPP grad student in school counselor program or instr consent

### EPSY 5451. College Students Today. (3 cr.; Student Option; Every Fall, Spring & Summer)
Issues involving diverse populations of students in colleges/universities. Student development theory, students' expectations/interests, how college affects student outcomes. Role of curricular/extracurricular activities and of student-faculty interactions.

### EPSY 5461. Cross-Cultural Counseling. (3 cr.; A-F or Audit; Every Fall)

### EPSY 5604. Transition From School to Work and Community Living for Persons With Special Needs. (3 cr.; Student Option; Every Spring & Summer)
Use of strategies/models for improving transition of youth from school to work and community living. Course content that specifically addresses all phases of student assessment, individualized transition planning. Parent, family, and student involvement in designing post school options. Community-based services (employment, residential living, social and recreational services, etc). Comprehensive interagency approaches.

### EPSY 5605. Collaborative Practices for the Special Educator. (3 cr.; A-F only; Every Spring)
Skills/knowledge required to consult/collaborate with school personnel, families, other professionals to maintain effective educational support.

### EPSY 5609. Family-centered Services. (2 cr.; A-F or Audit; Every Fall)

### EPSY 5611W. Research-based Practices in Academic and Behavior Disabilities. (WI; 3 cr.; A-F only; Every Fall)
Research that provides conceptual basis to aid in understanding of students with academic difficulties. Develop critical thinking skills through examination of research-based practices.

### EPSY 5612. Understanding of Academic Disabilities. (3 cr.; A-F or Audit; Every Fall & Spring)
Introduction to issues related to the education of students with academic disabilities (learning disabilities, mild mental intellectual disabilities, and emotional/behavioral disabilities) including history, definition, assessment, classification, legislation, and intervention approaches.
EPSY 5613. Foundations of Special Education I. (DSU; 3 cr.; A-F or Audit; Periodic Fall, Spring & Summer) Organization of educational programs/services for people with disabilities. First course for students seeking to become licensed in special education.

EPSY 5614. Assessment and Due Process in Special Education. (3 cr.; A-F or Audit; Every Spring & Summer) Participants will learn basic standardized assessment and how it directly relates to special education. In addition, students will use the assessment as part of an ongoing process for making instructional programming decisions. Students will apply skills in designing and evaluating assessment plans and in making eligibility decisions. prerequisite: 5613 or equiv or instr consent

EPSY 5615. Advanced Academic Interventions. (3 cr.; A-F or Audit; Every Spring) Designing, implementing, and evaluating individual educational plans (IEPs) for special education service in learning disabilities, emotional/behavioral disorders, and mild mental/intellectual disabilities. prerequisite: 5612

EPSY 5616. Classroom Management and Behavior Analytic Problem Solving. (3 cr.; Student Option; Every Fall, Spring & Summer) Assumptions, principles, procedures of problem solving approach to analyzing behavior/programs for classroom management. Conducting observations, intervening, evaluating behavioral change.

EPSY 5617. Academic and Social Interventions for Students with Mild to Moderate Disabilities. (3 cr.; A-F only; Every Spring) Use problem solving model to make data-based decisions regarding implementation and evaluation of instruction for students with academic and behavioral difficulties. prerequisite: instr consent

EPSY 5618. Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language. (3 cr.; A-F or Audit; Every Fall) Historical/contemporary perspectives, empirical evidence relating to reading/written language instruction/assessment designed to improve outcomes of students with disabilities. Field work in tutoring.

EPSY 5619W. Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities. (WI; 3 cr.; A-F only; Every Fall) Mathematics interventions using data-based, decision-making approach. Instructional strategies. Prevention/remediation of mathematics difficulties.

EPSY 5621. Assessment and Instructional Design for Students with Developmental Disabilities. (3 cr.; A-F or Audit; Every Spring) Methods/materials course. Functional/standards-based approaches to promoting academic learning in students with developmental disabilities. prerequisite: 5613, 5614

EPSY 5622. Programs and Curricula for Students with Developmental Disabilities. (3 cr.; Student Option; Every Summer) Developing programs/curricula for students with moderate, severe, profound developmental delays, as well as severe multihandicapping conditions. Special consideration given to preparing children/youth for integrated community environments. prerequisite: 5621 or 5661 and 5662


EPSY 5625. Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction. (2 cr.; A-F or Audit; Every Fall) Overview of the issues, problems, and practical applications in designing early intervention services for young children with disabilities and their families.

EPSY 5626. Seminar: Developmental Disabilities and Instructional Management. (3 cr.; Student Option; Every Fall & Summer) Data-based strategies for school and nonschool instruction of learners with developmental disabilities including assessment, design, implementation, and evaluation of curriculum and instruction: curriculum content, concept and task analysis, classroom arrangements, natural and instructional cues, corrections, and consequences. prerequisite: 5621, 5622) or instr consent

EPSY 5627. Seminar: Advanced issues in Learning Disabilities. (3 cr.; A-F only; Every Fall & Summer) Read, reflect, lead discussions related to issues in field of LD. Topics examined through relevant research in field of LD. prerequisite: Special Education graduate or licensure student or instr consent

EPSY 5628. Seminar: Advanced Issues in Severe Learning Disabilities. (3 cr.; A-F only; Every Fall & Summer) Characteristics of moderate/severe learning disabilities including (but not limited to) cognitive processing, language, attention/memory, co-existing conditions. Dyslexia, dysgraphia, dyscalculia. prerequisite: Special Education graduate or licensure student or instr consent

EPSY 5629. Strategic Instructional Methods for Students Academically At-Risk. (3 cr.; A-F only; Every Fall & Summer) Knowledge/skills needed to teach KU-CRL research-based learning strategies for students considered academically at-risk. Content relevant to basic skills/content instruction for students in K-12 settings will be included. prerequisite: Special Education graduate or licensure student or instr consent

EPSY 5631. Module 1: Introduction to Augmentative and Alternative Communication. (1 cr.; A-F only; Every Fall, Spring & Summer) Terms/concepts related to augmentative/alternative communication. Myths/facts regarding AAC.

EPSY 5632. Module 2: Evidence-based Methods for AAC Assessment and Intervention. (2 cr.; A-F only; Every Fall & Summer) Evidence-based tools to conduct augmentative/alternative communication (AAC) assessments. AAC intervention plans. Data-driven strategies to evaluate progress.

EPSY 5633. Module 3: Speech-generating Devices and High-Tech AAC. (1 cr.; A-F only; Every Fall) Identifying, funding, customizing high-tech augmentative/alternative communication (AAC) interventions. Manufacturer/community resources. Data-driven strategies to evaluate progress.

EPSY 5634. Module 4: Assistive technology with Deaf/Hard of Hearing Students. (2 cr.; A-F only; Every Spring & Summer) Theoretical/applied study communication modalities for children/adults who are Deaf or Hard of Hearing. Assessment/development of models including gesturers, speech reading, Cued Speech, sign language, Picture Exchange Communication Systems, high/low tech devices. prerequisite: Special Education licensure student or instr consent

EPSY 5636. Sensory Impairments of Students With Developmental Disabilities. (2 cr.; Student Option; Every Fall) Characteristics of learners with visual/auditory impairments. Design of instructional programs to remediate or circumvent disabilities, including use of prosthetic devices. prerequisite: 5613, 5614

EPSY 5637. Core Practices in Special Education: Foundations of Special Education. (1 cr.; S-N only; Every Fall) This course is an online module designed to be taken the first semester of a 4-semester sequence in the Clinical EBD Licensure Program. All materials necessary for proficient completion of the course will be delivered via on-line course. There will be no additional readings associated with this online module. prerequisite: Enrolled in Special Ed MEd or Special Ed ILP MEd program with EBD Residency-Based subplan

EPSY 5638. Core Practices in Special Education: IEP Writing. (1 cr.; S-N only; Every Spring) This course is an online module designed to be taken the second semester, in conjunction with the IEP Process course, of a 4-semester sequence in the Clinical EBD Licensure Program. All materials necessary for proficient completion of the course will be delivered via on-line course. There will be no additional readings associated with this online module.

EPSY 5641. Foundations of Education for Individuals Who Are Deaf/Hard of Hearing. (2 cr. [max 3 cr.]; A-F only; Every Fall) Philosophical foundations of education for deaf/hard of hearing (DHH) persons. Engage in
problem solving related to characteristics/rights of DHH persons. Psychological, educational, social-emotional, economic issues influencing education of DHH children/their families.

EPSY 5642. Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing. (3 cr.; Student Option; Every Summer)
Early identification/assessment. Family-centered, interdisciplinary servicing. Program development for infants, toddlers, preschoolers who are deaf/hard of hearing. Presentations, discussions, activities. prereq: Preservice teacher in deaf education licensing program or instr consent

EPSY 5644. Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing. (3 cr.; Student Option; Every Fall & Summer)
Perspectives and best practices related to the development, and assessment of early language and literacy skills for deaf and hard of hearing children. prereq: ASL II at the college level

EPSY 5646. Reading and Writing Practices with Deaf/Hard of Hearing Children. (2 cr.; A-F only; Every Fall & Summer)
Language reading connection/best practices for instruction with deaf/hard of hearing/students with co-occurring disabilities. Final project includes balanced literacy unit of instruction implemented with DHH student. Ions. Effective instructional approaches. prereq: 5644

EPSY 5647. Aural and Speech Programming for Persons Who Are Deaf/Hard of Hearing. (3 cr.; A-F only; Every Fall & Spring)
Study of the speech and hearing mechanisms, causes of hearing loss, and rehabilitation. Emphasis on instructional practices, aural rehabilitation in the educational setting, adaptive technology, and adaptations to optimize functional skills with individuals who are deaf or hard of hearing.

EPSY 5651. Evident-Based Practices in Deaf Education. (2 cr.; A-F only; Every Fall & Spring)
Problem solving related to individual needs of students including educational policies/educational procedures in variety of educational settings.

EPSY 5656. Advanced Issues in Emotional Behavior Disorders. (3 cr.; A-F or Audit; Every Fall)

EPSY 5657. Interventions for Behavioral Problems in School Settings. (3 cr.; A-F or Audit; Every Fall)
Comprehensive behavioral programs for students with social and or emotional disabilities. Instructing students with social and or emotional disabilities. prereq: EPSY 5616, 5611

EPSY 5658. Characteristics of Moderate to Severe Emotional/Behavioral Disorders. (3 cr.; A-F only; Every Fall & Summer)
Applying principles of assessment/individualized intervention for students with severe emotional behavior disorders(EBD). prereq: Special Education graduate or licensure student

EPSY 5661. Introduction to Autism Spectrum Disorder. (3 cr.; A-F only; Every Fall)

EPSY 5662. Assessment and Identification of Autism Spectrum Disorders. (2 cr.; A-F only; Every Summer)
Selection/use of assessment procedures that may be used to screen/identify children with autism spectrum disorders. prereq: 5661, Spec Ed grad or licensure student or instr consent

EPSY 5663. Assessment and Intervention for Individuals with Autism Spectrum Disorders. (3 cr.; A-F only; Every Spring)
Selection/use of range of procedures, including non-biased, specific assessments to screen/identify children with autism spectrum disorders. Specific intervention strategies designed to teach beginning communication/social skills to children with Autism Spectrum Disorders (ASD). prereq: 5661, Special Ed grad or licensure student or instr consent

EPSY 5664. Transitions for Individuals with Autism Spectrum Disorders. (2 cr.; A-F only; Every Summer)
Legal/practical aspects of transition planning, specifically for students with ASD. prereq: 5661. [Spec Ed grad or licensure student or instr consent]

EPSY 5668. Education of Infants and Toddlers with Disabilities: Methods and Materials. (3 cr.; A-F only; Every Spring)
Methods/materials available to maximize developmental and educational outcomes for young children with disabilities, age 3 to 5, and their families in home, community, and school-based settings. Develop, implement, and evaluate individualized education and family service plans. prereq: [5616, 5625] or instr consent

EPSY 5682. Education of Preschool Children With Disabilities: Methods and Materials. (3 cr.; A-F only; Every Spring)
Principles for successful inclusion of students with moderate disabilities. Address model for best practices.

EPSY 5690. Experimental Teaching Seminar: MEd Culminating Project. (2 cr.; A-F only; Every Fall & Spring)
Experimental teaching utilizing data based instruction for affecting student growth.

Conduct experimental teaching project during student teaching year. Guided through formal writing process for submitting short literature review or research report for M.Ed. prereq: instr consent

EPSY 5701. Practicum: Field Experience in Special Education. (1-2 cr. [max 24 cr.]; S-N only; Every Fall & Spring)
Observations and supervised support of teaching practice in schools or agencies serving children with disabilities in integrated programs. prereq: instr consent

EPSY 5702. Practicum in Autism Spectrum Disorder. (3 cr.; A-F only; Every Fall & Spring)
Four hundred hours of supervised work in settings where individuals with Autism Spectrum Disorder are served. On-site supervision is provided by qualified professionals. A University supervisor conducts on-site observations. Bi-weekly seminars. prereq: 5616, 5661, 5609, one of [5622 or 5644 or SLHS 5606], enrolled in Autism Spectrum Disorder certificate program, instr consent

EPSY 5703. Practicum in Applied Behavior Analysis. (3 cr.; A-F only; Every Spring)
Four hundred hours of supervised experience in applied behavior analytic intervention with individuals with significant challenging behavior and learning difficulties. On-site supervision is provided by qualified professionals. A University supervisor conducts on-site observations. Bi-weekly seminars. prereq: 5616, 5657, Psy 4011. Applied Behavior Analysis Certificate student, instr consent

EPSY 5704. Practicum in Middle/Secondary Settings. (1 cr.; S-N only; Every Fall & Spring)
Preparation for practicing principles required for successful inclusion. Address model for best practices/requirements specified by Minnesota Board of Teaching.

EPSY 5705. Practicum in ECSE/Elementary Settings. (1 cr.; S-N only; Every Fall & Spring)
Principles for successful inclusion of students with moderate disabilities. Address model for best practices.

EPSY 5706. Practicum in Moderate to Severe Developmental Disabilities. (2 cr.; S-N only; Every Fall & Spring)
Practicing principles required for successful inclusion. Address model for best practices/requirements specified by Minnesota Board of Teaching.

EPSY 5707. Practicum in Moderate to Severe Learning Disabilities. (3 cr.; S-N only; Every Fall & Spring)
Moderate/severe learning disabilities. Transfer of theoretical knowledge to practical application. Role of LD teacher in variety of settings.

EPSY 5708. Practicum in Moderate to Severe Emotional/Behavioral Disorders. (3 cr.; S-N only; Every Fall & Spring)
Moderate/severe emotional behavior disorders. Transfer of theoretical knowledge to practical
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**EPSY 5720. Special Topics: Special Education.** (; 1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)


**EPSY 5741. Student Teaching: Academic and Behavioral Strategist.** (3-6 cr.; S-N only; Every Fall & Spring)

Transfer of theoretical knowledge to practical application. Responsibilities of special education teacher in variety of settings. prereq: Special education licensure program or instructor consent

**EPSY 5742. Student Teaching: Autism Spectrum Disorders.** (; 6 cr.; S-N only; Every Fall & Spring)

Transfer of theoretical knowledge to practical application. Role/responsibilities of special education teacher in settings of elementary/secondary age.

**EPSY 5751. Student Teaching: Deaf and Hard of Hearing.** (; 1-6 cr. [max 10 cr.]; Student Option; Every Fall & Spring)

Students participate in educational programming for infants, children, and youth who are deaf or hard of hearing. On-site, directed experiences under supervision of master teachers of deaf/hard of hearing students. prereq: instructor consent

**EPSY 5752. Student Teaching: Learning Disabilities.** (; 1-6 cr. [max 10 cr.]; S-N or Audit; Every Fall, Spring & Summer)

Supervised experience in teaching or related work in schools or other agencies serving children and adolescents with learning disabilities. prereq: instructor consent

**EPSY 5754. Student Teaching: Social and Emotional Disabilities.** (; 1-6 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Teach students with social and emotional disorders at public schools and other appropriate sites. Attend a weekly seminar on student teaching competencies. prereq: Completion of licensure courses for social and emotional disorders, instructor consent

**EPSY 5755. Student Teaching: Developmental Disabilities, Mild/Moderate.** (; 1-6 cr.; A-F or Audit; Every Fall & Spring)

Supervised student teaching, or special practicum project, in schools or other agencies serving students at elementary/secondary levels who have mild to moderate developmental disabilities. prereq: Completion of all licensure coursework, instructor consent

**EPSY 5756. Student Teaching: Developmental Disabilities, Moderate/Severe.** (; 1-6 cr.; A-F or Audit; Every Fall & Spring)

Supervised student teaching, or special practicum projects, in schools or other agencies serving students at elementary/secondary levels who have moderate to severe developmental disabilities. prereq: Completion of all licensure coursework, instructor consent

**EPSY 5761. Student Teaching in Early Childhood Special Education Settings for Children Aged Three to Five Years.** (; 3 cr. [max 6 cr.]; S-N only; Every Fall & Spring)

Student teachers work closely with their cooperating teacher and University supervisor to design/implment programming for children in classrooms. Course includes a seminar with discussion, cooperative learning experiences, and some lectures. prereq: Licensure candidate in Early Childhood/Early Childhood Licensure Program, completion of all other licensure requirements for ECSE, instructor consent; completion of Birth-3 student teaching should be completed after age 3-5 student teaching when possible

**EPSY 5762. Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years.** (; 3 cr. [max 6 cr.]; S-N only; Every Fall & Spring)

Student teachers work closely with cooperating teacher and University supervisor to design/implment programming for families with children aged birth-three in their homes. Course includes seminar with discussion, cooperative learning experiences, and some lectures. prereq: Licensure candidate in Early Childhood/Early Childhood Licensure Program, completion of all other licensure requirements for ECSE, instructor consent; completion of Birth-3 student teaching should be completed after age 3-5 student teaching when possible

**EPSY 5763. Practicum in Special Education: Behavior Intervention Planning and Implementation.** (2 cr.; S-N only; Every Fall)

This course will be delivered within a clinical model of instruction where the instructor serves as a coaching guide and the candidates participate in a community of practice with their peers. It is expected that given the instructor's coaching and the interactions within the community of practice, that the candidates will complete the portfolio associated with this course and, as part of that completion, demonstrate proficiency in all competencies associated with this course in order to earn a passing grade. As such, there is not a didactic instruction component or assigned readings for this clinical model of instruction-based course.

**EPSY 5764. Practicum in Special Education: IEP Process.** (2 cr.; S-N only; Every Spring)

This course will be delivered within a clinical model of instruction where the instructor serves as a coaching guide and the candidates participate in a community of practice with their peers. It is expected that given the instructor's coaching and the interactions within the community of practice, that the candidates will complete the portfolio associated with this course and, as part of that completion, demonstrate proficiency in all competencies associated with this course in order to earn a passing grade. As such, there is not a didactic instruction component or assigned readings for this clinical model of instruction-based course.

**EPSY 5765. Practicum in Special Education: Instructional Planning and Delivery.** (2 cr.; S-N only; Every Fall)

This course will be delivered within a clinical model of instruction where the instructor serves as a coaching guide and the candidates participate in a community of practice with their peers. It is expected that given the instructor's coaching and the interactions within the community of practice, that the candidate will complete the portfolio associated with this course and, as part of that completion, demonstrate proficiency in all competencies associated with this course in order to earn a passing grade. As such, there is not a didactic instruction component or assigned readings for this clinical model of instruction-based course.

**EPSY 5800. Special Topics in School Psychology.** (; 1-9 cr.; Student Option; Every Fall & Spring)

Current issues in school psychology or areas not normally available through regular curriculum offerings.

**EPSY 5801. Assessment and Decision Making in School and Community Settings.** (; 3 cr.; A-F or Audit; Every Fall & Spring)

Introduction to psychological and educational assessment for individuals who work with children, especially those experiencing academic and behavior problems. Study of standardized group and individual tests of intelligence, achievement, socio-emotional functioning, perception, reading, mathematics, adaptive behavior, and language.

**EPSY 5802. Foundations of Developmental Psychology Across the Lifespan.** (3 cr.; A-F only; Every Fall)

Theories/research regarding human development across lifespan focusing on different contexts that shape development. Theoretical frameworks applied to study of human development. Cognitive, social, emotional development. Research methods in developmental psychology.

**EPSY 5849. Observation and Assessment of the Preschool Child.** (3 cr.; Student Option; Every Spring & Summer)

Introduction to assessment principles and practices, including observational assessment methods, for children (birth to 5). Intended primarily for teachers in training and others interested in basic information regarding assessment and its relationship to intervention services for young children.

**EPSY 5851. Engaging Diverse Students and Families.** (3 cr.; Student Option; Every Fall & Spring)

Theoretical, practical, scientific issues involved in school psychological practice/training/research. Theoretical/empirical bases for developing appropriate dispositions, practices, strategies. Illustrative lectures, discussions, group activities, case studies, presentations. prereq: Honors senior or grad student

**EPSY 5853. Biological Bases of Behavior.** (3 cr.; A-F only; Every Fall)

Biological bases of behavior with emphasis on relationship between functions/structures of brain.

**EPSY 5991. Independent Study in Educational Psychology.** (; 1-8 cr. [max 20 cr.]; A-F or Audit; Every Fall, Spring & Summer)


Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member. prereq: instr consent

**EPSY 8112. Mathematical Cognition.** (3 cr.; Student Option; Fall Even Year)
Cognitive science research. Papers investigating how adults/children understand fundamental mathematical concepts. Papers drawn from psychology, neuroscience, education literatures. prereq: 5114 or equiv

**EPSY 8113. The Psychology of Scientific Reasoning.** (3 cr.; Student Option; Spring Even Year)
Research at intersection of cognitive science, educational psychology, science education. What psychology tells us about how people think, reason, make decisions. Read empirical research that explores psychological processes that underlie scientific reasoning. prereq: 5114 or equiv

**EPSY 8114. Seminar: Cognition and Learning.** (3 cr. [max 9 cr.]; Student Option; Every Fall)
Advanced study in critical analysis and application of contemporary psychological theory and research in cognition and learning for education.

**EPSY 8115. Psychology of Instruction and Technology.** (3 cr.; Student Option; Spring Even Year)
Seminar including, but not limited to, learning and instructional theories, advanced and emerging technologies, and measurement and evaluation.

**EPSY 8116. Reading for Meaning: Cognitive Processes in the Comprehension of Texts.** (3 cr.; Student Option; Every Fall)
Cognitive processes that take place during reading comprehension/implications of these processes for instruction/assessment.

**EPSY 8117. Writing Empirical Paper and Research/Grant Proposals in Education and Psychology.** (3 cr.; Student Option; Every Spring)
Scientific writing skills. Focuses on logic/argumentation. Each student produces an empirical paper or research proposal. Breaks down the writing process into components: one component per week. Each week, students write a section of their paper/proposal and critique others’. prereq: instr consent

**EPSY 8132. Personality Development and Socialization.** (3 cr.; Student Option; Every Spring)
Major research and theoretical work. Developmental and educational influences on personality. prereq: Personality or child psych course

**EPSY 8157. Key Topics and Issues in Applying Social Psychology to Education.** (3 cr.; Student Option; Every Spring)
This course, designed for advanced graduate students, covers a number of classic and contemporary topics in social psychological theory, research, and methods, examining core theories and how they have persisted or changed over time and how those theories and approaches have been applied to research in and issues of education broadly conceived.

**EPSY 8215. Advanced Research Methodologies in Education.** (3 cr.; Student Option; Every Fall)
Quantitative research methods. Models of scientific inquiry. Role of theories/research design. Role of measurement error in quantitative data-based inference. Qualitative methods of inquiry. Qualitative/quantitative methodologies in methodologically-oriented studies in educational measurement. evaluation, stats. prereq: 5221, 5247, [8252 or equiv], instr consent

**EPSY 8216. Seminar: Research Processes in Psychological Foundations of Education.** (3 cr.; A-F or Audit; Spring Even Year)
Advanced examination of research processes in educational psychology. Invited faculty discuss specific research designs. Students refine/implement research projects and present them in class. prereq: [5216, admitted to doctoral program in psych foundations] or instr consent

**EPSY 8220. Special Topics: Seminar in Quantitative Methods.** (1-6 cr. [max 15 cr.]; Student Option; Periodic Fall, Spring & Summer)
Seminars focus on specialized current topics in methodology in educational psychology. Invited faculty discuss specific research designs. Students refine/implement research projects and present them in class. prereq: [5216, admitted to doctoral program in psych foundations] or instr consent

**EPSY 8221. Psychological Scaling.** (3 cr.; Student Option; Spring Even Year)
Topics in uni/multidimensional scaling. Measurement theory/statistics. Rating scales, category scaling methods. Magnitude estimation, paired comparisons, multi-attribute scaling, multidimensional scaling. prereq: [5221 or equiv], [8252 or equiv]

**EPSY 8222. Advanced Measurement: Theory and Application.** (4 cr.; Student Option; Spring Odd Year)
Generalizability theory, item response theory, factor models for test items, binomial model. Application to problems of designing, linking assessments. Includes computer lab. prereq: [5221 or PSY 5862 or equiv], [8252 or equiv]

**EPSY 8224. Performance Assessment Design and Analysis.** (3 cr.; Student Option; Spring Even Year)
Conceptualization, design, implementation, analysis of performance assessments as employed in both small-scale (e.g., classroom, large-scale (e.g., statewide, national testing programs), professional (e.g., teacher assessment, professional certification) settings. prereq: 5221, [5262 or 8261 or 8251 or equiv]

**EPSY 8225. Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating.** (3 cr.; Student Option; Spring Even Year)
Principles/practices of test score quality assurance, standard setting/equating. Operational testing programs. Focus on achievement tests. prereq: 5221, [8252 or equiv]

**EPSY 8226. Item Response Models: Theory and Applications.** (3 cr.; Student Option; Spring Even Year)
Item response theory. Application in education/psychology/social science. 1-, 2-, 3-parameter models for dichotomous/graded response models. Partial credit models for polytomous data. prereq: [5221 or Psy 5862 or equiv], [8252 or equiv]

**EPSY 8247. Advanced Interviewing and NVIVO.** (3 cr.; Student Option; Every Spring)
Practice in designing, conducting, and analyzing interviews. Students design interview protocols, video/audio tape themselves conducting interviews, analyze their techniques, and critique others. Students use NVIVO to analyze data they have collected. prereq: 5247 or qualitative course or instr consent

**EPSY 8251. Statistical Methods in Education I.** (3 cr.; Student Option; Every Fall, Spring & Summer)
Statistical Methods in Education I is the first course in an entry-level, doctoral sequence for students in education. This course covers estimation and hypothesis testing with a particular focus on ANOVA and an introduction to multiple linear regression. Prepares students for EPSY 8252/8262. prereq: [EPSY 5261 or equiv] or undergrad statistics course

**EPSY 8252. Statistical Methods in Education II.** (3 cr.; Student Option; Every Fall & Spring)
Statistical Methods in Education II is the second course in an entry-level, doctoral sequence for students in education. This course focuses on multiple linear regression and provides an introduction to linear mixed models. prereq: [8251, 8261 or equiv]

**EPSY 8261. Statistical Methods in Education I.** (3 cr.; Student Option; Every Fall, Spring & Summer)
Statistical Methods in Education I is the first course in an entry-level, doctoral sequence for students in education. This course covers estimation and hypothesis testing with a particular focus on ANOVA and an introduction to multiple linear regression. Prepares students for EPSY 8252/8262. prereq: 3264 or 5261 or equiv

**EPSY 8262. Statistical Methods in Education II.** (3 cr.; Student Option; Every Fall & Spring)
Statistical Methods in Education II is the second course in an entry-level, doctoral sequence for students in education. This course focuses on multiple linear regression and provides an introduction to linear mixed models. prereq: [EPSY 8251, 8261 or equiv]

**EPSY 8264. Advanced Multiple Regression Analysis.** (3 cr.; Student Option; Every Fall)
General linear model used as context for regression. Matrix algebra, multiple regression, path analysis, polynomial regression, standardized regression, stepwise solutions, analysis of variance, weighted least squares, logistic regression. prereq: [8252 or equiv], regression/ANOVA course, familiarity with statistical analysis package
EPSY 8265. Factor Analysis. (3 cr.; Student Option; Every Fall)
Factor analytic techniques/applications. Component, common factor, confirmatory analysis. Factor extraction, estimating number of dimensions. Rotation, factor scores, hierarchical factor analysis. prereq: [8252 or equiv or instr consent]

EPSY 8266. Statistical Analysis Using Structural Equation Methods. (3 cr.; Student Option; Periodic Spring)
Quantitative techniques using manifest/latent variable approaches for analysis of educational/social science data. Introduction to structural equation modeling approaches to multiple regression, factor analysis, path modeling. Developing, estimating, interpreting structural equation models. prereq: 8265, [8252 or equiv]

EPSY 8267. Applied Multivariate Analysis. (3 cr.; Student Option; Spring Even Year)
Use/interpretation of results from several multivariate statistical techniques. Matrix algebra, variance/covariance, Hotelling's T2, GLM, MANOVA, MANCOVA, discriminant analysis, canonical correlations, dimensionality, principal components, latent composites, distance, hierarchical clustering, prereq: [8252 or equiv], familiarity with matrix algebra, knowledge of a computerized statistics package

EPSY 8268. Hierarchical Linear Modeling in Educational Research. (3 cr.; Student Option; Every Fall)
Conceptual framework of hierarchical linear models for nested data, their application in educational research. Nature/effects of nested data, logic of hierarchical models, mixed-effects models. Estimation/hypothesis testing in these models, model-checking, nonlinear models. prereq: [8252 or equiv]

EPSY 8269. Matrix Algebra for Statistical Modeling. (2 cr.; Student Option; Periodic Fall & Spring)
Linear/matrix algebra, including vector operations, applications to multivariate statistics. Procedures for solving systems of linear equations. Geometry of vectors/matrices. Regression/regression diagnostics in matrix framework. Uses SPSS MATRIX language. prereq: [8252 or 8262 or equiv]

EPSY 8271. Statistics Education Research Seminar: Studies on Teaching and Learning Statistics. (3 cr.; max 9 cr.; Student Option; Periodic Fall & Spring)
Introduction to classic/current research related to teaching/learning of statistics. Research from psychology, education, and statistics. Students focus on a particular research question and review the literature related to that question.

EPSY 8272. Nonparametric Statistics in Education. (3 cr.; Student Option; Spring Even Year)
Estimation/inferential techniques outside normal-theory tests. One-, two-, K-sample procedures for between-within-subject differences, including factorial analysis of variance/covariance. Contingency table analysis (tests of independence, homogeneity). prereq: [8252 or equiv]

EPSY 8281. Advanced Statistical Computing and Data Analysis. (3 cr.; Student Option; Fall Even Year)
Cross-disciplinary course. Use SAS statistical package to perform data management, data analysis, report writing. prereq: [5261 or equiv]

EPSY 8282. Statistical Analysis of Longitudinal Data. (3 cr.; Student Option; Every Fall)
Traditional/modern approaches to analyzing longitudinal data. Dependent t-test, repeated measures ANOVA/MANOVA. Linear mixed models, multilevel models, generalized models. Required labs using SAS computer program. prereq: [8252 or equiv]

EPSY 8290. Special Topics: Seminar in Psychological Foundations. (1-6 cr.; max 15 cr.; Student Option; Periodic Fall, Spring & Summer)
Students formulate research designs. Learning and cognition, social psychology, measurement, and statistics.

EPSY 8299. Quantitative Methods in Education Internship. (1-3 cr.; S-N only; Every Fall & Spring)
Practical experience in applying concepts and skills in measurement, statistics, and evaluation in a real-world setting under supervision of a research professional. prereq: EPSy MA or PhD student, OME track

EPSY 8300. Special Topics in Educational Psychology. (1-4 cr.; max 9 cr.; Student Option; Every Fall & Spring)
Issues or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8311. Education Sciences Proseminar. (1 cr.; max 3 cr.; A-F only; Every Fall)

EPSY 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
Introduction to critical current related to teaching/learning of statistics. Research from psychology, education, and statistics. Students focus on a particular research question and review the literature related to that question.

EPSY 8400. Topics: Counseling and Student Personnel Psychology. (1-3 cr.; max 9 cr.; Student Option; Every Fall & Spring)
Current issues in counseling and student personnel psychology, or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8402. Individual Counseling: Theories, Applications & Counseling Skills. (4 cr.; A-F only; Every Fall)
This course will give the student an opportunity to read, think critically about, dialogue, and write on central counseling theories and therapies. During this course, students will begin to develop a useful theoretical viewpoint that will guide their work with clients and assist them in understanding the work of other therapists. In addition, students will practice and receive feedback on basic (common factors) counseling skills as well as counseling skills that are specific to various types of treatment approaches.

EPSY 8403. Social/Cultural Contexts: Counseling and Skills. (3 cr.; A-F or Audit; Every Spring)
Breadth personal dimensions of race, ethnicity, gender, class, beliefs, disability, age, sexual orientation, and geographic origin. Societal and personal biases and stereotypes; multicultural concepts and culturally appropriate counseling procedures. prereq: Grad ed psy major with CSPP subprog or instr consent

EPSY 8404. Group Counseling: Theory, Applications, and Skills. (3 cr.; A-F or Audit; Every Spring)
Theories, research, and procedures of group counseling and of groups such as psychoeducational groups. Applications to various settings and populations. Ethical issues in group work. Practice of group skills and techniques, including group participation and observation. prereq: Ed psy MA or PhD student with CSPP subprog or instr consent

EPSY 8405. Career Development: Theory, Skills, and Counseling Applications. (3 cr.; A-F or Audit; Every Fall)
Career development theory/practice over life span. Emphasizes career counseling for individuals/organizations, systems approaches to career programs in education/business. Traditional/contemporary theories/practices. prereq: CSPP grad student

EPSY 8406. Professional Ethics for Counselors and Psychologists. (3 cr.; A-F only; Every Fall)
Theory, research, and practice in counseling ethics. Scope/impact of professional ethics. Ethical decision making. Ethics and the law. Ethical practice in special settings. Scholarship/research in counseling ethics. Lectures, discussions, case studies, individual/group examination of original research. prereq: CSPP grad student

EPSY 8407. Assessing and Counseling Clients With Psychological Disorders. (4 cr.; A-F only; Every Spring)
Etiology, symptom patterns, and assessment/treatment for various psychological disorders. DSM diagnoses. Empirically validated psychological assessment and counseling methods. Field-based enquiry. prereq: CSPP PhD or MA student or instr consent

EPSY 8411. Advanced Counseling Research. (4 cr.; A-F or Audit; Every Fall)
Focus on critically reviewing counseling research, qualitatively and quantitatively integrating research, and designing valid research. prereq: Ed psy PhD student with CSPP subprog or instr consent

EPSY 8412. Seminar: Advanced Counseling Theory and Ethics. (4 cr.; A-F or Audit; Every Spring)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
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<tbody>
<tr>
<td>EPSY 8431</td>
<td>Personality Assessment of Adolescents and Adults.</td>
<td>(3 cr.; A-F only; Every Spring)</td>
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<td>Survey of research methods, data-based decision making, basic research design skills, and research evaluation. prereq: [MMPI-2], projective test (e.g., Thematic Apperception Test), and assessment report writing.</td>
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<tr>
<td>EPSY 8401</td>
<td>Counseling Pre-Practicum.</td>
<td>(3 cr.; A-F or Audit; Every Fall)</td>
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<td>Survey of research methods, data-based decision making, basic research design skills, and research evaluation. prereq:</td>
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<tr>
<td>EPSY 8502</td>
<td>Field Placement in Counseling and Student Personnel Psychology.</td>
<td>(2 cr.; S-N or Audit; Every Fall &amp; Spring)</td>
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<td>Students participate under supervision in practitioner activities within a counseling work environment.</td>
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<td>EPSY 8503</td>
<td>Counseling Practicum I.</td>
<td>(1-4 cr.; A-F or Audit; Every Fall)</td>
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<td>Beginning-level supervised practice in counseling with individuals and groups; emphasizes systematic evaluation of student's counseling practice through direct observations, video, and audio tapes.</td>
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<tr>
<td>EPSY 8504</td>
<td>Counseling Practicum II.</td>
<td>(1-4 cr.; A-F or Audit; Every Spring)</td>
<td></td>
<td>Intermediate supervised practice in counseling with individuals and groups; emphasizes ethical issues with systematic evaluation of student's practice through direct observations, video, and audio tapes.</td>
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<tr>
<td>EPSY 8509</td>
<td>Supervision Practicum: CSPP.</td>
<td>(1-2 cr.; max 6 cr.; Student Option; Every Fall &amp; Spring)</td>
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<td>Doctoral students meet weekly with master's prepracticum or practicum students for didactic supervision activities.</td>
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</tbody>
</table>
EPSY 8811. Assessment in School Psychology I: Foundations of Academic Assessment. (3 cr.; A-F or Audit; Every Fall) Theories and models of psychoeducational assessment of children and adolescents within home, school, and community. Conceptual and empirical foundations of eco-behavioral assessment that lead to efficient but comprehensive assessment of children presented from problem-solving perspective. prereq: Grad ed psy major with school psy subprog or instr consent

EPSY 8812. Assessment in School Psychology II: Intellectual and Social-Emotional Domains. (3 cr.; A-F or Audit; Every Spring) Builds on EPsy 8811. Emphasizes gathering data on a child's intellectual and social-emotional functioning and educational progress. prereq: Grad ed psy major with school psy subprog or instr consent

EPSY 8813. Introductory Practicum in School Psychology. (2 cr. [max 4 cr.]; A-F only; Every Fall & Spring) Students complete a variety of learning activities intended to foster familiarity with the school environment and role of the school psychologist including school observations, and formal and informal assessment techniques. All measures complement other facets of assessment presented in EPSY 8811 and 8812.

EPSY 8815. Behavioral and Social Emotional Prevention and Intervention. (3 cr.; A-F or Audit; Periodic Fall & Spring) Theories and research-based practices underlying prevention and intervention practices to support students' behavioral, social, and emotional development. Applied projects and assignments in practicum placements. prereq: 8821, 8811, 8812

EPSY 8816. Academic Prevention and Intervention. (3 cr.; A-F or Audit; Every Fall & Spring) Theories and research-based approaches to prevention, instruction, and intervention practices to support students' cognitive and academic development in core curricular domains. Applied projects and assignments in practicum placements.

EPSY 8817. Problem Analysis and Consultation in School Psychology. (3 cr.; A-F or Audit; Every Spring) Practical application of problem analysis and consultation models with school staff, parents, and students. Theories, approaches, and barriers to research-based indirect services in school psychology. Applied projects and assignments in practicum placements.

EPSY 8818. Intermediate Practicum in School Psychology. (2 cr.; A-F only; Every Fall & Spring) Students complete a variety of learning activities intended to foster familiarity with the role of the school psychologist including formal and informal assessment techniques, academic and social-emotional interventions, and consultation. All interventions and consultation activities are linked to didactic portions of

EPSY 8819. Emotion & Childhood Psychopathology. (3 cr.; A-F only; Every Spring) This seminar is designed to provide an overview of historical and current perspectives on emotion and childhood psychopathology including current diagnostic and classification systems, with emphasis on specific disorders. The course will focus on disorders that are typically observed by psychologists working in schools and other applied settings.

EPSY 8821. Issues in School Psychology. (3 cr.; A-F or Audit; Every Fall & Spring) School psychology as professional field of specialization in psychology/education. Historical, theoretical, and research basis of school psychology. How school systems operate. Common roles/functions of school psychologists. In-class discussion, didactic/field-based assignments. prereq: EPsy grad student with SchPsy subprog

EPSY 8822. Research in School Psychology. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Integrative, developmental series of discussions/activities about research in school psychology. Instruction/discussion regarding consumption, synthesis, conduct, dissemination of school psychology research.

EPSY 8823. Ethics and Professional Standards in School Psychology. (3 cr.; A-F or Audit; Every Fall & Spring) Ethics, law, and current educational issues applied to study/practice of school psychology. Ethical principles, state/federal laws governing educational practices. How mandates are applied to work of school psychologists in general/special populations (e.g., special education, ESL, ethnic/sexual minorities). Students apply learning as researchers and practicing school psychologists in schools. prereq: 8821

EPSY 8831. Comprehensive School Practicum in School Psychology. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Supervised school field placement requiring assessment, consultation, prevention, and intervention activities.

EPSY 8832. Advanced Practicum in School Psychology. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Supervised field placement individualized to student interests and training goals. May require variety of assessment, consultation, prevention, and intervention activities.

EPSY 8841. Practicum: Instruction and Supervision in School Psychology. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer) Didactic training/supervised experience teaching. Knowledge/skills in strategies for effective classroom instruction/supervision in individual/small group instruction. Construct teaching portfolio. prereq: Grad ed psy major with school psy subprog or instr consent

EPSY 8842. Internship: School Psychological Services. (1-10 cr. [max 99 cr.]; S-N or Audit; Every Fall, Spring & Summer) Advanced field placement. Full-time supervised experience for one year or part-time for no more than two years. prereq: Grad ed psy major with school psy subprog, instr consent

EPSY 8843. Internship - School Psychology. (1 cr. [max 4 cr.]; S-N only; Every Fall & Spring) Advanced field placement. Full-time supervised experience for one year or part-time for no more than two years. prereq: instr consent

EPSY 8849. Assessment in Early Childhood. (3 cr.; A-F or Audit; Spring Even Year) Training psychologists/researchers in use of various assessment tools, including observational assessment strategies, for children birth-age 7. Intended primarily for graduate level practitioners-in-training interested in applied information on assessment/intervention services. prereq: [8811, 8812] or equivalent in related programs

EPSY 8850. Doctoral Seminar in School Psychology: Research, Training, Practice, Policy Issues, and Action Plans. (3 cr.; A-F only; Every Fall & Spring) Critical issues in school psychology, led by students or visiting professionals. Outside reading/research. Scientific findings/implications for training, practice, policy, and research. Students create professional-development plan. prereq: [[Grad student in school psychology, coursework in school psychology] or advanced PhD student from related department], instr consent

EPSY 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

EPSY 8905. History and Systems of Psychology: Landmark Issues in Educational Psychology. (3 cr.; Student Option: Every Spring) Critical issues in learning and cognition, statistics and measurement, counseling, school psychology, social psychology of education, and special education. prereq: Ed psy PhD student

EPSY 8993. Directed Study: Educational Psychology. (1-10 cr. [max 20 cr.]; A-F or Audit; Every Fall, Spring & Summer) Arranged independently with individual faculty members. prereq: instr consent

EPSY 8994. Research Problems: Educational Psychology. (1-6 cr. [max 18 cr.]; A-F or Audit; Every Fall, Spring & Summer) Research methodology, techniques, and literature. Students participate in formulating/executing research proposal. prereq: instr consent

Educational/Human Development (EDHD)
EDHD 1051. Editing for Writers. (2 cr.; Student Option; Every Fall, Spring & Summer) Editing one's own writing. Linguistic features of standard written English. Styles/language utilized in academic writing. Small-group activities, individual/peer conferencing.

EDHD 1525V. First-Year Inquiry: Multidisciplinary Ways of Knowing. (WI; 4 cr.; A-F only; Every Fall) Writing intensive multidisciplinary approach to addressing the common question, “How can one person make a difference?” Students read a common book/work collaboratively to produce a final project. Active learning strategies to develop students’ skills in critical reading, thinking, and writing.

EDHD 1525W. First-Year Inquiry: Multidisciplinary Ways of Knowing. (WI; 4 cr.; A-F only; Every Fall) Writing intensive multidisciplinary approach to addressing the common question, “How can one person make a difference?” Students read a common book/work collaboratively to produce a final project. Active learning strategies to develop students’ skills in critical reading, thinking, and writing.

EDHD 1620. Current Topics: Strategies for Student Success. (1-4 cr.; max 12 cr.; Student Option; Every Fall & Spring) For topics see Class Schedule.

EDHD 1701. Introduction to TRIO: Identity, Culture, and College Success. (1 cr.; A-F only; Every Fall) How culture/identity play role in educational experience. Self-authorship skills to create educational/personal path that aligns with values/beliefs. Lecture, discussion, readings, activities. prerequisite: TRIO student.

EDHD 1904. Freshman Seminar, Global Perspectives. (IP; 1-3 cr.; max 6 cr.; Student Option; Periodic Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule.

EDHD 1909W. Freshman Seminar, International Perspectives and Writing Intensive. (WI; 1-3 cr.; max 6 cr.; Student Option; Periodic Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule.

EDHD 1920. CEHD Special Topics. (1-3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) For topics, see Class Schedule.

EDHD 1921. America Reads: Literacy Support, Mentorship, & Academic Achievement. (1 cr.; Student Option No Audit; Every Fall) America Reads: Literacy Support, Mentorship & Academic Achievement is a service-learning course specifically designed for UMN undergraduates that tutor and mentor children in literacy skill development. Literacy mentors will add dozens of research based literacy strategies to their tutoring repertoire through study, observation, application and reflection that can be referenced and implemented to support their current and future mentees in reading, writing, speaking & listening. Students are required to meet for 6 2.5 -hour class sessions and complete corresponding assignments that reflect the course concepts and how they apply to tutoring children in our communities.

EDHD 3001. Exploring the Teaching Profession I. (2 cr.; A-F only; Every Fall) Introduction to K-12 teaching as a profession. Culture of teaching, roles of teachers, student learning, multicultural/diverse students/ contexts, societal influences. Volunteer experiences in Twin Cities. prerequisite: DirectTrack to Teaching program or college consent.

EDHD 3002. Exploring the Teaching Profession II. (2 cr.; A-F only; Every Spring) Diversity in schools, strategies for increasing cultural competence. Parents, communities, professional development. Students reflect on themselves as future teachers and complete 50 hours in educational settings. prerequisite: 3001, admission to DirectTrack to Teaching.

EDHD 3100. International Topics for Undergraduates. (1-12 cr.; max 36 cr.; Student Option; Every Fall, Spring & Summer) Off-campus course. Topics from research exploration to academic/engagement activities. Delivered in international setting. Course requirements are determined by instructor(s) and reflect advanced undergraduate rigor. prerequisite: instructor consent.

EDHD 3300. Special Topics in Education and Human Development. (1-6 cr.; max 12 cr.; Student Option; Periodic Fall, Spring & Summer) Special topics in education/human development.

EDHD 4093. Directed Study. (1-4 cr.; max 8 cr.; A-F only; Every Fall, Spring & Summer) Student-initiated project in consultation with faculty member. Student determines topic, sets goals, designs a course of study, and finds an appropriate faculty member to work collaboratively. prerequisite: Instructor consent.

EDHD 5004. Teaching Students With Special Needs in Inclusive Settings. (2 cr.; A-F or Audit; Every Fall, Spring & Summer) Exceptionalities in educational settings as defined in federal/state rules/regulations. Historical perspectives, definitions, etiology, needs, characteristics. Service delivery systems for each exceptionality, prerequisite: Teacher preparation program in [CEHD or music education or agriculture education or DirectTrack] or instructor consent; licensure students must take this course for a grade.

EDHD 5100. International Topics for Graduate Students. (1-12 cr.; Student Option; Every Fall, Spring & Summer) Off-campus course. Topics from research exploration to academic/engagement activities. Delivered in international setting. Course requirements are determined by instructor(s) and reflect graduate-level rigor.

EDHD 5200. Special Topics: Professional Development for Educators. (1-3 cr.; max 12 cr.; Student Option; Every Summer) Special topics course that permits offering a variety of research-based and scholarly content to meet the needs of educators from P-12 settings.

EDHD 5300. Special Topics in Education and Human Development. (1-6 cr.; max 12 cr.; Student Option; Every Fall, Spring & Summer) Special topics in education and human development. Fee in-lieu of tuition for non-degree seeking students only. prerequisite: Non-degree seeking students only. Practitioners and graduates who have already completed undergraduate coursework.

EE 1. Refresher Course for Electrical Engineers. (0 cr.; A-F or Audit; Every Fall & Spring) Review of electrical engineering fundamentals required to pass the Minnesota Professional Engineering Examination in electrical engineering. Organized review of material ordinarily contained in electrical engineering college curriculum. Emphasizes problem solving with orientation as close possible to type of questions in exam. prerequisite: [BSEE or BEE], pass EIT exam, four yrs elec eng experience.

EE 1001. Introduction to Electrical and Computer Engineering. (1 cr.; S-N or Audit; Every Spring) Introduction to engineering/computer engineering. Techniques and technologies developed by electrical and computer engineers.

EE 1301. Introduction to Computing Systems. (4 cr.; Student Option; Every Fall & Spring) Fundamental concepts of computing systems, from machine level to high-level programming. Transistors, logic circuits, instruction set architecture. Memory, pointer addressing. Binary arithmetic, data representation. Data types/structures. Assembly language, C programming. Control flow, iteration, recursion. Integral lab. prerequisite: concurrent registration is required (or allowed) in MATH 1271 or concurrent registration is required (or allowed) in MATH 1371.

EE 1701W. Energy, Environment, and Society. (WI; 3 cr.; Student Option; Every Fall) Energy supply and demand; generation of electricity; environmental impact of energy usage; energy conservation methods; utility deregulation; role of communication and computers. Demos, computer simulation, teamwork, and projects.

second-order circuits. CMOS-based logic gates. Circuit simulators, prereq: concurrent registration is required (or allowed) in PHYS 1302, concurrent registration is required (or allowed) in (MATH 2243 or MATH 2373 or MATH 2573)

**EE 2002, Introductory Circuits and Electronics Laboratory.** (1 cr.; Student Option; Every Fall, Spring & Summer)

Introductory lab in electronics to accompany EE 2001. Experiments with simple circuits. Familiarization with basic measurement tools and equipment, prereq: 2001 or concurrent registration is required (or allowed) in 2001

**EE 2006, Introductory Circuits Laboratory.** (0.5 cr.; Student Option; Every Fall & Spring)

Meets concurrently with an arranged 2002 section.

**EE 2011, Linear Systems, Circuits, and Electronics.** (3 cr.; Student Option; Every Fall, Spring & Summer)


**EE 2101, Introduction to Electronics I.** (1.5 cr.; Student Option; Every Fall)

Diodes, field effect transistors and bipolar junction transistors, small signal transistor models. Amplifier circuits. Covers electronics content of 2001 in half a semester. prereq: Linear circuits

**EE 2103, Introduction to Electronics II.** (1 cr.; Student Option; Every Fall)

Active and passive analog filters, high frequency diode and transistor models, amplifier frequency response, multistage amplifiers. Covers electronics content of 2011 in half a semester. prereq: 2001 or 2101

**EE 2301, Introduction to Digital System Design.** (4 cr.; Student Option; Every Fall & Spring)

Boolean algebra, logic gates, combinational logic, logic simplification, sequential logic, design of synchronous sequential logic, VHDL modeling, design of logic circuits. Integral lab. prereq: MATH 1272 or MATH 1372 or MATH 1572

**EE 2361, Introduction to Microcontrollers.** (4 cr.; Student Option; Every Fall, Spring & Summer)

Computer organization, pipelining, instruction fetch / decode / execution, opcodes, assembly language programming, arithmetic/logical operations, parallel/serial input/output, buffers, interrupts, using special-purpose features such as A/D converters. Integral lab. Prereq: 2301, 1301 or CSCI 1113 or CSCI 1901

**EE 2701, Sustainable Electricity Supply: Renewables and Conservation.** (3 cr.; A-F only; Every Spring)

Overview of energy usage, role of electricity and its contribution to global warming/ climate change. Electric power systems with conventional generation and transmission, and renewable resources such as solar and wind. Electric and hybrid vehicles, conservation using LEDs and green house applications. Power electronics and electric machines/drives.

**EE 3005, Fundamentals of Electrical Engineering.** (4 cr.; Student Option; Every Fall, Spring & Summer)

Fundamentals of analog electronics, digital electronics, and power systems. Circuit analysis, electronic devices and applications, digital circuits, microprocessor systems, operational amplifiers, transistor amplifiers, frequency response, magnetically coupled circuits, transformers, steady state power analysis. prereq: Math 2243, Phys 1302; not for EE majors

**EE 3006, Fundamentals of Electrical Engineering Laboratory.** (1 cr.; Student Option; Every Fall, Spring & Summer)

Lab to accompany 3005. prereq: Concurrent enrollment in 3005 is allowed but not required

**EE 3015, Signals and Systems.** (3 cr.; Student Option; Every Fall & Spring)

Basic techniques for analysis/design of signal processing, communications, and control systems. Time/frequency models, Fourier-domain representations, modulation, Discrete-time/digital signal/system analysis. Z transform. State models, stability, feedback. prereq: 2011, CSE or dept consent

**EE 3025, Statistical Methods in Electrical and Computer Engineering.** (3 cr.; Student Option; Every Fall, Spring & Summer)


**EE 3041, Industrial Assignment I.** (2 cr.; A-F only; Every Fall, Spring & Summer)

Industrial work assignment in engineering co-op program. Evaluation based on student's formal written report covering semester's work assignment. prereq: [EE or CompE upper div], enrolled in ECE co-op program

**EE 3101, Circuits and Electronics Laboratory I.** (2 cr.; Student Option; Every Fall, Spring & Summer)

Experiments in circuits/electronics. prereq: [2002. [3115 or concurrent registration is required (or allowed) in 3115], CSE] or dept consent

**EE 3102, Circuits and Electronics Laboratory II.** (2 cr.; Student Option; Every Fall, Spring & Summer)

Experiments in circuits/electronics. Team design project. prereq: [3101 or CSE or dept consent], attendance first day of class.

**EE 3115, Analog Electronics.** (3 cr.; Student Option; Every Fall, Spring & Summer)


**EE 3161, Semiconductor Devices.** (3 cr.; Student Option; Every Fall & Spring)

Elementary semiconductor physics; physical description of pn junction diodes, bipolar junction transistors, field-effect transistors. prereq: Upper div CSE, 2011, Phys 1302, Phys 2303 or Chem 1022

**EE 3601, Transmission Lines, Fields, and Waves.** (3 cr.; Student Option; Every Fall, Spring & Summer)

Properties of transmission lines, electrostatics, magnetostatics, and electromagnetic waves in unbounded space. Guides, cavities, radiation theory, antennas. prereq: 2011, [Math 2243 or Math 2373 or Math 2573], [Phys 1302 or Phys 1402], CSE or dept consent

**EE 3940, Special Topics in Electrical and Computer Engineering.** (1-4 cr. [max 8 cr.]; Student Option; Every Summer)

Topics that are not available in regular courses. Topics vary. prereq. instr consent

**EE 3990, Curricular Practical Training.** (1-2 cr. [max 12 cr.]; S-N only; Every Fall, Spring & Summer)

Industrial work assignment involving advanced electrical engineering technology. Reviewed by faculty member. Final report covering work assignment prereq: instr consent, undergrad EE or CompE major

**EE 4043W, Industrial Assignment II.** (WI; 4 cr.; A-F only; Every Fall, Spring & Summer)

Solution of system design problems that require developing criteria, evaluating alternatives, and generating a preliminary design. Final report emphasizes design communication and describes design decision process, analysis, and final recommendations. prereq: 3041

**EE 4044, Industrial Assignment III.** (2 cr.; A-F only; Every Fall, Spring & Summer)

Industrial work assignment in engineering co-op program. Evaluation based on student's formal written report covering semester work assignment. prereq: 4043W

**EE 4111, Advanced Analog Electronics Design.** (4 cr.; Student Option; Every Spring)


**EE 4161W, Energy Conversion and Storage.** (WI; 3 cr.; Student Option; Every Spring)

Fundamental physics/chemistry of selected energy conversion and energy storage devices. Connections with their electric power applications. Role of grid, application to electric vehicles. Lectures, lab, student presentations. prereq: 3161 or instr consent
EE 4163. Energy Conversion and Storage Laboratory. (1 cr.; Student Option; Every Spring)
Provides laboratory experiences with the topics of 4161W, including the fundamental physics and chemistry of selected energy conversion and energy storage devices, their application, and their connection strategies in electric power applications. prereq: concurrent registration is required (or allowed) in 4161W

EE 4231. Linear Control Systems: Designed by Input/Output Methods. (3 cr.; ; Student Option; Every Fall)
Modeling, characteristics, performance of feedback control systems. Stability, root locus, frequency response methods. Digital implementation, hardware considerations. prereq: [3015, upper div CSE or grad student in CSE major] or instr consent

EE 4233. State Space Control System Design. (3 cr.; Student Option; Every Spring)
State space models, performance evaluation, numerical issues for feedback control. Stability, state estimation, quadratic performance. Implementation, computational issues. prereq: [3015, upper div CSE] or instr consent

EE 4235. Linear Control Systems Laboratory. (1 cr.; ; Student Option; Every Fall)
Lab to accompany 4231. prereq: 4231 or concurrent registration is required (or allowed) in 4231

EE 4237. State Space Control Laboratory. (1 cr.; Student Option; Every Spring)
Lab to accompany 4233. prereq: 4233 or concurrent registration is required (or allowed) in 4233; no cr for [EE or CompE] grad students

EE 4301. Digital Design With Programmable Logic. (4 cr.; ; Student Option; Every Fall & Summer)
Introduction to system design/simulation. Design using Verilog code/synthesis. Emulation using Verilog code. prereq: 2301, [1301 or CSCI 1113 or CSCI 1901]

EE 4303. Introduction to Programmable Devices Laboratory. (1 cr.; ; Student Option; Periodic Spring)
Verilog Language. Combinatorial and sequential logic synthesis with Verilog. Implementation in Field Programmable Gate Arrays (FPGAs). prereq: 2301, 2361; cannot receive cr for 4303 if cr granted for EE 4301

EE 4341. Embedded System Design. (4 cr.; ; Student Option; Every Spring)

EE 4363. Computer Architecture and Machine Organization. (4 cr.; ; Student Option; Every Fall & Spring)
Introduction to computer architecture. Aspects of computer systems, such as pipelining, memory hierarchy, and input/output systems. Performance metrics. Examines each component of a complicated computer system. prereq: 2361

EE 4389W. Introduction to Predictive Learning. (WI; 3 cr.; ; Student Option; Fall Odd Year)
Empirical inference and statistical learning. Classical statistical framework, model complexity, inductive bias, Vapnik-Chervonenkis (VC) theoretical framework, philosophical perspective. Nonlinear methods. New types of inference. Application studies. prereq: [3025, ECE student] or STAT 3022; computer programming or MATLAB or similar environment is recommended for ECE students

EE 4501. Communications Systems. (3 cr.; ; Student Option; Every Fall)

EE 4505. Communications Systems Laboratory. (1 cr.; ; Student Option; Every Fall)
Experiments in analysis/design of wired/wireless communication systems. Lab to accompany 4501. prereq: 4501 or concurrent registration is required (or allowed) in 4501

EE 4541. Digital Signal Processing. (3 cr.; ; Student Option; Every Fall & Summer)

EE 4607. Wireless Hardware System Design. (3 cr.; ; Student Option; Every Spring)
Random processes, noise, modulation, error probabilities. Antenna opertaion, power transfer between antennas, rf propagation phenomena, transmitters/receivers, transmission lines, effect of antenna performance on system performance, rf/microwave device technologies, small-signal amplifiers, mixers, power amplifiers, rf oscillators. prereq: [3015, 3115, 3601, CSE student] or dept consent

EE 4701. Electric Drives. (3 cr.; ; Student Option; Every Spring)
AC/DC electric-machine drives for speed/position control. Integrated discussion of electric machines, power electronics, and control systems. Computer simulations. Applications in electric transportation, robotics, process control, and energy conservation. prereq: 3015

EE 4703. Electric Drives Laboratory. (1 cr.; ; Student Option; Every Spring)
Laboratory to accompany 4701. Simulink-based simulations of electric machines/drives in applications such as energy conservation and motion control in robotics. prereq: 4701 or concurrent registration is required (or allowed) in 4701

EE 4721. Introduction to Power System Analysis. (3 cr.; ; Student Option; Every Fall)

EE 4722. Power System Analysis Laboratory. (1 cr.; ; Student Option; Every Fall)
Lab analysis of AC power systems, power system networks, power flow, short circuit, transient stability. prereq: 4721 or concurrent registration is required (or allowed) in 4721

EE 4741. Power Electronics. (3 cr.; ; max 4 cr.; ; Student Option; Every Fall)
Switch-mode power electronics. Switch-mode DC power supplies. Switch-mode converters for DC and AC motor drives, wind/photovoltaic inverters, interfacing power electronics equipment with utility system. Power semiconductor devices, magnetic design, electro-magnetic interference (EMI). prereq: 3015, 3115

EE 4743. Switch-Mode Power Electronics Laboratory. (1 cr.; ; Student Option; Every Fall)
Laboratory to accompany 4741. PSim-based simulations of converters, topologies, and control in switch-mode dc power supplies, motor drives for motion control, and inverters for interfacing renewable energy sources to utility grid. prereq: 4741 or concurrent registration is required (or allowed) in 4741

EE 4930. Special Topics in Electrical and Computer Engineering Laboratory. (1-2 cr.; ; max 6 cr.; ; A-F only; Periodic Fall, Spring & Summer)
Lab work not available in regular courses. Topics vary. prereq: CSE sr or grad student or instr consent

EE 4940. Special Topics in Electrical and Computer Engineering. (1-4 cr.; ; max 8 cr.; ; Student Option; Every Fall, Spring & Summer)
Topics that are not available in regular courses. Topics vary. prereq: CSE or instr consent

EE 4951W. Senior Design Project. (WI; 4 cr.; ; Student Option; Every Fall & Spring)
Team participation in formulating/solving open-ended design problems. Oral/written presentations. prereq: 3015, 3115, 3102, attendance first day of class

EE 4970. Directed Study. (1-3 cr.; ; max 12 cr.; ; Student Option; Every Fall & Spring & Summer)
Studies of approved projects, either theoretical or experimental. prereq: Cr ar [may be repeated for cr]; dept consent

EE 4981H. Senior Honors Project I. (2 cr.; ; Student Option; Every Fall)
Experience in research/design for electrical/computer engineering. Oral/written reports. prereq: ECE honors, sr, instr consent
EE 4982V. Senior Honors Project II. (WI; 2 cr.; Student Option; Every Spring) Experience in research/design for electrical/computer engineering. Oral/written reports. prereq: 4981

EE 4999. Special Exam. (2 cr.; Student Option; )

EE 5041. Industrial Assignment for Graduate Students. (1 cr.; S-N only; Every Fall, Spring & Summer) Optional industrial work assignment. Evaluation based on student's formal written report covering semester's work assignment. This course counts for 6 credits of Academic Progress for the semester in which it is taken. prereq: Consent of Advisor and Office of the DGS

EE 5121. Transistor Device Modeling for Circuit Simulation. (3 cr.; Student Option; Periodic Fall & Spring) Basics of MOS, bipolar theory. Evolution of popular device models from early SPICE models to current industry standards. prereq: [3115, 3161, CSE grad student] or dept consent

EE 5141. Introduction to Microsystem Technology. (4 cr.; Student Option; Every Spring) Microelectromechanical systems composed of microsensors, microactuators, and electronics integrated onto common substrate. Design, fabrication, and operation principles. Labs on micromachining, photolithography, etching, thin film deposition, metallization, packaging, and device characterization. prereq: [3161, 3601, CSE grad student] or dept consent

EE 5163. Semiconductor Properties and Devices I. (3 cr.; Student Option; Every Fall) Principles/properties of semiconductor devices. Selected topics in semiconductor materials, statistics, and transport. Aspects of transport in p-n junctions, heterojunctions. prereq: [3161, 3601, CSE grad student] or dept consent

EE 5164. Semiconductor Properties and Devices II. (3 cr.; Student Option; Every Spring) Principles/properties of semiconductor devices. Charge control in different FET's, transport, modeling. Bipolar transistor models (Ebers-Moll, Gummel-Poon), heterostructure bipolar transistors. Special devices. prereq: 5163 or instr consent

EE 5171. Microelectronic Fabrication. (4 cr.; Student Option; Every Fall) Fabrication of microelectronic devices. Silicon integrated circuits, GaAs devices. Lithography, oxidation, diffusion, Process integration of various technologies, including CMOS, double poly bipolar, and GaAs MESFET. prereq: CSE grad student or dept consent

EE 5173. Basic Microelectronics Laboratory. (1 cr.; Student Option; Every Fall) Students fabricate a polysilicon gate, single-layer metal, NMOS chip, performing 80 percent of processing, including photolithography, diffusion, oxidation, and etching. In-process measurement results are compared with final electrical test results. Simple circuits are used to estimate technology performance. prereq: [5171 or concurrent registration is required (or allowed) in 5171], CSE grad student] or dept consent


EE 5231. Linear Systems and Optimal Control. (3 cr.; Student Option; Every Fall) Properties and modeling of linear systems. Linear quadratic and linear-quadratic-Gaussian regulators. Maximum principle. prereq: [3015, CSE grad student] or instr consent

EE 5235. Robust Control System Design. (3 cr.; Student Option; Every Spring) Development of control system design ideas; frequency response techniques in design of single-input/single-output (and MIMO) systems. Robust control concepts. CAD tools. prereq: CSE grad, 3015, 5231 or instr consent


EE 5301. VLSI Design Automation I. (3 cr.; Student Option; Periodic Fall & Spring) Basic graph/numerical algorithms. Algorithms for logic/high-level synthesis. Simulation algorithms at logic/circuit level. Physical-design algorithms. prereq: [2301, CSE grad student] or dept consent


EE 5323. VLSI Design I. (3 cr.; Student Option; Every Fall) Combinational static CMOS circuits. Transmission gate networks. Clocking strategies, sequential circuits. CMOS process flows, design rules, structured layout techniques. Dynamic circuits, including Domino, CMOS and DCVS. Performance analysis, design optimization, device sizing. prereq: [2301, 3115, CSE grad student] or dept consent

EE 5324. VLSI Design II. (3 cr.; Student Option; Every Spring) CMOS arithmetic logic units, high-speed carry chains, fast CMOS multipliers. High-speed performance parallel shifters. CMOS memory cells, array structures, read/write circuits. Design for testability, including scan design and built-in self test. VLSI case studies. prereq: [5323, CSE grad student] or dept consent

EE 5327. VLSI Design Laboratory. (3 cr.; Student Option; Every Spring) Complete design of an integrated circuit. Designs evaluated by computer simulation. prereq: [4301, 5323 or concurrent registration is required (or allowed) in 5323], CSE grad student] or dept consent

EE 5329. VLSI Digital Signal Processing Systems. (3 cr.; Student Option; Periodic Fall & Spring) Programmable architectures for signal/media processing. Data-flow representation. Architecture transformations. Low-power design. Architectures for two's complement/redundant representation, carry-save, and canonical signed digit. Scheduling/allocation for high-level synthesis. prereq: [5323 or concurrent registration is required (or allowed) in 5323], CSE grad student] or dept consent

EE 5333. Analog Integrated Circuit Design. (3 cr.; Student Option; Every Fall) Fundamental circuits for analog signal processing. Design issues associated with MOS/BJT devices. Design/testing of circuits. Selected topics (e.g., modeling of basic IC components, design of operational amplifier or comparator or analog sampled-data circuit filter). prereq: [3115, CSE grad student] or dept consent

EE 5351. Applied Parallel Programming. (3 cr.; Student Option; Every Fall) Parallel programming/architecture. Application development for many-core processors. Computational thinking, types of parallelism, programming models, mapping computations effectively to parallel hardware, efficient data structures, paradigms for efficient parallel algorithms, application case studies. prereq: [4363 or equivalent], programming experience (C/C++ preferred)

EE 5364. Advanced Computer Architecture. (3 cr.; Student Option; Every Fall) Instruction set architecture, processor microarchitecture. Memory and I/O systems. Interactions between computer software and hardware. Methodologies of computer design. prereq: [4363 or CSci 4203], CSE grad student] or dept consent

EE 5371. Computer Systems Performance Measurement and Evaluation. (3 cr.; Student Option; Periodic Fall & Spring)
Tools/techniques for analyzing computer hardware, software, system performance. Benchmark programs, measurement tools, performance metrics. Deterministic/probabilistic simulation windows of techniques, random number generation/testing. Bottleneck analysis. prerequisites: [4363 or 5361 or CSE 4203 or 5201], [CSE grad student] or dept consent

EE 5381. Telecommunications Networks. (; 3 cr.; Student Option; Periodic Fall & Spring) Fundamental concepts of modern telecommunications networks, mathematical tools required for their performance analysis. Layered network architecture, point-to-point protocols/links, delay models, multimedia communication/routing. Prerequisite: [4501, 5531, CSE grad student] or dept consent

EE 5391. Computing With Neural Networks. (; 3 cr.; Student Option; Periodic Fall & Spring) Neural networks as a computational model. Connections to AI, statistics and model-based computation. Associative memory and matrix computation; Hopfield networks. Supervised networks for classification and prediction. Unsupervised networks for data reduction. Associative recognition/attention, optimization, time series prediction, knowledge extraction. Prerequisite: [3025 or Stat 3091], CSE grad student or dept consent

EE 5393. Circuits, Computation, and Biology. (; 3 cr.; Student Option; Periodic Fall & Spring) Connections between digital circuit design and synthetic/computational biology. Probabilistic, discrete-event simulation. Timing analysis. Information-Theoretic Analysis. Feedback in digital circuits/genetic regulatory systems. Synthesizing stochastic logic and probabilistic biochemistry. Prerequisite: MATH 2263 or dept consent


EE 5505. Wireless Communication. (; 3 cr.; Student Option; Every Spring) Introduction to wireless communication systems. Propagation modeling, digital communication over fading channels, diversity and spread spectrum techniques, radio mobile cellular systems design, performance evaluation. Current European, North American, and Japanese wireless networks. Prerequisite: [4501, CSE grad student] or dept consent; 5501 recommended


EE 5556. Image Processing and Applications. (; 3 cr.; Student Option; Every Spring) Two-dimensional digital filtering/transforms. Application to image enhancement, restoration, compression, and segmentation. Prerequisite: [4541, 5581, CSE grad student] or dept consent

EE 5581. Information Theory and Coding. (; 3 cr.; Student Option; Fall Even Year) Source/channel models, codes for sources/channels. Entropy, mutual information, capacity, rate-distortion functions. Coding theorems. Prerequisite: [5531, CSE grad student] or dept consent

EE 5583. Error Control Coding. (; 3 cr.; Student Option; Periodic Spring) Error-correcting codes. Concepts, properties, polynomial representation. BCH, Golay, Reed-Muller/Reed-Solomon codes. Convolutional codes. Iterative codes. Prerequisite: [3025, Math 2373] or equiv. [CSE grad student or dept consent


EE 5601. Introduction to RF/Microwave Engineering. (; 3 cr.; Student Option; Periodic Fall & Spring) Fundamentals of EM theory and transmission lines concepts. Transmission lines and network analysis. CAD tool. Lumped circuit component designs. Passive circuit components. Connectivity to central communication theme. Prerequisite: [5601, CSE grad student] or dept consent

EE 5602. RF/Microwave Circuit Design. (; 3 cr.; Student Option; Periodic Fall & Spring) Transmission lines, network analysis concepts. CAD tools for passive/active designs. Diode based circuit designs (detectors, frequency multipliers, mixers). Transistor based circuit design (amplifiers, oscillators, mixer/doubler). Prerequisite: [5601 or equiv], [CSE grad student or instr consent

EE 5611. Plasma-Aided Manufacturing. (; 4 cr.; A-F or Audit; Periodic Fall & Spring) Manufacturing using plasma processes. Plasma properties as a processing medium. Plasma spraying, welding and microelectronics processing. Process control and system design; industrial speakers. Cross-disciplinary experience between heat transfer design issues and manufacturing technology. Prerequisite: [[ME 3321, ME 3322] or equiv], [upper div CSE or grad student] or dept consent

EE 5613. RF/Microwave Circuit Design Laboratory. (; 2 cr.; A-F only; Every Spring) Scattering parameters, planar lumped circuits, transmission lines, RF/microwave substrate materials, matching networks/tuning elements, resonators, filters, combiners/dividers, couplers. Integral lab. Prerequisite: [5601 or concurrent registration is required (or allowed) in 5601], CSE grad student or dept consent

EE 5616. Antenna Theory and Design. (; 3 cr.; Student Option; Periodic Fall & Spring) Antenna performance parameters, vector potential/radiation integral, wire antenna structures, broadband antenna structures, microstrip/aperture theory, antenna measurements. Prerequisite: [5601 or concurrent registration is required (or allowed) in 5601], CSE grad student or dept consent

EE 5621. Physical Optics. (; 3 cr.; Student Option; Every Spring) Physical optics principles, including Fourier analysis of optical systems/images, scalar diffraction theory, interferometry, and coherence theory. Diffraction optical elements, holography, astronomical imaging, optical information processing, microoptics. Prerequisite: [3015, CSE grad student] or dept consent

EE 5622. Physical Optics Laboratory. (; 1 cr.; Student Option; Every Spring)
Fundamental optical techniques. Diffraction and optical pattern recognition. Spatial/ temporal coherence. Interferometry. Speckle. Coherent/incoherent imaging. Coherent image processing. Fiber Optics, prereq: [5621 or concurrent registration is required (or allowed) in 5621], CSE grad student or dept consent

EE 5624. Optical Electronics. (4 cr.; Student Option; Every Fall) Fundamentals of lasers, including propagation of Gaussian beams, optical resonators, and theory of laser oscillation. Polarization optics, electro-optic, acousto-optic modulation, nonlinear optics, phase conjugation. prereq: [3601 or Phys 3002], CSE grad student or dept consent


EE 5628. Fiber Optics Laboratory. (1 cr.; Student Option; Spring Odd Year) Experiments in fiber optics. Dielectric waveguides, modes in optical fibers, fiber dispersion/attenuation, properties of light sources/detectors, optical communication systems. prereq: [5627 or concurrent registration is required (or allowed) in 5627], CSE grad student or instr consent

EE 5629. Optical System Design. (2 cr.; Student Option; Periodic Fall & Spring) Elementary or paraxial optics. Non-paraxial, exact ray tracing. Energy considerations in instrument design. Fourier optics and image quality. Design examples: telescopes, microscopes, diffraction-limited lenses, projectors, scientific instruments. prereq: CSE grad student or dept consent

EE 5653. Physical Principles of Magnetic Materials. (3 cr.; Student Option: Every Fall) Physics of diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism. Ferromagnetic phenomena. Static/dynamic theory of micromagnetics, magneto-optics, and magnetization dynamics. Magnetic material applications. prereq: CSE grad student or dept consent

EE 5655. Magnetic Recording. (3 cr.; Student Option; Periodic Spring) Magnetic fundamentals, recording materials, idealized models of magnetic records/reproduction, analytic models of magnetic record heads, sinusoidal magnetic recording, digital magnetic recording, magnetic recording heads/media, digital recording systems. prereq: CSE grad student or dept consent

EE 5657. Physical Principles of Thin Film Technology. (4 cr.; Student Option; Every Fall) Fabrication, characterization, and application of thin film and nanostructured materials and devices. Focuses on vacuum deposition. Materials science. Hands-on, team-based labs.

EE 5705. Electric Drives in Sustainable Energy Systems. (3 cr.; Student Option; Periodic Spring) Role of electric drives in wind-electric systems, inertial storage, elec/hybrid vehicles. AC machines for energy-efficient operation using d-q axis modeling. Vector-/direct-torque-controlled induction motor drives. Permanent-magnet and interior-permanent magnet ac motor drives. Sensorless drives. Voltage space-vector modulation technology. prereq: [4701, CSE grad student] or dept consent

EE 5707. Electric Drives in Sustainable Energy Systems Laboratory. (1 cr.; Student Option; Periodic Spring) Lab to accompany 5705. prereq: 5705 or concurrent registration is required (or allowed) in 5705

EE 5721. Power Generation Operation and Control. (3 cr.; Student Option; Spring Odd Year) Engineering aspects of power system operation. Economic analysis of generation plants & scheduling to minimize total cost of operation. Scheduling of hydro resources and thermal plants with limited fuel supplies. Loss analysis, secure operation. State estimation, optimal power flow. Power system organizations. prereq: [4721, CSE grad student] or dept consent

EE 5725. Power Systems Engineering. (3 cr.; Student Option; Spring Even Year) Reliability analysis of large power generation/transmission systems. Writing programs for state-by-state analysis and Monte Carlo analysis. Power system protection systems, circuit current calculations, short circuit detection, isolating faulted components. Characteristics of protection components. prereq: [4721, CSE grad student] or dept consent

EE 5741. Advanced Power Electronics. (3 cr.; Student Option; Periodic Spring) Physics of solid-state power devices, passive components, magnetic optimization, advanced topologies. Unity power factor correction circuits, EMI issues, snubbers, soft switching in dc/ac converters. Practical considerations. Very low voltage output converters. Integrated computer simulations. prereq: CSE grad student or dept consent

EE 5745. Wind Energy Essentials. (2 cr.; Student Option; Every Fall) Design, planning, development/operation of wind energy facilities. Wind turbine generator types, wind forecasting/assessment, wind farm project development, grid integration, wind turbine controls, blade aerodynamics/acoustics, mechanical/hydrostatic transmissions, materials/structural reliability, wind turbine foundations, radar interference, role of public policy in wind energy. prereq: CSE grad student or dept consent

EE 5900. Special Topics in Electrical Engineering I. (1-4 cr.; max 12 cr.; Student Option; Every Fall & Spring) Special topics in electrical and computer engineering. Topics vary.

EE 5901. Special Topics in Electrical Engineering II. (1-4 cr.; max 12 cr.; Student Option; Every Fall & Spring) Special topics in electrical and computer engineering. Topics vary.

EE 5902. Special Topics in Electrical Engineering III. (1-4 cr.; max 12 cr.; Student Option; Every Fall & Spring) Special topics in electrical and computer engineering. Topics vary.

EE 5903. Special Topics in Electrical Engineering IV. (1-4 cr.; max 12 cr.; Student Option; Periodic Fall & Spring) Special topics in electrical and computer engineering. Topics vary. prereq: EE or CompE grad student or instr consent; only available for Rochester Campus

EE 5990. Curricular Practical Training. (1-2 cr.; max 6 cr.; S-N or Audit; Every Fall, Spring & Summer) Industrial work assignment involving advanced electrical engineering technology. Review by faculty member. Final report covering work assignment. prereq: Grad student, instr consent

EE 8100. Advanced Topics in Electronics. (1-3 cr.; max 12 cr.; Student Option; Periodic Fall) Topics vary according to needs and staff availability. prereq: instr consent

EE 8141. Advanced Heterojunction Transistors. (3 cr.; Student Option; Periodic Fall) Recent developments in device modeling with emphasis on bipolar junction transistors. High-level effects in base and collector regions and their interrelationship. prereq: 5664 or instr consent

EE 8161. Physics of Semiconductors. (3 cr.; Student Option; Periodic Fall & Spring) Modern solid-state theory applied to specific semiconductor materials. Influence of band structure and scattering mechanisms upon semiconductor properties. Plasma effects in semiconductors. Mathematical treatments of generation-recombination kinetics, carrier injection, drift, and diffusion. Use of semiconductor properties in devices of current importance. prereq: instr consent


EE 8190. Electronics Seminar. (1 cr.; max 3 cr.; S-N or Audit; Every Fall & Spring) Current literature, individual assignments. prereq: instr consent

EE 8210. System Theory Seminar. (1 cr.; max 3 cr.; S-N or Audit; Periodic Fall & Spring) Current literature, individual assignments.
EE 8213. Advanced System Theory. (3 cr.; Student Option; Periodic Fall)
Generalized linear systems; applications, structural properties, computational approaches, classification, functional behavior, and synthesis. prereq: IT grad student, instr consent

EE 8215. Nonlinear Systems. (3 cr.; Student Option; Periodic Fall & Spring)
Current topics in stability analysis of nonlinear systems, design of controllers for nonlinear systems, discrete-time and stochastic nonlinear systems. prereq: instr consent

EE 8230. Control Theory Seminar. (1 cr. [max 3 cr.]; S-N or Audit; Periodic Fall & Spring)
Current literature, individual assignments. prereq: instr consent

EE 8231. Optimization Theory. (3 cr.; Student Option; Periodic Fall)
Introduction to optimization in engineering; approximation theory. Least squares estimation, optimal control theory, and computational approaches. prereq: instr consent

EE 8235. Advanced Control Topics. (3 cr.; Student Option; Periodic Spring)

EE 8300. Advanced Topics in Computers. (1-3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8310. Advanced Topics in VLSI. (1-3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8320. Advanced Topics in Design Automation. (1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall)
State-of-the-art automated design tools for electronic system design. Topics vary. prereq: Grad student or instr consent

EE 8331. CMOS Data Converters: A/D and D/A. (3 cr.; Student Option; Every Fall & Spring)
Data converters, low power low voltage analog circuits. Basic background in design of CMOS analog-to-digital and digital-to-analog converters. Special circuit design techniques for low power design. Students design/test several design problems. prereq: 5333 or instr consent

EE 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

EE 8337. Analog Circuits for Wire/Wireless Communications. (3 cr.; A-F or Audit; Every Spring)
Basic background, advanced design concepts necessary to design integrated CMOS RF circuits. Emphasizes CMOS and RF. Where appropriate, mention is made of bipolar circuits and applications to other communications areas. prereq: 5333

EE 8360. Computer Systems Seminar. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments.

EE 8367. Parallel Computer Organization. (3 cr.; Student Option; Every Spring)

EE 8370. Computer Aided Design Seminar. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments. prereq: [EE or CompE or CSci] grad major, instr consent

EE 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

EE 8500. Seminar: Communications. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments.

EE 8510. Advanced Topics in Communications. (1-3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8520. Advanced Topics in Signal Processing. (1-3 cr. [max 12 cr.]; Student Option; Every Spring)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8581. Detection and Estimation Theory. (3 cr.; Student Option; Periodic Spring)
Risk theory approach to detection and estimation, random process representation, signal parameter estimation. Waveform estimation; detection of phase, frequency, and delay in signals. Applications to communications and radar-sonar signal design and processing. prereq: 5531 or instr consent

EE 8591. Predictive Learning from Data. (3 cr.; Student Option; Every Fall)
Basic elements and application areas of artificial intelligence (AI) related to design and implementation of expert systems (ES). Knowledge representation, reasoning under uncertainty, ES and their environment, planning, natural language processing (NLP), intelligent computer-aided instruction (ICAI), and AI tools (software and hardware). prereq: CSE grad student or instr consent

EE 8601. Advanced Electromagnetic Theory. (3 cr.; A-F or Audit; Periodic Fall)
Aspects of electromagnetic theory. Review of introductory material. Scattering theory, geometric theory of diffraction, integral equation methods, Green's functions. prereq: 4601 or equiv

EE 8610. Seminar: Electronics, Fields, and Photonics. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)

EE 8611. Plasma Physics. (3 cr.; Student Option; Periodic Fall)
Plasma theory and charged particle transport phenomena; collision processes, orbit theory, kinetic theory. Boltzmann transport equation, moment (continuity) equations, magnetohydrodynamics, transport properties. Applications of plasma theory to modeling of dc, rf, and microwave discharges. prereq: instr consent

EE 8620. Advanced Topics in Magnetics. (1-3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: 5653 or instr consent

EE 8630. Advanced Topics in Electromagnetics. (1-3 cr. [max 12 cr.]; Student Option)
Topics vary according to needs and staff availability.

EE 8660. Seminar: Magnetics. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments.

EE 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; dept consent for 3rd/4th registrations, up to 24 combined cr.; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

EE 8725. Advanced Power System Analysis and Economics. (3 cr.; Student Option; Periodic Fall)
Solving sets of equations that involve large sparse matrices. Sparse matrix storage, ordering schemes, application to power flow, short circuit calculation, optimal power flow, and state estimation. prereq: 4721, CSE grad student or instr consent

EE 8741. Power Electronics in Power Systems. (3 cr.; Student Option; Periodic Fall)
Impact of power electronics loads on power quality. Passive and active filters. Active input current wave shaping, HVDC transmission. Static VAR control, energy storage systems. Interconnecting photovoltaic and wind generators. Static phase shifters and circuit breakers for flexible AC transmission (FACTS). prereq: 4741, IT grad student or instr consent

EE 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

EE 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
ENDO 8312. Literature Review. (2 cr.; A-F or Audit; Every Fall)
Critical review of classic/current endodontic literature. prereq: 8311

ENDO 8313. Literature Review. (2 cr.; A-F or Audit; Every Spring)
Critical review of classic/current endodontic literature. prereq: 8312

ENDO 8320. Advanced Endodontic Lecture. (1 cr.; A-F or Audit; Every Spring)
Pulpal/periapical pathology, diagnosis, and treatment planning. prereq: dept consent

ENDO 8321. Advanced Endodontic Lecture. (1 cr.; A-F or Audit; Every Spring)
Pulpal/periapical pathology, diagnosis, treatment planning. prereq: 8320

ENDO 8322. Advanced Endodontic Lecture. (1 cr.; A-F or Audit; Every Fall)
Pulpal/periapical pathology, diagnosis, treatment planning. prereq: 8321

ENDO 8323. Advanced Endodontic Lecture. (1 cr.; A-F or Audit; Every Spring)
Pulpal/periapical pathology, diagnosis, treatment planning. prereq: 8322

ENDO 8335. Endodontics/Periodontics Seminar. (1 cr.; S-N or Audit; Every Spring)
Discussions of endo-perio problems. prereq: dept consent

English as a Second Language (ESL)

ESL 5. SIEP: Beginning Grammar. (0 cr.; S-N or Audit; Every Summer)
Develop English grammar skills by focusing on meaning, form, use of basic grammar structures. Intended for students with some prior English. prereq: Non-native English speaker

ESL 10. Beginning Grammar. (0 cr.; S-N or Audit; Every Fall & Spring)
Meaning/form/use of fundamental grammar structures. Appropriate for students with some prior English. prereq: Non-native English speaker

ESL 15. SIEP: Beginning Reading and Composition. (0 cr.; S-N or Audit; Every Summer)
Develop skills/strategies for reading/writing in English. Read variety of short/simplified texts. Learn fundamentals of writing at sentence/basic paragraph level. Vocabulary development. Intended for students with some prior English. prereq: Non-native English speaker

ESL 20. Beginning Reading and Composition. (0 cr.; S-N or Audit; Every Fall & Spring)
Skills/strategies for reading/writing in English. Fundamentals of writing at sentence/basic paragraph level. Vocabulary development. Appropriate for students with some prior English. prereq: Non-native English speaker

ESL 25. SIEP: Beginning Oral Skills. (0 cr.; S-N or Audit; Every Summer)
Designed for beginning level non-native speakers of English with some prior English

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Reading for main/supporting ideas with increased speed. Vocabulary development through study of word formation and use of dictionary. Writing fundamentals. Organization. Writing as process. prereq: Non-native speaker of English

ESL 225. SIEP, Intermediate Oral Skills. (0 cr. ; S-N only; Every Summer) English spoken language skills, community contact. prereq: Non-native speaker of English

ESL 230. Intermediate Oral Skills. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) fluency/accuracy. Language for specific functions. Communication strategies. Standard forms of organization for academic lectures. Conversational speech. prereq: Non-native speaker of English

ESL 305. SIEP: Advanced Grammar. (0 cr. ; S-N or Audit; Every Fall) English grammar skills. prereq: Non-native speaker of English; see English as a Second Language Program for override

ESL 310. Advanced Grammar. (0 cr. ; S-N or Audit; Every Fall & Spring) Difficult areas of grammar, resources to work on them. Meaning, use, form, Complex sentence patterns. prereq: Non-native speaker of English

ESL 315. SIEP: Advanced Reading and Composition. (0 cr. ; S-N or Audit; Every Summer) English reading/composition skills. prereq: Non-native speaker of English; see Minnesota English as a Second Language Program for override

ESL 320. Advanced Reading and Composition. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) Improving reading efficiency. Strategy development, vocabulary building. Using reading to support academic writing. prereq: Non-native speaker of English

ESL 325. SIEP, Advanced Oral Skills. (0 cr. ; S-N only; Every Summer) English spoken language skills, community contact. prereq: Non-native speaker of English

ESL 330. Advanced Oral Skills. (0 cr. ; S-N or Audit; Periodic Fall) Listening/speaking skills in academic/conversational situations. Listening to lectures, note taking, giving speeches/presentations, readings, film, discussion. Pronunciation focuses on individual need. prereq: Non-native speaker of English

ESL 405. SIEP: High-Advanced Grammar. (0 cr. ; S-N or Audit; Every Summer) English grammar skills. prereq: Non-native speaker of English; see English as a Second Language Program for override

ESL 410. English Grammar for Academic Purposes. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) Production of grammatically sophisticated structures in writing. Students edit their assignments. prereq: Non-native speaker of English

ESL 415. SIEP: High-Advanced Reading and Composition. (0 cr. ; S-N or Audit; Every Summer) English reading/composition skills. prereq: Non-native speaker of English; see Minnesota English as a Second Language Program for override

ESL 420. High Advanced Reading/Composition. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) Reading for academic purposes. Comprehension of scholarly reading selections. Increasing reading efficiency. Writing process, academic-style assignments. prereq: Non-native speaker of English

ESL 425. SIEP, High Advanced Oral Skills. (0 cr. ; S-N or Audit; Every Summer) English spoken language skills, community contact. prereq: Non-native speaker of English

ESL 430. High Advanced Oral Skills. (0 cr. ; S-N or Audit; Every Fall & Spring) Listening/speaking skills. Understanding U.S. culture through interaction with American students. Weekly seminar with American university students. Students visit local schools and present about their home country. Pronunciation instruction focuses on individual needs. prereq: Non-native speaker of English

ESL 900. Current Issues in the Media. (0 cr. ; S-N or Audit; Every Fall) News media as means of English improvement and as source of information/entertainment. International news events via radio broadcasts, newspaper, and other sources. Understanding American culture. Developing listening/speaking skills using American movies/television. prereq: Non-native speaker of English

ESL 901. American Culture. (0 cr. ; S-N or Audit; Every Spring) Areas of U.S. culture such as humor, religions, ethnic groups, lifestyles, and popular culture. prereq: Non-native speaker of English

ESL 902. Academic Skills for the American University. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) English language needed to interact within university setting. Academic life, student/instructor roles, communicating by email, classroom interactions, discussion/panel presentation skills. prereq: Non-native speaker of English

ESL 903. Business English. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) Oral/written communication skills in business setting. prereq: Non-native speaker of English

ESL 904. TOEFL Preparation. (0 cr. ; S-N or Audit; Every Fall, Spring & Summer) Preparing for Internet-based TOEFL (iBT). Listening, speaking, grammar, writing, reading. Students examine types of questions and practice strategies useful on the test.

ESL 905. Topics in ESL. (0 cr. ; S-N or Audit; Periodic Fall & Spring) Varying topics in learning English as a second language. prereq: Non-native speaker of English

ESL 906. English for Business Interactions. (0 cr. ; S-N or Audit; Every Fall & Spring) Zero-credit course designed for high-intermediate to advanced non-native speakers of English currently working in professional settings or wish to study business. Writing for business communication, self-editing skills, communication styles, presentations, telephone communication. prereq: Non-native speaker of English

ESL 907. English for Science and Engineering. (0 cr. ; S-N or Audit; Every Fall & Spring) Zero-credit course is designed for students who are high-intermediate to advanced non-native speakers of English in Intensive English Program (IEP) preparing for admission to science/engineering programs at university level. Open to students at higher levels in Intensive English Program in Minnesota English Language Program (MELP). prereq: Non-native English Speaker, dept consent

ESL 909. Reading for Academic Purposes. (0 cr. ; S-N or Audit; Every Fall & Spring) This zero-credit course is designed for students who are high-intermediate to advanced non-native speakers of English in the Intensive English Program (IEP) in the Minnesota English Language Program (MELP), and are preparing for admission to academic programs at the university level. Students taking this course will develop skills and strategies for reading authentic college-level texts and managing unfamiliar vocabulary. Students will improve their ability to apply reading strategies, analyze, critique, and use critical thinking to synthesize information from a variety of texts such as authentic college textbook chapters, shorter essays, and news articles. Students will respond with their own ideas in writing and discussion and will demonstrate comprehension through tests, quizzes, written assignments, and discussion. This course is open to students at higher levels in the Intensive English Program in the Minnesota English Language Program (MELP).

ESL 921. Academic Writing. (0 cr. ; S-N or Audit; Every Fall & Spring) Writing for academic purposes. prereq: Non-native speaker of English

ESL 931. Academic Speaking. (0 cr. ; S-N or Audit; Every Fall & Spring) American academic interactions. Lectures, presentations, seminar-style discussions, informal exchanges. Presenting oneself professionally/socially in collegial settings with accuracy, variety, and flexibility. prereq: Non-native speaker of English

ESL 941. Research Writing for the American University. (0 cr. ; S-N only; Every Fall & Spring) Methods of citation, conventions of style and organization, and critical thinking skills necessary for writing college-level research papers. Students select topics derived from a contemporary academic theme and apply a process approach to produce a research paper. Students learn to use the library effectively. Structure and vocabulary usage. prereq: [Non-
native speaker of English, [TOEFL iBT 79 or IELTS 6.5 or MNBatt 80 or equiv] or dept consent

ESL 950. Pronunciation Improvement. (2 cr.; S-N or Audit; Every Summer)

ESL 951. Pronunciation. (0 cr.; S-N or Audit; Every Fall & Spring)

ESL 3001. Integrated Skills for Academic English. (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Polishing English skills to succeed in university-level classes. Small group discussions, interactions with instructors/peers, academic writing, vocabulary building. prereq: Non-native speaker of English

ESL 3006. English for Business Interactions. (12 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Designed for high-intermediate to advanced non-native speakers of English who are currently business majors or in closely related major. Writing for business communication, self-editing skills, communication styles, presentations, telephone communication. prereq: Non-native English speaker

ESL 3007. English for Physics. (1 cr.; Student Option; Every Fall & Spring)
One-credit course designed for non-native speakers of English who have high-intermediate to advanced English skills and are currently enrolled in Physics 1301W. Students taking this course will gain more support and practice with the conventions of scientific lab report writing, applying the concepts of academic integrity, interacting and participating in lab-type discussions, interpreting authentic texts (both text and aural-based), and understanding the cultural norms for seeking additional academic / social support. One of the goals of this course is to equip participants with techniques to aid in continual improvement of English skills for science and engineering contexts beyond the class. prereq: Non-native English speaker

ESL 3101. Advanced English Grammar. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)
Form, meaning, and use of common English grammatical structures in written/oral discourse. Adverb, adjective, and noun clauses. Verb tense, aspect, and modality. Grammar beyond sentence level. Application to development of revision/editing skills. prereq: dept consent, non-native speaker of English, [C-TOEFL score 153-187 or equiv], ESL program consent

ESL 3102. English Grammar for Academic Purposes. (4 cr. [max 8 cr.]; Student Option; Every Fall)
Form, meaning, and use of an expanded repertoire of complex English grammatical structures used in academic written/oral discourse. Subordination, coordination, transition. Complex referential expressions. Complementation. Lexical grammar. Independent self-editing of academic writing. prereq: 3101, [Non-native speaker of English, [C-TOEFL score of at least 190 or equiv], dept consent

ESL 3201. Advanced English Reading and Composition. (5 cr. [max 10 cr.]; Student Option; Every Fall & Spring)
Comprehension of main ideas, organization, and support in longer authentic English texts. Expanded vocabulary comprehension. Fluency, focus, and persuasiveness through drafting revision. Focus on sharing and support of source material of expression. prereq: Non-native speaker of English, [IBT score of 53-67 or equiv]

ESL 3202. Academic Reading and Composition. (5 cr. [max 10 cr.]; Student Option; Every Fall & Spring)
Academic writer's purpose, main ideas, and supporting evidence in English language texts. Expansion of academic vocabulary. Use of source material in English research writing in different academic genres. Focuses on revision to improve fluency/accuracy. prereq: 3201, Non-native speaker of English, [IBT score of at least 68 or equiv], dept consent

ESL 3302. Writing for Academic Purposes. (4 cr. [max 8 cr.]; Student Option; Every Fall)
Writing process. Idea generation/development, drafting, revision, editing. Focuses on different genres of academic writing, including critical response to scholarly argument, scholarly response to critical writing. prereq: Non-native speaker of English, [IBT score of at least 68 or equiv], dept consent

ESL 3402. Research Writing for the American University. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)
Methods of citation, conventions of style and organization, and critical thinking skills necessary for writing college-level research papers. Students select topics derived from a contemporary academic theme and apply a process approach to produce a research paper. Students learn to use the library effectively. prereq: Non-native speaker of English, [TOEFL iBT 79 or IELTS 6.5 or MNBatt 80 or equiv] or dept consent

ESL 3501. Advanced English Listening and Speaking. (5 cr. [max 10 cr.]; Student Option; Every Fall & Spring)
Speaking/understanding naturally spoken English in academic activities such as lecture comprehension, note taking, class discussions, and oral presentations. Emphasizes cross-cultural interaction related to academic subject matter. prereq: Non-native speaker of English, [IBT score 53-67 or equiv], dept consent

ESL 3502. Academic Listening and Speaking. (5 cr. [max 10 cr.]; Student Option; Every Fall & Spring)
Understanding lectures and academic discussions. Focuses on critical listening. Students produce academic presentations and participate in discussions on subjects of general academic interest. Cross-cultural awareness. Negotiation of disagreement/ misunderstanding. prereq: 3501, non-native speaker of English, [IBT score of at least 68 or equiv], dept consent

ESL 3550. Pronunciation Improvement. (2 cr. [max 4 cr.]; Student Option; Every Summer)

ESL 3551. English Pronunciation. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)

ESL 3602. Speaking for Academic Purposes. (4 cr. [max 8 cr.]; Student Option; Every Spring)
Students participate in American academic interactions of various types: lectures, presentations, seminar-style discussions, informal exchanges. Presenting oneself professionally/socially in collegial settings with accuracy, variety, and flexibility. prereq: 3502, non-native speaker of English, [C-TOEFL score of at least 190 or equiv], dept consent

ESL 3900. Special Topics in ESL. (1-5 cr. [max 10 cr.]; Student Option; Every Fall & Spring)
Topics vary. prereq: Non-native speaker of English, program consent

ESL 5006. English for Business Interactions. (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Designed for high-intermediate to advanced non-native speakers of English who are currently business majors or in closely related major. Writing for business communication, self-editing skills, communication styles, presentations, telephone communication. prereq: Grad, non-native English speaker

ESL 5008. Speaking for Professional Settings. (2 cr.; Student Option; Every Fall & Spring)
This course is designed for graduate students who are non-native speakers of English seeking to improve their English speaking skills for professional contexts. The course assumes that students already have a high level of proficiency in English; this course will help students refine their skills for specific professional situations. The course covers topics such as small talk, networking, interviewing, and presentation
English: Literature (ENGL)

ENGL 1001V. Introduction to Literature: Poetry, Drama, Narrative. (LITR, WI; 4 cr.; A-F or Audit; Every Fall & Spring) Techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays. prereq: Honors or instr consent

ENGL 1001W. Introduction to Literature: Poetry, Drama, Narrative. (LITR, WI; 4 cr.; Student Option; Every Fall & Spring) Basic techniques for analyzing/understanding literature. Readings of novels, short stories, poems, plays.

ENGL 1003W. Women Write the World. (GP, WI, LITR; 3 cr.; Student Option; Every Fall) Concepts in literary studies. Poems, plays, short stories, novels, essays, letters by women from different parts of world. Focuses on lives, experiences, and literary expression of women, including basic concepts of women's studies.

ENGL 1172. The Story of King Arthur. (LITR; 3 cr.; A-F or Audit; Every Spring) Arthurian literature, from earliest times to present. How same story can accommodate many different systems of belief. Form, changing historical backgrounds.

ENGL 1181W. Introduction to Shakespeare. (LITR, WI; 4 cr.; Student Option; Every Fall & Spring) Survey of Shakespeare's work, treating approximately 10 plays. Lecture.

ENGL 1201W. Contemporary American Literature. (LITR, WI; 4 cr.; Student Option; Every Spring & Summer) Literature of 1960s to today. Ways American authors from various ethnic, gender, religious, sexual, economic orientations and genres explore politics, aesthetics, sociocultural taboos, and extra-literary concerns.

ENGL 1301W. Introduction to Multicultural Literatures of the United States. (DSJ, WI, LITR; 4 cr.; Student Option; Every Fall & Summer) Representative works by African American, American Indian, Asian American, and Chicano/Chicana writers, chiefly from 20th century. Social/cultural factors informing America's literary past/present.

ENGL 1401V. Honors: Introduction to World Literatures in English. (GP, WI, LITR; 4 cr.; A-F only; Every Fall & Spring) Diverse works produced in English outside the United States and Britain. Works represent different cultures, but treat concerns derived from common post-colonial legacy.

ENGL 1401W. Introduction to World Literatures in English. (GP, WI, LITR; 4 cr.; Student Option; Every Fall & Spring) Diverse works produced in English outside the United States and Britain. Works represent different cultures, but treat concerns derived from common post-colonial legacy.

ENGL 1501W. Literature and Public Life. (WI, LITR, CIV; 4 cr.; A-F only; Every Fall & Spring) Meaning/practice of citizenship. Historical themes, contemporary issues in American public life: access of citizenship, tensions between social duties and individual freedoms, role of moral values in public life. Diverse literary materials. Optional service-learning component.

ENGL 1701. Modern Fiction. (LITR; 3 cr.; Student Option; Every Fall & Spring) Basic techniques for analyzing/understanding fiction. Readings from novels and short stories written in English-speaking countries and elsewhere (in translation). Introduction to fictional techniques such as point of view, fictional conventions, and some forms of experimentation.

ENGL 1701H. Honors: Modern Fiction. (LITR; 3 cr.; A-F only; Every Fall & Spring) Basic techniques for analyzing/understanding fiction. Readings from novels and short stories written in English-speaking countries and elsewhere (in translation). Point of view, fictional conventions, forms of experimentation. prereq: Honors or instr consent

ENGL 1902. Topics: Freshman Seminar. (DSJ; 3 cr.; A-F or Audit; Every Fall) Topics specified in Class Schedule. prereq: Freshman

ENGL 1904. Topics: Freshman Seminar. (GP; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

ENGL 1905. Topics: Freshman Seminar. (GP; 3 cr.; A-F or Audit; Every Fall) Topics specified in Class Schedule. prereq: Freshman

ENGL 1910W. Topics: Freshman Seminar. (WI; 3 cr.; A-F or Audit; Every Fall) Topics specified in Class Schedule.

ENGL 3001H. Honors: Textual Analysis, Methods. (WI; 4 cr.; A-F only; Every Fall & Spring) Training/practice in analyzing various literary forms. Emphasizes poetry. Argument, evidence, and documentation in literary papers. Introduction to major developments in contemporary criticism, prereq: Honors, [English major or minor or approved BIS or IDIM program with English area]

ENGL 3001W. Textual Analysis: Methods. (WI; 4 cr.; A-F only; Every Fall & Spring) Close/critical reading, placing literature in history/culture. Idea of multiple approaches to literary works. Analysis of various literary forms, including poetry. prereq: English major or minor or premajor or BIS/IDIM-English

ENGL 3002. Modern Literary Criticism and Theory. (; 3 cr.; Student Option; Every Fall & Spring) Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance.

ENGL 3002H. Honors: Modern Literary Criticism and Theory. (; 3 cr.; Student Option; Every Fall & Spring) Problems of interpretation/criticism. Questions of meaning, form, authority, literary history, social significance. prereq: Honors or instr consent

ENGL 3003W. Historical Survey of British Literatures I. (HIS, WI; 4 cr.; Student Option; Every Fall, Spring & Summer) An introductory historical survey of British literature and culture from the Anglo-Saxon invasions through the end of the 18th century.

ENGL 3004W. Historical Survey of British Literatures II. (HIS, WI; 4 cr.; Student Option; Every Fall, Spring & Summer) An introductory historical survey of British literature and culture in the 19th and 20th centuries. Includes Romantic, Victorian, and Modernist authors, such as Wordsworth, Keats, Tennyson, the Brontes, Austen, Dickens, Wilde, Yeats, Woolf, and Thomas.

ENGL 3005W. Survey of American Literatures and Cultures I. (DSJ, WI, LITR; 4 cr.; A-F only; Periodic Fall & Spring) Readings in American literature from first European contact, through colonial times, to mid-19th century. Texts in several genres by diverse authors. Classics, less familiar works. Historical, social, and aesthetic contexts.

ENGL 3006V. Honors Survey of American Literatures and Cultures II. (DSJ, WI, LITR; 4 cr.; A-F only; Periodic Fall & Spring) Readings from the mid-19th to the mid-20th century; including the realists’ and regionalists’ response to the growth of industrial capitalism, Modernism in the 1920s, and the issues which united and divided the country throughout the 20th century.

ENGL 3006W. Survey of American Literatures and Cultures II. (DSJ, WI, LITR; 4 cr.; Student Option; Every Fall, Spring & Summer) Readings from the mid-19th to the mid-20th century; including the realists' and regionalists' response to the growth of industrial capitalism, Modernism in the 1920s, and the issues which united and divided the country throughout the 20th century.

ENGL 3007. Shakespeare. (LITR; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Plays from all of Shakespeare's periods, including at least A Midsummer Night's Dream, Hamlet, the history plays, King Lear, Macbeth, The Tempest, Twelfth Night, Antony and Cleopatra, Othello, and The Winter's Tale.

ENGL 3007H. Honors: Shakespeare. (LITR; 3 cr.; A-F or Audit; Every Fall & Spring) Plays from all of Shakespeare's periods, including at least A Midsummer Night's Dream, Hamlet, the history plays, King Lear, Macbeth, The Tempest, Twelfth Night, Antony and Cleopatra, Othello, and The Winter's Tale. prereq: Honors or instr consent

ENGL 3010. Studies in Poetry. (; 3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Special topics related to reading poetry in various interpretive contexts.

ENGL 3010H. Honors: Studies in Poetry. (; 3 cr.; A-F only; Periodic Spring)
Special topics related to reading poetry in various interpretive contexts. prereq: Honors or instr consent

ENGL 3011. Diaspora Poetics. (3 cr.; Student Option; Periodic Fall & Spring)
Verbal art, historic or recent, produced by displaced persons as basis for engagement with idea of creative, survivalist displacement of language itself.

ENGL 3013. Poems about Cities. (3 cr.; Student Option; Periodic Spring)
Read/respond to selection of poems about various cities. Emphasis on poetry written in English from 18th through 21st century. Some poetry in translation/from other periods.

ENGL 3020. Studies in Narrative. (; 3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Examine issues related to reading and understanding narrative in a variety of interpretive contexts. Topics may include "The 19th-century English (American, Anglophone) Novel," "Introduction to Narrative," or "Techniques of the Novel." Topics specified in the Class Schedule.

ENGL 3020H. Honors: Studies in Narrative. (; 3 cr.; A-F or Audit; Fall Odd Year)
Issues related to reading/understanding narrative in various interpretive contexts. Topics may include nineteenth-century English (American, Anglophone) novel, narrative, or techniques of the novel. Topics specified in Class Schedule. prereq: honors student

ENGL 3021. Captivity in Literature and Film: From the Barbary Coast to Guantanamo Bay. (; 3 cr.; Student Option; Spring Even Year)
Whether there is a captivity genre in English/Global literature, from early modern period to 21st century. Texts/films from numerous civilizations/histories.

ENGL 3022. Science Fiction and Fantasy. (; 3 cr.; Student Option; Every Fall & Spring)
Variety of science fiction/fantasy authors, such as Mary Shelley, J.R.R. Tolkien, and Neil Gaiman.

ENGL 3023. Children's Literature. (; 3 cr.; Student Option; Every Fall & Spring)
Range of children's literature, from classic fairy tales such as "Little Red Riding Hood" to contemporary texts such as Harry Potter and the Sorcerer's Stone.

ENGL 3023H. Honors: Children's Literature. (; 3 cr.; A-F only; Periodic Spring)
Range of children's literature, from classic fairy tales such as Little Red Riding Hood to contemporary texts such as Harry Potter and the Sorcerer's Stone. prereq: Honors

ENGL 3024. The Graphic Novel. (; 3 cr.; Student Option; Every Fall & Spring)
Graphic novel as well as manga.

ENGL 3025. The End of the World in Literature and History. (HIS; 3 cr.; Student Option; Every Fall)
Apocalypse through readings of text that focus on pandemic, extraterrestrial attack, nuclear holocaust, prophecy, cybernetic revolt, divine judgment, resource depletion, meteoric impact.

ENGL 3026. Mediterranean Wanderings: Literature and History on the Borders of Three Continents. (GP; 3 cr.; Student Option; Every Spring)
History of the Mediterranean with emphasis on the literature produced over the last three millennia. Epic poems, religious texts, and novels.

ENGL 3027W. The Essay. (WI; 4 cr.; Student Option; Every Fall, Spring & Summer)
Incorporating narrative, descriptive, analytical, and persuasive techniques into writing on general topics. Effective argumentation through critical reading. Use of library resources. Awareness of context/audience.

ENGL 3030. Studies in Drama. (; 3 cr. [max 9 cr.]; Student Option; Spring & Summer Odd Year)
Topics may include English Renaissance tragedy, English Restoration and 18th century, or American drama by writers of color. Single-author courses focus on writers such as Tennessee Williams and Eugene O'Neill, or issues/themes such as gender/performance.

ENGL 3032. Shakespeare in London. (; 3 cr.; Student Option; Summer Odd Year)
How are different interpretations of Shakespeare's works embodied in the theater? How are they transformed by location/context? Students attend/discuss theatrical productions.

ENGL 3040. Studies in Film. (; 3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Topics regarding film in variety of interpretive contexts, from range/historic development of American, English, Anglophone film.

ENGL 3040H. Honors: Studies in Film. (; 3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer)
Topics regarding film in various interpretive contexts. Range and historic development of American, English, and Anglophone film.

ENGL 3060. Studies in Literature and the Other Arts. (; 3 cr. [max 9 cr.]; Student Option; Spring Odd Year)
Examine literature's role in conjunction with other arts, including music, visual arts, dance, etc. Topics specified in Class Schedule.

ENGL 3061. Literature and Music. (LITR; 3 cr.; Student Option; Every Spring)
Explores various parallels/intersections between literature and music, in terms of both form/content. Musical genres vary by instructor.

ENGL 3070. Studies in Literary and Cultural Modes. (; 3 cr. [max 9 cr.]; Student Option; Fall Odd Year)
Modes of literary expression/representation that transcend conventional demarcations of genre and historical periods. Topics may include horror, romance, mystery, comedy, and satire.

ENGL 3071. The American Food Revolution in Literature and Television. (CIV; 3 cr.; Student Option; Every Fall)
Native food landscape in 1930s. Classic literature from rise of movement. Recent work that focuses on personal/environmental ethics of food.

ENGL 3090. General Topics. (; 3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

ENGL 3091. The Literature and Film of Baseball. (LITR; 3 cr.; Student Option; Every Spring)
The study of baseball writing by genre including poetry, novel, essay, memoir, and film.

ENGL 3101. Survey of Medieval English Literature. (; 3 cr.; A-F or Audit; Every Fall)
Major/representative Medieval English works, including Sir Gawain the Green Knight, Chaucer's Canterbury Tales, Piers Plowman, Book of Margery Kempe, Julian of Norwich's Revelations, and Malory's Morte D'Arthur.

ENGL 3102. Chaucer. (; 3 cr.; A-F or Audit; Every Fall & Spring)
Major/representative works written by Chaucer, including The Canterbury Tales, Troilus and Criseyde, and the dream visions. Historical, intellectual, and cultural background of the poems. Language, poetic theory, form.

ENGL 3110. Medieval Literatures and Cultures: Intro to Medieval Studies. (; 3 cr. [max 9 cr.]; Student Option; Every Spring)
Major and representative works of the Middle Ages. Topics specified in the Class Schedule.

ENGL 3116. Early Modern Drama. (3 cr.; Student Option; Every Spring)
Reading of selected British plays ranging from the Reformation to the French Revolution. Plays show the evolution of English society and reflect changing social mores from the era of Shakespeare and Jonson to the rise of the bourgeoisie.

ENGL 3122. Shakespeare II: The Major Themes. (; 3 cr.; Student Option; Periodic Spring)
Shakespeare's intellectual community, its language/values. In-class readings from at least six plays. Quizzes on dramatic speeches. Written assignments. prereq: 3007 or instr consent

ENGL 3132. The King James Bible as Literature. (; 3 cr.; Student Option; Fall Odd Year)
Literature of Jewish Bible ("Old Testament"). Narratives (Torah through Kings), prophets (including Isaiah), writings (including Psalms, Job, Ecclesiastes). God's words/deeds as reported by editors/translator.

ENGL 3133. Stuart England: 17th-Century Literature and Culture. (3 cr.; Student Option; Fall Odd Year)
Major/representative works of the Restoration and 18th century (1660-1798). Typical authors:
ENGL 3134. Milton and Rebellion. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Milton's prose/minor poems from the Revolution (1641-1660). Post-revolutionary works (Paradise Lost, Samson Agonistes). Emphasizes Milton's lifelong effort to bring about reform ("change").

ENGL 3141. The Restoration and the Eighteenth Century. (3 cr.; A-F or Audit; Every Spring)
Major/representative works of the Restoration and 18th century (1660-1789). Typical authors: Dryden, Behn, Swift, Pope, Fielding, Burney.

ENGL 3151. Romantic Literatures and Cultures. (3 cr.; A-F only; Every Fall & Spring)
British literature written between 1780 and 1830. Concept of Romanticism, Effects of French Revolution on literary production. Role of romantic artist.

ENGL 3161. Victorian Literatures and Cultures. (3 cr.; Student Option; Every Spring)
The literature of the British Victorian period (1832-1901) in relation to its cultural and historical contexts. Typical authors include Tennyson, the Brownings, Dickens, Arnold, Hopkins, and the Brontes.

ENGL 3161H. Honors: Victorian Literatures and Cultures. (3 cr.; A-F only; Periodic Fall & Spring)
Literature of British Victorian period (1832-1901) in relation to its cultural/historical contexts. Typical authors: Tennyson, the Brownings, Dickens, Arnold, Hopkins, the Brontes. prereq: Honors or instr consent

ENGL 3175. 20th-Century British Literatures and Cultures I. (3 cr.; Student Option; Periodic Fall)

ENGL 3180. Contemporary Literatures and Cultures. (3 cr.; max 9 cr.; Student Option; Every Fall & Summer)
Examine issues related to the reading and understanding of British, American, and Anglophone fiction and poetry in a variety of interpretive contexts.

ENGL 3201W. American Indian Literature. (DSJ,WL,LITR; 3 cr.; A-F only; Every Fall & Spring)
Comparative studies of oral traditions and modern literature from various tribal cultures.

ENGL 3212. American Poetry from 1900. (3 cr.; Student Option; Spring Even Year)
Famous and lesser-known poems from the Modernist era, the time of Frost, HD, Pound, Eliot and the Harlem Renaissance. The course attends to the intellectual and cultural background of the poets, poetic theory and form.

ENGL 3221. American Novel to 1900. (3 cr.; Student Option; Fall Even Year)
Novels, from early Republic, through Hawthorne, Melville, and Stowe, to writers at end of 19th century (e.g., Howells, Twain, James, Chopin, Crane). Development of a national literature. Tension between realism and romance. Changing role of women as writers and as fictional characters.

ENGL 3222. American Novel from 1900. (3 cr.; Student Option; Every Fall & Spring)
Novels from early 1900's realism through Modernists (e.g., Faulkner, Hemingway, Fitzgerald) to more recent writers (e.g., Ellison, Bellow, Erdrich, Pynchon). Stylistic experiments, emergence of voices from formerly under-represented groups, novelists' responses to society.

ENGL 3231. American Drama. (3 cr.; Student Option; Periodic Fall & Spring)
Representative dramas from 18th through 20th centuries. Topics include staging of national identities, aesthetics of modern/contemporary drama. Production concerns of mainstream, regional, community theaters.

ENGL 3301. Asian America through Arts and Culture. (AH,DSJ; 3 cr.; Student Option; Spring Even Year)
Interdisciplinary questions of Asian American experience, identity, and community. Literature, dance, music, photography, film, theater, other cultural forms. Students work with local Asian American arts groups/organizations. Students express their own cultural contradictions through writing and other forms of artistic expression and attend local arts events.

ENGL 3303W. Writing Differences: Literature by U.S. Women of Color. (DSJ,WL,LITR; 3 cr.; Student Option; Fall Odd Year)
Interpret/analyze poetry, fiction, and drama of U.S. women minority writers. Relationship of writer's history, ethnicity, race, class, and gender to her writings.

ENGL 3330. Gay, Lesbian, Bisexual, and Transgender Literature. (3 cr.; max 9 cr.; Student Option; Spring Odd Year)
Literature/culture produced by/about gay, lesbian, bisexual, and transgender people. Emphasizes importance of materials falsified/ignored in earlier literary/cultural studies. How traditional accounts need to be revised in light of significant contributions of GLBT people.

ENGL 3350. Women Writers. (3 cr.; max 9 cr.; Student Option; Spring Odd Year)
Women writers in the 19th and/or 20th centuries. Will focus either on writers from a single country or be comparative in nature. The course will be organized thematically or according to topics of contemporary and theoretical interest.

ENGL 3350H. Honors: Women Writers. (3 cr.; max 9 cr.; A-F or Audit; Spring Odd Year)
Women writers in the 19th and/or 20th centuries. Will focus either on writers from a single country or be comparative in nature. The course will be organized thematically or according to topics of contemporary and theoretical interest.

ENGL 3501. Public Discourse: Coming to Terms With the Environment. (ENV,LITR; 3 cr.; Student Option; Every Fall & Spring)
Analysis of literary texts about environmental issues. Issues of language and meaning, social and historical contexts, scientific, technological, and public policy concerns, and appropriate societal responses. Active learning components. Formal and informal writing assignments.

ENGL 3502. Nature Stories: Environmental Discourse in Action. (LITR,CIV; 4 cr.; Student Option; Every Fall)
Explore contemporary texts from multiple disciplines to analyze the role of stories in interpreting nature. Emphasis on lived experience, civic motivation, and observational research that enrich effective nature writing. Optional service-learning component.

ENGL 3505. Community Learning Internships I. (3 cr.; A-F or Audit; Every Fall)
Connections between literature/literacy, theory/practice, community work and academic study. Students work as interns in local community-based education projects. Interns meet with faculty and community representatives to reflect on daily work and practical relevance. Students receive initial training from Career and Community Learning Center and Minnesota Literacy Council, and orientations at community sites. Four hours weekly work at community site, readings, journal writing, monthly short papers.

ENGL 3506. Learning Internships II. (4 cr.; A-F or Audit; Every Spring)
Students work at a community site. In weekly meetings with faculty and community representatives, students explore relationship between their academic skills and community experiences. Social functions of literacy and liberal education in the United States. Eight hours weekly work at community site, readings in history/theory of literacy, written reflection exercises, design/execution of scholarly or educational project at community site. prereq: 3505 in preceding semester or instr consent

ENGL 3507W. Introduction to Chicana/o Literature. (DSJ,WL,LITR; 3 cr.; Student Option; Every Fall & Spring)
Cultural, intellectual, and sociopolitical traditions of Mexican Americans as they are represented in creative literature. Genres/forms of creative cultural expression and their significance as representations of social, cultural, and political life in the United States. Novels, short stories, creative nonfiction, drama, essay, poetry, and hybrid forms of literature.

ENGL 3592W. Introduction to Black Women Writers in the United States. (DSJ,WL,LITR; 3 cr.; Student Option; Every Fall & Spring)
The literature of African American women writers explored in novels, short stories, essays, poetry, autobiographies, and drama from the 18th to the late-20th century.
ENGL 3593. The African American Novel. (3 cr.; Student Option; Every Spring)

ENGL 3597W. Introduction to African American Literature and Culture I. (LITR, WI; 4 cr.; Student Option; Every Fall)
African American oral tradition, slave narrative, autobiography, poetry, essay, fiction, oratory, and drama, from colonial era through Harlem Renaissance.

ENGL 3598W. Introduction to African American Literature and Culture II. (LITR, WI; 4 cr.; Student Option; Every Spring)
African American oral tradition, autobiography, poetry, essay, fiction, oratory, drama. From after Harlem Renaissance to end of 20th century.

ENGL 3601. Analysis of the English Language. (; 4 cr.; Student Option; Every Fall, Spring & Summer)

ENGL 3711. Literary Magazine Production Lab I. (4 cr.; A-F only; Every Fall)
First of two courses. Students produce undergraduate art/literary magazine Ivory Tower. Students decide upon identity, tone, and direction of the issue. They take on magazine staff responsibilities, call for submissions, make selections, edit/design, set budget, and begin fund-raising. Prereq: [Instructor consent required, instr consent]

ENGL 3712. Literary Magazine Production Lab II. (4 cr.; A-F only; Every Spring)
Second of two courses. Produce undergraduate art/literary magazine Ivory Tower. Contact writers/artists, edit final selections, design/layout pages, select printer, distribute, and market journal. Reading/writing assignments on history of literary magazines. Prereq: [3711, instr consent]

ENGL 3741. Literacy and American Cultural Diversity. (DSJ; 4 cr.; Student Option; Every Fall & Spring)

ENGL 3883V. Honors Thesis. (WI; 1-4 cr.; A-F or Audit; Every Fall & Spring)

ENGL 3960W. Senior Seminar. (WI; 4 cr.; A-F or Audit; Every Fall & Spring)
Rigorous/intensive seminar. Students write extended scholarly essay. Topics specified in Class Schedule. Prereq: English major, [jr or sr], major adviser approval, dept consent

ENGL 3993. Directed Study. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq: One 3xxx, [English major or minor or [BIS 3xxx] or [ICP] with English concentration], [jr or sr], instr consent, dept consent, college consent.

ENGL 4003. History of Literary Theory. (; 3 cr.; A-F or Audit; Fall Odd Year)
How thinkers from classical to modern times posed/answered questions about language (how words mean), audience (to whom they mean), and the literary (how literary writing differs from other forms of writing). Works by Plato, Aristotle, Augustine, Christine de Pizan, Dante, Sidney, Behn, Wordsworth, Shelley, and Woolf.

ENGL 4090. General Topics. (; 1-4 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

ENGL 4152. Nineteenth Century British Novel. (3 cr.; A-F or Audit; Every Fall & Spring)
British novel during the century in which it became widely recognized as a major vehicle for cultural expression. Possible topics include the relation of novel to contemporary historical concerns: rise of British empire, developments in science, and changing roles for women; formal challenges of the novel; definition of realism.

ENGL 4232. American Drama by Writers of Color. (; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Selected works by Asian American, African American, American Indian, Latino, and Chicano playwrights. How racial/ethnic differences are integral to shaping different visions of American drama. History of minority/ethnic theaters, politics of casting, mainstreaming of the minority playwright.

ENGL 4233. Modern and Contemporary Drama. (; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Works written for theater in 19th/20th century. Emphasizes how major aesthetic forms of modern drama (the well-made play, realism, expressionism, symbolism, epic theater, absurdism) presented not just distinctive theatrical styles, but also new ways of seeing, for the theatrical spectator. How social differences, as informed by gender, class, and race, inform content/presentation.

ENGL 4311. Asian American Literature and Drama. (DSJ, LITR; 3 cr.; A-F or Audit; Fall Odd Year)
Literary/dramatic works by Asian American writers. Historical past of Asian America through perspective of writers such as Sui Sin Far and Carlos Bulosan. Contemporary artists such as Frank Chin, Maxine Hong Kingston, David Henry Hwang, and Han Ong. Political/historical background of Asian American artists, their aesthetic choices.

ENGL 4603W. World Literatures. (WI; 4 cr.; Student Option; Fall Odd Year)
Historical background, psychosocial significance, and linguistic characteristics of diverging varieties of English spoken around world, especially in postcolonial contexts (Caribbean, Africa, Asia). Development of local standards/vernaculars. Sociolinguistic methods of analysis.

ENGL 4612. Old English I. (3 cr.; Student Option; Periodic Fall)
Introduction to the language through 1150 A.D. Culture of Anglo-Saxons. Selected readings in prose/poetry.

ENGL 4613. Old English II. (; 3 cr.; Student Option; Periodic Spring)
Critical reading of texts. Introduction to versification. Readings of portions of Beowulf.

ENGL 4711. Introduction to Editing and Publishing. (4 cr.; Student Option; Every Fall & Spring)
Editor-writer relationship, manuscript reading, author querying, rewriting, style. Some discussion of copy editing. Students develop editing skills by working on varied writing samples. Prereq: Credit will not be granted if credit has been received for ENGL 5711 or ENGL 5401; prereq: jr or senior or grad student) Prereq: Credit will not be granted if credit has been received for ENGL 5711 or ENGL 5401; prereq: jr or senior or grad student

ENGL 4721. Electronic Text. (; 3 cr.; Student Option; Periodic Fall)
Status/function of text, related questions as framed by electronic text.

ENGL 4722. Alphabet to Internet: History of Writing Technologies. (; 4 cr.; Student Option; Every Fall & Spring)

ENGL 5001. Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University. (; 3 cr.; Student Option; Every Fall)
Where and what is literary study vis-a-vis the history of the discipline, of the humanities, and of the university—all in the context of a graduate education. Literary theory focusing on key theoretical works that address the discipline, the humanities, and the university.

ENGL 5020. Studies in Narrative. (; 3 cr.; [max 6 cr.]; Student Option; Periodic Fall & Spring)
Examine issues related to reading and understanding narrative in a variety of interpretive contexts. Topics may include: “The 19th-century English (American, Anglophone) Novel,” “Introduction to Narrative,” or “Techniques of the Novel.” Topics specified in the Class Schedule.

ENGL 5040. Theories of Film. (; 3 cr.; [max 9 cr.]; Student Option; Periodic Fall)
Advanced topics regarding film in a variety of interpretive contexts, from the range and historic development of American, English, and Anglophone film (e.g., “Fascism and Film,” “Queer Cinemas”). Topics and viewing times

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
ENGL 5090. Readings in Special Subjects. (1-4 cr. [max 9 cr.]; Student Option; Every Fall & Spring) General background preparation for advanced study. Diverse selection of literatures written in English, usually bridging national cultures and time periods. Readings specified in Class Schedule.

ENGL 5110. Medieval Literatures and Cultures: Intro to Medieval Studies. (3 cr.; Student Option; Every Spring) Major and representative works of the Middle Ages. Topics specified in the Class Schedule.

ENGL 5121. Readings in Early Modern Literature and Culture. (3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Topical readings in early modern poetry, prose, fiction, and drama. Attention to relevant scholarship or criticism. Preparation for work in other courses or seminars. prereq: Grad student or instr consent

ENGL 5140. Readings in 18th Century Literature and Culture. (3 cr.; Student Option; Every Spring) Literature written in English, 1660-1798. Topics may include British literature of Reformation and 18th century, 18th-century American literature, a genre (e.g., 18th-century novel). prereq: Grad student or instr consent

ENGL 5150. Readings in 19th-Century Literature and Culture. (3 cr. [max 9 cr.]; Student Option; Periodic Fall, Spring & Summer) Topics may include British Romantic or Victorian literatures, American literature, important writers from a particular literary school, a genre (e.g., the novel). Readings.

ENGL 5501. Origins of Cultural Studies. (3 cr.; Student Option; Periodic Fall & Spring) Intellectual map of the creation of cultural studies as a unique approach to studying social meanings. Key figures and concepts, including nineteenth- and early twentieth-century precursors.

ENGL 5510. Readings in Criticism and Theory. (3 cr. [max 9 cr.]; Student Option; Spring Odd Year) Major works of classical criticism in the English critical tradition from Renaissance to 1920. Leading theories of criticism from 1920 to present. Theories of fiction, narratology, Feminist criticisms. Marxist criticisms. Psychoanalytic criticisms. Theories of postmodernism. prereq: Grad student or instr consent


ENGL 5597. Seminar: Harlem Renaissance. (3 cr.; Student Option; Every Fall & Spring) Multidisciplinary review of Jazz Age's Harlem Renaissance: literature, popular culture, visual arts, political journalism, major black/white figures. prereq: Grad student or instr consent

ENGL 5743. History of Rhetoric and Writing. (3 cr.; Student Option; Periodic Fall & Spring) Assumptions of classical/contemporary rhetorical theory, especially as they influence interdisciplinary field of composition studies. prereq: Grad student or instr consent

ENGL 5790. Topics in Rhetoric, Composition, and Language. (3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Grad student or instr consent

ENGL 5800. Practicum in the Teaching of English. (1-3 cr.; Student Option; Every Fall) Discussion of and practice in recitation, lecture, small-groups, tutoring, individual conferences, and evaluation of writing/reading. Emphasizes theory informing effective course design/teaching for different disciplinary goals. Topics vary. See Class Schedule. prereq: Grad student or instr consent

ENGL 5805. Writing for Publication. (3 cr.; Student Option; Fall Even Year) Conference presentations, book reviews, revision of seminar papers for journal publication, and preparation of a scholarly monograph. Style, goals, and politics of journal and university press editors/readers. Electronic publication. Professional concerns. prereq: Grad student or instr consent

ENGL 5992. Directed Readings, Study, or Research. (1-3 cr.; max 45 cr.); Student Option; Every Fall, Spring & Summer) TBD Prereq-Grad student or instr consent

ENGL 8090. Seminar in Special Subjects. (3 cr. [max 12 cr.]; Student Option; Every Fall) Sample topics: literature of World War II, writings of the Holocaust, literature of English Civil War, advanced versification.


ENGL 8180. Seminar in 20th-Century British Literature and Culture. (3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall) Sample topics: modernism, Bloomsbury Group, working-class/immigrant literature. Topics specified in Class Schedule.

ENGL 8190. Seminar in 20th-Century Anglophone Literatures and Cultures. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Topics in Anglophone literatures of Canada, Africa, the Caribbean, India and Pakistan, and the Pacific. Sample topics: Stuart Hall and Black Britain; Salman Rushdie and cosmopolitan literatures; national literatures and partitioned states. Topics specified in Class Schedule.

ENGL 8200. Seminar in American Literature. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) American literary history. Sample topics: first American novels, film, contemporary short stories and poetry, American Renaissance, Cold War fiction, history of the book. Topics specified in Class Schedule.

ENGL 8290. Topics, Figures, and Themes in American Literature. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Sample topics: Dickinson, 19th-century imperialism, Faulkner, San Francisco poets, humor, Chaplin, Hitchcock, and popular culture. Topics specified in Class Schedule.

ENGL 8300. Seminar in American Minority Literature. (3 cr. [max 12 cr.]; Student Option; Periodic Fall) Sample topics: Harlem Renaissance, ethnic autobiographies, Black Arts movement. Topics specified in Class Schedule.

ENGL 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

ENGL 8400. Seminar in Post-Colonial Literature, Culture, and Theory. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Sample topics: Marxism and nationalism; modern India; feminism and decolonization; "the Empire Writes Back"; Islam and the West. Topics specified in Class Schedule.

ENGL 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

ENGL 8510. Studies in Criticism and Theory. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)
Developments within critical theory that have affected literary criticism, by altering conceptions of its object ("literature") or by challenging conceptions of critical practice. Topics specified in Class Schedule.

ENGL 8520. Seminar: Cultural Theory and Practice. (; 3 cr. [max 12 cr.]; Student Option; Every Fall & Spring)
Sample topics: semiotics applied to perspective paintings, numbers, and money; analysis of a particular set of cultural practices by applying various theories to them. Topics specified in Class Schedule.

ENGL 8530. Seminar in Feminist Criticism. (; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)
Brief history of feminist criticism, in-depth treatment of contemporary perspectives/issues. Topics specified in Class Schedule.

ENGL 8600. Seminar in Language, Rhetoric, Literacy, and Composition. (; 3 cr. [max 9 cr.]; Student Option: Periodic Fall & Spring)
Students read/conduct research on theories/literature relevant to cross-disciplinary fields committed to writing and to teaching writing.

ENGL 8610. Seminar in Language and Discourse Studies. (; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)

ENGL 8625. Dissertation Seminar: Preparing the Book List and Prospectus. (; 2 cr.; Student Option; Every Spring)
Assembling book list, defining field of study, and articulating a rationale for list. How to conceptualize/develop dissertation prospectus. Students work with faculty instructor, advising committee, and peer writing group. prereq: Engl PhD student in [3rd or 4th yr]; at least 12 cr completed

ENGL 8626. Dissertation Seminar: Writing the Dissertation. (; 2 cr.; Student Option; Every Spring)
Conceptualizing dissertation (using model of Graduate School doctoral Dissertation Fellowship application). Producing dissertation draft chapter/proposal. Students work with instructor, advising committees, and peer writing groups. prereq: English PhD student, passed prelim exam

ENGL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ENGL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Topics specified in Class Schedule. prereq: 1101 or 1102 or 1103 or 1104 or dept consent

ENGL 8992. Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing. (; 1-9 cr. [max 15 cr.]; Student Option; Every Fall & Spring)
Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing prereq: instr consent, dept consent

English: Creative Writing (ENGW)

ENGW 1101W. Introduction to Creative Writing. (LITR, WI; 4 cr.; Student Option No Audit; Every Fall & Spring)
Writing poetry/prose. Small group workshops, lectures by visiting writers. prereq: Students may not audit this course

ENGW 1102. Fiction Writing (Intro.). (; 3 cr.; Student Option No Audit; Every Fall & Spring)
Beginning instruction in art of fiction: characterization, plot, dialogue, and style. Writing exercises to generate ideas. Students read/discuss published fiction and their own writing.

ENGW 1103. Poetry Writing (Intro.). (; 3 cr.; Student Option No Audit; Every Fall, Spring & Summer)
Beginning instruction in art of poetry. Discussion of student poems and contemporary poetry. Ideas for generating material. Writing exercises in/out of class.

ENGW 1104. Journal, Essay, Memoir Writing (Introduction). (; 3 cr.; Student Option No Audit; Every Fall & Spring)
Art of literary nonfiction. Discussion of student work and contemporary creative nonfiction. Ideas for generating material. Writing exercises. prereq: Students not allowed to audit this course

ENGW 3102. Fiction Writing (Intermediate). (3 cr.; Student Option No Audit; Every Fall & Spring)
Exercises, experiments, assigned readings, discussion of student work. prereq: EngW 1101 OR 1102 OR 1103 OR 1104, students cannot audit course

ENGW 3104. Poetry Writing (Intermediate). (3 cr.; Student Option No Audit; Every Fall & Spring)
Exercises, experiments, assigned readings, discussion of student work. prereq: [EngW 1101 OR 1102 OR 1103 OR 1104], students cannot audit course

ENGW 3960W. Senior Seminar in Creative Writing. (WI; 4 cr.; A-F only; Every Fall & Spring)
Topics specified in Class Schedule. prereq: English major, 6 cr of ENGW [including 3xxx appropriate for workshop genre], [jr or sr], major advisor approval, dept consent

ENGW 4205. Screenwriting. (3 cr. [max 4 cr.]; Student Option No Audit; Every Fall & Spring)
Advanced workshop. An introduction to screenwriting basics, including formatting, style and structure. In-class and take-home exercises will assist the students in learning techniques for developing engaging characters, writing concise description and vivid dialogue, and outlining a usable plot. prereq: One EngW or Engl 3xxx course, [permission number available in creative writing office]

ENGW 5012. Advanced Fiction Writing. (4 cr.; [max 8 cr.]; Student Option No Audit; Every Fall & Spring)
Advanced workshop for graduate students with considerable experience in writing fiction.

ENGW 5014. Advanced Poetry Writing. (4 cr.; [max 8 cr.]; Student Option No Audit; Every Fall)
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

ENGW 5106. Advanced Literary Nonfiction Writing. (4 cr.; [max 8 cr.]; Student Option No Audit; Periodic Fall)
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

ENGW 5130. Topics in Advanced Creative Writing. (4 cr.; [max 16 cr.]; Student Option; Every Fall & Spring)
Workshop. Might include work in more than one genre, prereq: instr consent

ENGW 5202. Journal and Memoir Writing. (; 3 cr.; Student Option; Every Fall, Spring & Summer)
Using memory in writing, from brainstorming to drafting to revision, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

ENGW 5310. Reading as Writers. (; 4 cr.; [max 8 cr.]; Student Option No Audit; Every Fall)
Special topics in reading fiction, literary nonfiction, poetry. Topics specified in Class Schedule.

ENGW 5506W. Literary Aspects of Journalism. (WI; 3 cr.; Student Option; Every Spring)
Literary aspects of journalism. American and British writers, past and present. Lectures, discussions, weekly papers, critiques.

ENGW 5593. Directed Study in Writing. (1-4 cr. [max 18 cr.]; Student Option; Every Spring & Summer)
Projects in writing poetry, fiction, drama, and nonfiction, or study of ways to improve writing.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Prereq-instr consent, dept consent, college consent.

**ENGW 8101. Reading Across Genres.** (4 cr.; Student Option No Audit; Every Fall)
Contemporary writing in fiction, poetry, creative nonfiction. Primarily reading course rather than writing course. prereq: Students may not audit this course

**ENGW 8110. Seminar: Writing of Fiction.** (4 cr. [max 16 cr.]; Student Option; Every Spring)
Focuses on full-length book (e.g., novel, short story collection). Assignments in common. Individual project. prereq: dept consent

**ENGW 8120. Seminar: Writing of Poetry.** (4 cr. [max 8 cr.]; Student Option; Every Spring)
Focuses on exploration and practice of various styles. Assignments in common and individual projects. prereq: dept consent

**ENGW 8130. Seminar: Writing of Literary Nonfiction.** (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)
Advanced workshop. Assignments in common and individual projects. prereq: dept consent

**ENGW 8140. Thesis Seminar: Poetry.** (4 cr. [max 8 cr.]; Student Option; Every Fall)
For students working on their creative project. prereq: Creative writing MFA student, instr consent

**ENGW 8150. Thesis Seminar: Fiction.** (4 cr. [max 8 cr.]; Student Option; Every Fall)
Students work on creative project, prereq: Creative writing MFA student, instr consent

**ENGW 8160. Thesis Seminar: Nonfiction.** (4 cr. [max 8 cr.]; Student Option; Every Fall)
Students work on their creative project. prereq: Creative writing MFA student, instr consent

**ENGW 8170. MFA Practicum: EngW 1101W.** (1-3 cr.; S-N only; Every Fall & Spring)
Teaching Practicum for Teaching Assistants assigned to EngW 1101W. prereq: Creative writing MFA student, instr consent

**ENGW 8180. Thesis Seminar: Multi-Genre.** (4 cr.; A-F only; Every Fall)
Thesis preparation course for advanced graduate students in the creative writing MFA program. prereq: MFA creative writing program grad student

**ENGW 8310. Topics in Creative Writing.** (4 cr. [max 8 cr.]; Student Option; Periodic Fall & Spring)
Special topics in fiction, literary nonfiction, poetry. Topics specified in Class Schedule. prereq: [English or creative writing] grad major or dept consent

**ENGW 8333. FTE: Master’ s.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(NO description) prereq: Master’s student, adviser and DGS consent

**ENGW 8990. MFA Creative Thesis.** (2-8 cr. [max 48 cr.]; Student Option; Every Fall, Spring & Summer)
For students working on their creative project. prereq: 8140, 8150, 8160, creative writing MFA student, instr consent

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**Entomology (ENT)**

**ENT 1001. Life in a World of Insects.** (3 cr.; A-F or Audit; Every Spring)
The tremendous diversity and abundance displayed by insects is a demonstration of their ability to adapt to a wide range of environmental conditions. This success has both attracted and repulsed human curiosity. This course explores the interaction between insects and humans through time, focusing especially on how it has led to changes in human society and the natural environment. Topics include: basic concepts in insect biology and behavior; the evolution of insect diversity; environmental and cultural degradation caused by insects or their control; pest outbreaks, epidemics vectored by insects, and other episodes within the context of climate change; perception and awareness about insects role in nature.

**ENT 1005. Insect Biology.** (BIOL 4 cr.; Student Option; Every Fall)
Diverse biology of insects and their arthropod relatives. Insect behavior (including social insects), pollination, herbivory, insects as disease vectors, beneficial insects, insect population dynamics/ecology. Insects’ role in natural, agricultural, and urban, systems. Lecture/lab.

**ENT 1480. Topics in Entomology.** (1-4 cr. [max 24 cr.]; A-F or Audit; Every Spring)
Lectures by a visiting scholar or regular staff member. Topics specified in Class Schedule.

**ENT 1905. Topics: Freshman Seminar.** (1-3 cr.; Student Option; Every Fall)
Topics vary.

**ENT 3281. Veterinary Entomology.** (3 cr.; A-F or Audit; Every Fall)
Biological management of insects, mites, ticks that affect livestock, poultry, companion animals. Emphasizes problem identification/solving. Lecture, lab.

**ENT 3925. Insects, Aquatic Habitats, and Pollution.** (3 cr.; A-F or Audit; Every Fall)
Effects differing classes of pollutants have on insects that are aquatic. Insect life-cycle dynamics, trophic guilds, community structure. Hypotheses to explain community structure in streams, rivers, wetlands, ponds, lakes, reservoirs. Organic pollution, eutrophication, heavy metal pollution, runoff/siltation, acidification, thermal pollution. Changes in aquatic insect community structure. Designing/maintaining biological monitoring networks. prereq: [3005 or Biol 3407 or FW 2001] or [jr or sr] or instr consent

**ENT 4001. Agroecology and Insect Pests.** (3 cr.; A-F or Audit; Every Fall)
Evaluation of the ecological processes that operate in agricultural production systems as they relate to insect pest management, emphasizing an ecologically-based, integrated approach to managing arthropod pests of agronomic and horticulture crops. prereq: CFANS3333 or CFANS3001, General Biology (BIOL 1009) or equivalent, or instructor consent. A course in insect biology will be useful but is not required.

**ENT 4015. Ornamentals and Turf Entomolgy.** (3 cr.; Student Option; Every Spring)
Diagnosis and management of insect pests in landscape plants. Emphasis on the principles of biological control, biorational pesticides, and integrated pest management. prereq: 1xxx course in biol or hort or forest resources

**ENT 4021. Honey Bees and Insect Societies.** (3 cr.; Student Option; Fall Odd Year)
Natural history, identification, and behavior of honey bees and other social insects. Evolution of social behavior, pheromones and communication, organization and division of labor, social parasitism. Lab with honey bee management and maintenance of other social bees for pollination. prereq: Biol 1009 or instr consent

**ENT 4022. Honey Bee Management.** (1 cr.; Student Option; Summer Odd Year)
Field course for students interested in honey bee management and the conservation and maintenance of other bee pollinators. Work with live bee colonies and participate in field research projects related to honey bee behavior and management. prereq: Biol 1009 or instr consent; concurrent registration is required (or allowed) in 4021 recommended

**ENT 4096. Professional Experience Program: Internship.** (1-3 cr.; S-N or Audit; Every Fall, Spring & Summer)
Professional experience in entomology firms or government agencies through supervised practical experience; evaluative reports and consultations with faculty advisors and employers. prereq: COAFES jr or sr, complete internship contract available in COAFES Career Services before enrolling, UC only, instr consent

**ENT 4231. Insect Behavior.** (3 cr.; A-F or Audit; Periodic Fall)
Diversity of behavior in insects. Modes of perception, ways in which stimuli are translated into behavior. Genetic basis of behavior. Behavioral traits with Mendelian and more complex modes of inheritance. Natural history of insect behavior. Emphasizes how evolution has shaped diversity of behaviors. Movement/dispersal, feeding, defense/escape, mating/ reproduction, sociality. Case studies. prereq: Biol 1009 or equiv or instr consent; [3005 or EEB 3111] recommended

**ENT 4251. Forest and Shade Tree Entomology.** (3 cr.; Student Option; Every Fall)
Biological, ecology, population management of forest/shade tree insects. Emphasizes predisposing factors/integrated management. Lecture/lab.

**ENT 5009. Pesticides in Horticulture: Their Use and Abuse.** (3 cr.; A-F or Audit; Every Spring)
History of pesticide use. Case studies on specific pesticide issues, such as DDT, atrazine, Temik, and imidacloprid. Pesticides use, application methods, environmental concerns. Training for pesticide certification license for Minnesota. Test given near campus
ENT 5011. Insect Structure and Function. (4 cr.; A-F or Audit; Every Spring) Comparative study of insect structures/functions from evolutionary perspective. Introduction to physiology of digestion, respiration, other organ systems.


ENT 5025. Field Methods in Insect Taxonomy. (1 cr.; Student Option; Fall Odd Year) Field methods in insect taxonomy. Preservation, mounting, curatorial techniques. Entomological nets/traps for terrestrial/aquatic species, dry/fluid preservation techniques, slide mounting, habitat selection, geo-reference/field data records, morphological preparation. prereq: An undergraduate course in entomology is preferred.

ENT 5041. Insect Ecology. (3 cr.; Student Option; Fall Even Year) Synthetic analysis of the causes of insect diversity and of fluctuations in insect abundance. Focus on abiotic, biotic, and evolutionary mechanisms influencing insect populations and communities. prereq: Biol 5041 or EEB 5122 or instr consent

ENT 5045. Insect Population Dynamics. (3 cr.; A-F or Audit; Fall Odd Year) Analytical/experimental approaches to study of insect abundance. Path/loop diagrams, time series analyses. Life tables and demography. Single-/multiple-species models for population growth/interactions with competitors. Predators/pathogens in time/space. prereq: 3005 or instr consent


ENT 5121. Applied Experimental Design. (4 cr.; Student Option; Periodic Fall) Principles of sampling methodologies, experimental design, and statistical analyses. Methods/procedures in generating scientific hypotheses. Organizing, initiating, conducting, and analyzing scientific experiments using experimental designs and statistical procedures. Offered with AGRO 5121. prereq: Stat 5021 or equiv or instr consent

ENT 5126. Spatial and Temporal Analysis of Ecological Data. (3 cr. [max 6 cr.]; A-F or Audit; Spring Odd Year) This course covers linear models (regression and ANOVA) and extensions to temporal data and spatial point processes, lattice/areal data, and geostatistics. The course bridges sufficient theory to understand why contending with spatiotemporal dependence is important with enough application to make students confident in their own data analyses.

ENT 5241. Ecological Risk Assessment. (; 3 cr.; Student Option; Every Spring) Evaluating current/potential impact of physical, chemical, biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating managing risks. Class participation, two reaction papers, final exam, small-group project. prereq: instr consent

ENT 5275. Medical Entomology. (3 cr.; Student Option; Every Fall) Biology of arthropod vectors of human disease. Emphasizes disease transmission and host, vector, and pathogen interactions. prereq: instr consent

ENT 5341. Biological Control of Insects and Weeds. (3-4 cr.; Student Option; Periodic Spring) Biological control of arthropod pests and weeds. Analysis of relevant ecological theory and case studies; biological control agents. Lab includes natural enemy identification, short experiments, and computer exercises. prereq: 3001, Biol 1009, EEB 3001 or grad

ENT 5351. Insect Pathology. (; 2 cr.; Student Option; Every Fall & Spring) Major pathogenic microorganisms that cause diseases in insects. Routes of infection of major pathogens in time/space. prereq: 5371 or instr consent

ENT 5361. Aquatic Insects. (4 cr.; A-F or Audit; Every Spring) Taxonomy, natural history of aquatic insects including their importance in aquatic ecology, water resource management, recreation, and conservation. Emphasizes family-level identification of immatures/adults. Field trips scheduled to local aquatic habitats. A collection is required. prereq: instr consent

ENT 5900. Basic Entomology. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) For graduate students who need to make up certain deficiencies in their biological science background. prereq: instr consent

ENT 5910. Special Problems in Entomology. (1-6 cr. [max 10 cr.]; Student Option; Every Fall & Spring) Individual field, lab, or library studies in various aspects of entomology. prereq: instr consent

ENT 5920. Special Lectures in Entomology. (; 1-4 cr. [max 12 cr.]; S-N only; Every Fall & Spring) Lectures or labs in special fields of entomological research. Given by visiting scholar or regular staff member.

ENT 8006. Supervised Laboratory or Extension Teaching Experience. (; 1-3 cr.; A-F or Audit; Every Fall & Spring) Training/experience conducting lab or extension based educational activities in Entomology. Students select a faculty member to serve as their sponsor, and develop lecture outlines or instructional aids such as Web sites, Web-based training sites, print materials, demonstration aids, and demonstration projects. Students prepare/conduct lab or extension presentations. Overviews of Web-based instructional aids. prereq: 3005 or equiv or instr consent

ENT 8041. Advanced Insect Genetics. (; 2 cr.; Student Option; Periodic Fall & Spring) Molecular genetic techniques and their applications. Emphasizes insect species other than Drosophila. Application of genetic techniques to physiological processes. prereq: 5011. basic genetics course) or instr consent; offered alt yrs

ENT 8051. Toxicology. (; 2 cr.; Student Option; Periodic Fall) Chemistry, mode of action of conventional insecticides. Insect growth regulators, microbial pesticides. Transgenic viruses, genetically modified plants. Offered alternate years. prereq: 5011, [organic, inorganic] chem courses, biochem course) or instr consent

ENT 8061. Scientific Communication and Ethics. (1 cr.; S-N or Audit; Every Fall) Students develop/use critical elements of scientific communication, within an ethical framework. Elements in writing scientific manuscripts and research proposals. Oral communication for scientific, outreach, and classroom presentations.

ENT 8200. Colloquium in Social Insects. (1-3 cr.; Student Option; Periodic Spring) Current research on bees, wasps, ants, and termites. Student critiques and research reports. prereq: 3020 or 3200

ENT 8210. Colloquium in Insect Evolution. (; 1-3 cr.; Student Option; Periodic Fall) Research issues in systematics and evolution. Comparative biology, biogeography, and molecular evolution. Students may re-enroll as topics alternate. Students critique papers from primary literature. prereq: 5371 or instr consent

ENT 8240. Colloquium in Insect Ecology. (1-2 cr.; Student Option; Every Fall & Spring) Advanced topics. prereq: 5041 or 5045 or instr consent

ENT 8300. Graduate Seminar. (1-2 cr.; S-N or Audit; Every Fall & Spring) Oral and written reports on and discussion by students of selected topics from current literature. prereq: instr consent

ENT 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
Translating a business plan into a financing plan. Developing alternative financing. Choosing a plan, based on financial/ nonfinancial criteria. Types of non-Fortune 1,000-type businesses as financiers view them. U.S. financial institutions: what they finance, their financing criteria. Financing instruments used in the United States, when/why to use them. Cases, exercises, guest speakers. prereq: MBA student

ENTR 6036. Managing the Growing Business. (2 cr.; A-F only; Every Spring & Summer) Challenges posed by rapid growth/change in independent startups. Infrastructure development, radical changes in strategy, continuous needs for substantial additional resources. Emphasizes analysis of factors accelerating/impeding growth and review/creation of growth strategies. Integration of concepts from strategy, operations, marketing, finance, and human resource management. prereq: MBA student

ENTR 6037. Corporate Venturing. (2 cr.; A-F or Audit; Every Fall & Summer) Entrepreneurial role of top management in maintaining/increasing stakeholder value through formation/acquisition of new businesses, products, or markets within established corporations. Strategic role of corporate venturing. Cases, guest speakers, group projects. prereq: MBA student

ENTR 6041. Initiating New Product Design and Business Development. (2-4 cr.; max 10 cr.; A-F only; Every Fall & Spring) Product development projects sponsored by business organizations. Supervision by faculty adviser/executives from sponsoring company. Lectures, workshops, guest speakers, team meetings, company visits, projects. prereq: MBA student

ENTR 6042. Implementing New Product Design and Business Development. (4 cr.; max 8 cr.; A-F only; Every Spring) Implementation of product development projects begun in the Fall term in Entr 6041. Projects are sponsored by businesses. Supervision by faculty advisors and sponsoring executives. Lectures, workshops, guest speakers, team meetings, company visits, and projects. prereq: MBA student

ENTR 6080. Technology Commercialization for Scientists and Engineers. (1-2 cr.; S-N or Audit; Periodic Fall) Theoretical knowledge and real-world examples of skills/knowledge required to commercialize scientific discoveries/engineering inventions. Commercializing technology process, including starting/running a new company. prereq: Registered Ph.D. student in IT or College of Biological Sciences or College of Agriculture, Food and Environmental Sciences or Medical School, instr consent


ENTR 6087. New Product Design and Business Development. (6 cr.; A-F only; Periodic Fall) Nine month project course in designing new products and business plans through prototype stage. Teams of CSOM and CSE students work with personnel from sponsoring organizations. Weekly lectures and team meetings. Formal design reviews and presentations. prereq: Grad student in CSOM or CSE or instr consent

ENTR 6089. Research Seminar in Entrepreneurial Studies. (6 cr.; A-F only; Periodic Fall) Research into populations of individual new and growing businesses. Evaluation of existing studies, development of research questions; selection of research methods, information collection and analysis. Final report suitable for publication. prereq: CSOM grad student or instr consent

ENTR 6090. Topics in Entrepreneurship. (2-4 cr.; max 8 cr.; A-F only; Every Fall & Spring) Selected topics in value creation; in business formation, growth, restructuring; in social and economic impact of new businesses, and entrepreneurship and public policy. prereq: CSOM grad student or instr consent

Environment Sci, Policy, Mgmt (ESPM)

ESPM 1001. Freshmen Orientation to Environmental Sciences, Policy, and Management. (1 cr.; A-F or Audit; Every Fall) Academic planning. ESPM careers, liberal education requirements, internships. Building relationships with other students/faculty, student life, information technology, critical computer skills. New freshmen.

ESPM 1002. Transfer Orientation Seminar. (1 cr.; A-F or Audit; Every Fall) Academic planning. ESPM careers, liberal education requirements, internships. Building relationships with other students/faculty, student life, information technology, critical computer skills. Transfer and continuing students.
ESPM 1011. Issues in the Environment. (ENV; 3 cr.; Student Option; Every Fall & Spring) Interdisciplinary survey of environmental issues. Introductions to environmental and human society. Roles of science, technology, and policy in meeting environmental challenges. Lecture, discussion. Students evaluate social, ethical, political, and economic factors.

ESPM 1012H. Environmental Science and Society. (ENV; 3 cr.; A-F only; Every Spring) Selection of current environmental issues affecting our daily lives. Evaluate the scientific and social approaches necessary to resolve environmental issues. Students explore how everything we do affects the environment in different ways.


ESPM 1425. Introduction to Weather and Climate. (ENV, PHYS; 4 cr.; Student Option; Every Fall & Spring) Pre-calculus introduction to the nature of the atmosphere and its behavior. Topics covered include atmospheric composition, structure, stability, and motion; precipitation processes, air masses, fronts, cyclones, and anticyclones; general weather patterns; meteorological instruments and observation; weather map analysis; and weather forecasting.

ESPM 1901. Topics: Freshman Seminar. (ENV; 3 cr.; Student Option; Every Spring) Topics vary. prereq: Fr

ESPM 1905. Freshman Seminar. (1-3 cr.; Student Option; Every Fall & Spring) Freshman Seminar: Topics Vary


ESPM 2401. Environmental Education/Interpretation. (3 cr.; Student Option; Every Fall) Foundational view of environmental education/interpretation, its history, theories, and methodologies. Practical skills for teaching in the outdoors. Educational content, state/national standards, effective pedagogy for informal learning environments.

ESPM 3000. Seminar on Current Issues for ESPM. (1 cr.; max 6 cr.; A-F or Audit; Every Fall & Spring) Environmental issues students will have to address in their future careers. Small group discussion, in-depth/focused intellectual debate. Topics depend on faculty selection or student interest. prereq: Jr

ESPM 3011W. Ethics in Natural Resources. (WI; 3 cr.; Student Option; Every Fall & Spring) Normative/professional ethics, and leadership considerations, applicable to managing natural resources and the environment. Readings, discussion.

ESPM 3012. Statistical Methods for Environmental Scientists and Managers. (MATH; 4 cr.; A-F or Audit; Every Spring) Introduction to statistical principles, foundations, and methods for examining data and drawing conclusions. Regression modeling of relationships in environmental and natural resource science and management problems. prereq: Two yrs of high school math

ESPM 3031. Applied Global Positioning Systems for Geographic Information Systems. (3 cr.; A-F or Audit; Every Spring) GPS principles, operations, techniques to improve accuracy. Datum, projections, and coordinate systems. Differential correction, accuracy assessments discussed/applied in lab exercises. Code/carrier phase GPS used in exercises. GPS handheld units, PDA based ArcPad/GPS equipment. Transferring field data to/from desktop systems, integrating GPS data with GIS. prereq: Intro GIS course

ESPM 3072. Site Assessment for Ecological Restoration. (1 cr.; Student Option; Every Fall, Spring & Summer) Introduction to site assessment/goal-setting for ecological restoration projects. Topography, soil, land use, hydrology, vegetation, biodiversity. Pre-requisite for other courses in series.

ESPM 3073. Designing and Using Seed Mixes in Restoration. (1 cr.; Student Option; Every Fall, Spring & Summer) Various steps of restoration seeding including designing seed mixes, preparing planting sites, obtaining seed, installing seed, caring for establishing vegetation.

ESPM 3074. Designing, Installing, & Managing Native Plantings in Restoration. (1 cr.; Student Option; Every Fall, Spring & Summer) Successful steps for designing, installing, managing native species planting project.

ESPM 3075. Vegetation Management of Restored Ecosystems. (1 cr.; Student Option; Every Fall, Spring & Summer) Re-establishing natural disturbances, controlling invasive species.

ESPM 3076. Monitoring Ecological Restorations. (1 cr.; Student Option; Every Fall, Spring & Summer) How to design efficient/effective monitoring program that yields information helpful for ongoing restoration management decisions/ problem solving.

ESPM 3101. Conservation of Plant Biodiversity. (3 cr.; A-F or Audit; Every Fall) Introduction to principles underlying assessment/conservation of plant biodiversity at individual, population, and community levels. Case studies in management of biodiversity to restore/maintain ecosystem function. Issues such as genetics, timber harvesting, invasive species, plant reproduction. prereq: Biol 1001 or Biol 1009

ESPM 3102. Managing International Natural Resources Programs and Projects: Forests, Water and Land Use. (3 cr.; A-F only; Every Spring) Global hot spots where biodiversity is threatened by multiple stressors (zoonotic disease, rapid growth, opening of new frontiers, climate change). Strategies to address complex situations. Interdisciplinary applied skills, best management practices, hands-on techniques of international organizations.

ESPM 3108. Ecology of Managed Systems. (ENV; 3 cr.; Student Option; Every Fall) Ecology of ecosystems that are primarily composed of managed plant communities, such as managed forests, field-crop agroecosystems, rangelands and nature reserves, parks, and urban open-spaces. Concepts of ecology and ecosystem management, prereq: BIOL 1001 or BIOL 1009 or HORT 1001 or instr consent


ESPM 3121. Environmental Physics. (3 cr.; A-F or Audit; Every Spring) Concepts and principles of classic and modern physics applied to environmental problems arising from interaction between humans and the natural environment. Forms of pollution (e.g., land, water, air). Transport mechanisms. Anthropogenic greenhouse gas emissions. Global climate change. Social issues related to environmental problems. prereq: Phys 1101

ESPM 3202W. Environmental Conflict Management, Leadership, and Planning. (WI; 3 cr.; A-F or Audit; Every Spring) Negotiation of natural resource management issues. Use of collaborative planning. Case study approach to conflict management, strategic planning, and building leadership qualities. Emphasizes analytical concepts, techniques, and skills.

ESPM 3211. Survey, Measurement, and Modelling for Environmental Analysis. (3 cr.; Student Option; Every Spring) Survey, measurement, modeling concepts/methods for study of natural resources/environmental issues. Emphasizes survey design for data collection, estimation. Analysis for issues encompassing land, water, air, vegetation, animal, soil, human/social variables. prereq: [MATH 1031 or MATH 1051], [3012 or FW 4001 or STAT 3011 or SOC 3811], computer competency

ESPM 3221. Soil Conservation and Land-Use Management. (3 cr.; Student Option; Every Spring)
This course is designed to provide a local and global historical perspective of soil erosion (causes and consequences); develop a scientific understanding of soil erosion processes; and relates various soil conservation and land-use management strategies to real-world situations. Basics of soil erosion processes and prediction methods will be the fundamental building blocks of this course. From this understanding, we will discuss policies and socioeconomic aspects of soil erosion. Lastly, we will focus on effective land-use management using natural resource assessment tools. Case studies and real-world and current events examples will be used throughout the course to relate course material to experiences. prerequisite: SOIL 2125 or instructor consent

ESPM 3241W. Natural Resource and Environmental Policy. (CIV, WI, SOCS; 3 cr.; Student Option; Every Spring) Political processes in management of the environment. How disagreements are addressed by different stakeholders, private-sector interests, government agencies, institutions, communities, and nonprofit organizations.

ESPM 3245. Sustainable Land Use Planning and Policy. (ENV; 3 cr.; A-F or Audit; Every Fall) Policies affecting land use planning at local, state, and federal levels. Ecosystem and landscape scale planning. Collaborative and community-based approaches to planning for ecological, social, and economic sustainability. Class project applies interdisciplinary perspectives on planning and policy, including information gathering techniques, conservation planning tools, and evaluation of planning options.

ESPM 3251. Natural Resources in Sustainable International Development. (GP; 3 cr.; A-F or Audit; Every Fall) International perspectives on resource use and sustainable development. Integration of natural resource issues with social, economic, and policy considerations. Agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, development issues. Global case studies. Impact of consumption in developed countries on sustainable development in lesser developed countries.

ESPM 3261. Economics and Natural Resources Management. (ENV, SOCS; 4 cr.; A-F or Audit; Every Spring) Microeconomic principles, their application to natural resource management problems. Tools to address market failure, project analysis. Economic/financial considerations. Benefit/cost analysis. Valuation/assessment methods for property/market/nonmarket benefits. Planning/management problems. Managing renewable natural resources. Case studies. prerequisite: MATH 1031 or MATH 1051 or MATH 1142 or MATH 1155 or MATH 1271 or ESPM 3012 or STAT 3011 or Soc 3811 or equiv

ESPM 3271. Environmental Policy, Law, and Human Behavior. (CIV, SOCS; 3 cr.; A-F or Audit; Every Fall) What is necessary to achieve sustainable societies. What influences societal deliberation/decisions about environmental issues. How our behaviors affect natural systems. Key theoretical concepts of environmental/social psychology and political science. How people respond to policies, using theoretical concepts from social psychology about attitudes, values, and social norms; applying these ideas to specific environmental problems and ethical debates.


ESPM 3480. Topics in Natural Resources. (1-4 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

ESPM 3575. Wetlands. (3 cr.; Student Option; Every Spring) Freshwater wetland classification, wetland biota, current/historic status of wetlands, value of wetlands. National, regional, Minnesota wetlands conservation strategies, ecological principles used in wetland management. prerequisite: ESPM 2021 or equivalent

ESPM 3601. Sustainable Housing—Community, Environment, and Technology. (TS; 3 cr.; A-F or Audit; Every Spring) How sustainable housing practices build community. How community growth has impacted the environment and how natural events impact our communities. Science and technology required to build high performance houses.

ESPM 3602. Regulations and Corporate Environmental Management. (3 cr.; A-F only; Every Spring) Concepts/issues relating to industrial ecology and industry as they are influenced by current standards/ regulations at local, state, and national levels. prerequisite: APEC 1101 or ECON 1101 or 3261W

ESPM 3603. Environmental Life Cycle Analysis. (3 cr.; A-F only; Every Fall) Concepts/issues relating to inventory, subsequent analysis of production systems. Production system from holistic point of view, using term commonly used in industrial ecology: “metabolic soil.”

ESPM 3604. Environmental Management Systems and Strategy. (3 cr.; A-F only; Every Fall) Environmental problems such as climate change, ozone depletion, and loss of biodiversity.


ESPM 3607. Natural Resources Consumption and Sustainability. (GP; 3 cr.; A-F only; Every Spring) Current world trends for industrial raw materials; environmental/other tradeoffs related to options for satisfying demand/needs; global and systemic thinking; provides a framework for beginning a process of thinking critically about complex environmental problems/potential solutions in a diverse global economy.

ESPM 3612W. Soil and Environmental Biology. (WI; 4 cr.; Student Option; Every Fall) Properties of microorganisms that impact soil fertility, structure, and quality. Nutrient requirements of microbes and plants and mineral transformations in biogeochemical cycling. Symbiotic plant/microbe associations and their role in sustainable agricultural production. Biodegradation of pollutants and biomethane approaches. prerequisite: Biol 1009 or equiv, Chem 1021 or equiv; SOIL 2125 recommended

ESPM 3656. Composting and Organics Utilization. (3 cr.; A-F or Audit; Every Spring) Practical introduction to composting technology and organics utilization for undergraduate students and industry professionals. How organics can be utilized in soils. Scientific steps involved in compost process. Application methods and rates. prerequisite: SOIL 2125

ESPM 3703. Agroforestry in Watershed Management. (3 cr.; Student Option; Spring Even Year) Biological, physical, and environmental attributes of agroforestry as pertains to watershed management. Coupling production with watershed protection benefits. Implications for policy, economics, and human dimensions in sustainable development. Examples, case studies from North America and from developing countries.

ESPM 4021W. Problem Solving: Environmental Review. (WI; 4 cr.; Student Option; Every Spring) Roles of government agencies, consultants, and private citizens in EIS process. Students read EIS/EAW, analyze their content/Scope, and prepare an EAW and EIS according to Minnesota EOB guidelines. prerequisite: ESPM 2021 and jr or sr

ESPM 4041W. Problem Solving for Environmental Change. (WI; 4 cr.; A-F or Audit; Every Fall) Capstone course. Students working with a team on a real world project related to selected track, gather/analyze data relevant to client’s objectives, and make recommendations for future use. Students produce a final written report and formal presentation, and present findings to client group. prerequisite: ESPM 2021 and ESPM Sr
ESP 4061W. Water Quality and Natural Resources. (ENV;WI; 3 cr.; Student Option; Every Fall) Water quality decision making. International focus. Ecology of aquatic ecosystems, how they are valuable to society and changed by landscape management. Case studies, impaired waters, TMDL process, student engagement in simulating water quality decision making.

ESP 4093. Directed Study. (1-7 cr.; max 20 cr.; Student Option; Every Fall, Spring & Summer) Research, readings, and instruction. prereq: instr consent

ESP 4094. Directed Research. (1-7 cr.; Student Option; Every Fall, Spring & Summer) Research under the direction of department faculty. prereq: instr consent

ESP 4096. Professional Experience Program: Internship. (1 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Students create oral/written report based on paid or volunteered work or field experience. prereq: CFANS undergrad, instr consent, completed internship contract

ESP 4216. Contaminant Hydrology. (3 cr.; A-F or Audit; Every Fall) Principles of contaminant transport in percolate solution and in overland flow. Hydrologic cycle, percolation/runner processes, contaminant transport, leachate sampling methods, remediation technologies, scale effects on runoff water quality, tillage technologies, control of sediment/chemical losses. Discussions mostly descriptive, but involve some computations.

ESP 4242. Methods for Environmental and Natural Resource Policy Analysis. (3 cr.; A-F or Audit; Fall Even Year) Methods, formal/informal, for analyzing environmental/natural resource policies. How to critically evaluate policies, using economic/non-economic decision-making criteria. Application of policy analysis to environmental/natural resource problems. Recognizing politically-charged environment in which decisions over use, management, and protection of resources often occur.


ESP 4295W. GIS in Environmental Science and Management. (WI; 4 cr.; A-F or Audit; Every Fall) Application of geographic information science and technologies (GIS) in complex environmental problems. Students gain experience in spatial data collection, database development, and spatial analysis, including GNSS and field attribute collection, image interpretation, and existing data fusion, raster/vector data integration and analysis, information extraction from LiDAR data, DEM conditioning and hydrologic analysis, neighborhood analysis, bulk processing and automation, and scripting. Problems vary depending on topics, often with extra-University partners. prereq: FNRM 3131 or Geog 3561 or instr consent

ESP 4601. Environmental Pollution. (3 cr.; Student Option; Every Fall) This course uses the principles of chemistry, microbiology, physics, and toxicology to understand the fate and behavior of environmental contaminants and the pollution of soils, surface waters, groundwater, and sediments. The course is structured around a semester-long risk assessment project that provides a framework for integrating concepts of pollution, contaminant movement, contaminant degradation, human health risk, ecological risk, risk mitigation, environmental remediation processes, and interactions among them. The history of federal regulations concerning environmental contamination is presented in the context of the major episodes of environmental pollution that motivated legislative action. prereq: SOIL 2125, CHEM 1061 and 1062 or equiv, or permission

ESP 4607. Industrial Biotechnology and the Environment. (3 cr.; A-F only; Every Spring) Biotechnology pertaining to biobased products development, their environmental impact. prereq: BIOL 1009, CHEM 1021


ESP 5031. Applied Global Positioning Systems for Geographic Information Systems. (3 cr.; A-F or Audit; Every Spring) GPS principles, operations, techniques to improve accuracy. Datum, projections, and coordinate systems. Differential correction, accuracy assessments discussed/applied in lab exercises. Code/phase GPS used in exercises. GPS handheld units, PDA based ArcPad/GPS equipment. Transferring field data to/from desktop systems, integrating GPS data with GIS. prereq: Grad student or instr consent

ESP 5061. Water Quality and Natural Resources. (3 cr.; Student Option; Every Fall & Spring) Recent literature in field. Complements 4061. Ecology of aquatic ecosystems, how they are valuable to society and changed by landscape management. Case studies, impaired waters, TMDL process, student engagement in simulating water quality decision making.

ESP 5071. Ecological Restoration. (4 cr.; Student Option; Every Fall) Ecological/phytoremediation concepts for revegetation of grasslands, wetlands, forests, and landscapes. Plant selection, stand establishment/evaluation. State/federal programs that administer restoration/reclamation. Field trips. prereq: [One college course in ecology, one college course in [plant science or botany]] or instr consent

ESP 5101. Conservation of Plant Biodiversity. (3 cr.; A-F or Audit; Every Fall) Introduction to principles underlying assessment/conservation of plant biodiversity at individual, population, and community levels. Case studies in management of biodiversity to restore or maintain ecosystem function. Genetics, timber harvesting, invasive species, plant reproduction. prereq: Grad student or instr consent

ESP 5102. Managing International Natural Resources Programs and Projects: Forests, Water and Land Use. (3 cr.; A-F only; Every Spring) Global hot spots where biodiversity is threatened by multiple stressors (zoonotic disease, rapid growth, opening of new frontiers, climate change). Strategies to address complex situations. Emphasis on learning interdisciplinary applied skills, management practices, hands-on techniques.

ESP 5108. Ecology of Managed Systems. (4 cr.; A-F or Audit; Every Fall) Analysis of functioning of ecosystems primarily structured by managed plant communities. Managed forests, field-crop agroecosystems, rangelands, aquatic systems. Structure-function relations. Roles of biodiversity in productivity, resource-use efficiency, nutrient cycling, resilience. Emerging principles for design of sustainable managed ecosystems, provision of ecological services. prereq: Sr or grad student

ESP 5111. Hydrology and Water Quality Field Methods. (3 cr.; A-F or Audit; Every Spring) Integrates water quality, surface/groundwater hydrology. Case studies, hands-on field data collection, calculations of hydrological/water quality parameters. Meteorological data, snow hydrology, stream gauging, well monitoring, automatic water samplers. Designing water quality sampling program. Geomorphology, interception, infiltration, evaporation. prereq: Grad student or instr consent


ESP 5211. Survey, Measurement, and Modeling for Environmental Analysis. (3 cr.; Student Option; Every Spring) Introduction to survey, measurement, and modeling concepts/methods for study
of natural resources and environmental issues. Emphasizes survey design for data collection, estimation, and analysis for issues encompassing land, water, air, vegetation, animal, soil, and human/social variables.

**ESPM 5241. Natural Resource and Environmental Policy.** (3 cr.; Student Option; Every Spring)

Political processes at play in management of environment and how disagreements are addressed by different stakeholders, private-sector interests, government agencies and institutions, communities, and nonprofit organizations. prereq: Grad student or instr consent

**ESPM 5242. Methods for Environmental and Natural Resource Policy Analysis.** (3 cr.; A-F or Audit; Fall Even Year)

Methods, formal and informal, for analyzing environmental and natural resource policies. How to critically evaluate policies, using economic and non-economic decision-making criteria. Application of policy analysis principles/concepts to environmental/natural resource problems. Recognizing politically-charged environment in which decisions over use, management, and protection of these resources often occur. prereq: grad student

**ESPM 5245. Sustainable Land Use Planning and Policy.** (3 cr.; A-F or Audit; Every Fall)

Planning theories, concepts, and constructs. Policies, processes, and tools for sustainable land use planning. Scientific/technical literature related to land use planning. Skills needed to participate in sustainable land use planning.

**ESPM 5251. Natural Resources in Sustainable International Development.** (3 cr.; A-F or Audit; Every Fall)

International perspectives on resource use in developing countries. Integration of natural resource issues with social, economic, and policy considerations. Agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, development issues. Latin American case studies. prereq: Grad student or instr consent

**ESPM 5256. Natural Resource Law and the Management of Public Lands and Waters.** (3 cr.; A-F or Audit; Every Spring)


**ESPM 5261. Economics and Natural Resources Management.** (4 cr.; A-F or Audit; Every Spring)


**ESPM 5295. GIS in Environmental Science and Management.** (4 cr.; A-F or Audit; Every Fall)

Application of geographic information science and technologies (GIS) in complex environmental problems. Students gain experience in spatial data collection, database development, and spatial analysis, including GNSS and field attribute collection, image interpretation, and existing data fusion, raster/vector data integration and analysis, information extraction from LIDAR data, DEM conditioning and hydrologic analysis, neighborhood analysis, bulk processing and automation, and scripting. Problems vary depending on topics, often with extra-University partners. prereq: Grad student or instr consent

**ESPM 5402. Biometeorology.** (3 cr.; Student Option; Fall Even Year)

This course examines the interactions between the atmosphere and the Earth’s surface. We will discuss the principles of the surface energy and radiation balance, air motion in the atmospheric boundary layer, land surface parameterization for climate models, boundary layer budgets, and field research methods. The course aims to achieve exemplary learning through hands-on activities and examining recent field studies conducted in natural and managed ecosystems. prereq: MATH 1271, PHYS 1201, STAT 3011, [inst consent]

**ESPM 5480. Topics in Natural Resources.** (1-4 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)

Lectures by visiting scholar or regular staff member. Topics specified in class schedule.

**ESPM 5555. Wetland Soils.** (3 cr.; A-F or Audit; Every Fall)

Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphology and indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project. prereq: SOIL 1125 or 2125 or equiv or instr consent; concurrent registration is required (or allowed) in SOIL 4511 recommended

**ESPM 5575. Wetlands.** (3 cr.; Student Option; Every Spring)

Freshwater wetland classification, wetland biota, current/historic status of wetlands, value of wetlands. National, regional, Minnesota wetlands conservation and their influence on society. Ecological principles used in wetland management. prereq: 3575, [sr or grad student or instr consent]

**ESPM 5601. Principles of Waste Management.** (3 cr.; A-F or Audit; Every Spring)


**ESPM 5602. Regulations and Corporate Environmental Management.** (3 cr.; A-F only; Every Spring)

Concepts, major issues relating to inventory and subsequent analysis of production systems. Production system from holistic point of view, using term commonly used in industrial ecology: "the metabolic system." prereq: [Math 1142 or [Math 1271, Math 1282]], [Econ 1101 or ApEc 1101]

**ESPM 5603. Environmental Life Cycle Analysis.** (3 cr.; A-F only; Every Fall)

Concepts, major issues relating to inventory and subsequent analysis of production systems. Production system from holistic point of view, using term commonly used in industrial ecology: "the metabolic system." prereq: [Math 1142 or [Math 1271, Math 1282]], [Econ 1101 or ApEc 1101]

**ESPM 5604. Environmental Management Systems and Strategy.** (3 cr.; A-F only; Every Fall)

Environmental problems such as climate change, ozone depletion, and loss of biodiversity.

**ESPM 5605. Recycling: Extending Raw Materials Supplies.** (3 cr.; A-F only; Every Spring)


**ESPM 5607. Industrial Biotechnology and the Environment.** (3 cr.; A-F only; Every Spring)

Biotechnology pertaining to biobased products development and their environmental impact. prereq: BIOL 1009, CHEM 1021, grad student

**ESPM 5703. Agroforestry in Watershed Management.** (3 cr.; Student Option; Spring Even Year)

Biological, physical, and environmental attributes of agroforestry as pertains to watershed management. Coupling production with watershed protection benefits. Implications for policy, economics, and human dimensions in sustainable development. Examples/case studies from North America and developing countries. prereq: Grad student or instr consent

**ESPM 5811. Environmental Interpretation.** (3 cr.; A-F or Audit; Every Spring)


**ECP 5220. Regulatory Issues in Drug Research.** (2 cr.; Student Option; Every Fall)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
FMCH 5950. Clinical Issues in Human Sexuality. (2 cr.; O-N or Audit; Every Fall & Spring) Assessment and treatment techniques pertaining to common problems. Prereq: Enrollment in health sci grad programs in CSPS. Psy, PubH, SW or FSoS or instr consent

FMCH 5955. Directed Study. (1-10 cr.; O-N or Audit; Every Fall, Spring & Summer) Studies on special topics as arranged between student and faculty. Prereq: instr consent; qualified students may arrange for work on a tutorial basis

FMCH 7500. Sub-internship in Family Medicine. (2-4 cr.; H-N or Audit; Every Fall & Spring) This elective is offered at all the University of Minnesota-affiliated Twin Cities Residency Programs in Family Medicine and selected other local programs. This elective provides students the opportunity to experience the full spectrum of Family Medicine. All efforts will be made to place the student at the program of their choice. The student will work with Family Medicine faculty physicians and Family Medicine residents in all the facets of Family Medicine care including: office, inpatient hospital service, labor and delivery, overnight call, procedures and, where applicable, nursing home rounds or home visits. Although not required, it is essential that students have first completed the Primary Care Clerkship or equivalent and schedule this elective in the Spring of Year 3 or later. Students are expected to take both inpatient medicine and obstetrical call at a frequency of approximately one night per week, work may include evenings and weekends. Prereq: MED 7500 or PED 7501

FMCH 7501. Rural Physician Associate Program (RPAP). (2-6 cr. [max 18 cr.]; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive primary care experience in a rural setting. Intended for the student with an interest in rural Minnesota primary care. Each student works with family physicians and local and/or visiting specialists. Problem-based learning, hands-on clinical experience and one-to-one teaching. Scholarships are available. Prereq: Med 7500, Obst 7500, USMLE Step 1 Passing Score

FMCH 7502. Rural Physician Associate Program (RPAP): Orthopaedic Surgery. (2-4 cr.; P-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive orthopaedic surgery experience in a rural setting. Prereq: 7501. RPAP student

FMCH 7503. Preceptorship in Family Medicine Obstetrics. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer) This course provides an overview of family medicine Obstetrics, or maternity care. The student is given the opportunity to participate in the care of the pregnant woman both in the clinic and in the hospital. The student is assigned to call one time per week. Additionally, the student will be given time to research one topic of interest and complete a one-page summary.

FMCH 7504. Rural Physician Associate Program (RPAP): Surgery. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive primary care (surgery) experience in a rural setting. Each student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching. Prereq: Med 7500, Obst 7500, USMLE Step 1 Passing Score

FMCH 7505. Rural Physician Associate Program (RPAP): Obstetrics and Gynecology. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive obstetrics/gynecology experience in a rural setting. Each student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching. Prereq: 7501

FMCH 7506. Rural Physician Associate Program (RPAP): Pediatrics. (6 cr.; H-N or Audit; Every Fall & Spring) Community-based elective with extensive pediatrics experience in a rural setting. Prereq: 7501

FMCH 7507. Rural Physician Associate Program (RPAP): Otolaryngology. (2-4 cr.; P-N or Audit; Every Spring) Community-based elective with extensive otolaryngology experience in a rural setting.

FMCH 7508. Rural Physician Associate Program (RPAP): Urology. (2-4 cr.; P-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive urology experience in a rural setting.

FMCH 7509. Rural Physician Associate Program (RPAP): Primary Care Clerkship I. (4 cr.; H-N or Audit; Every Fall & Spring) Community-based elective with extensive primary care experience in a rural setting. Prereq: 7501

FMCH 7510. Rural Physician Associate Program (RPAP): Primary Care Clerkship II. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive primary care experience in a rural setting. Prereq: 7509

FMCH 7511. Urban Community Ambulatory Medicine (UCAM). (4 cr.; H-N or Audit; Every Fall, Spring & Summer) UCAM provides 12 weeks of ambulatory continuity experience in an underserved urban community Family Medicine Clinic. UCAM expands the Family Medicine Clerkship exposure to patient diversity, low income, multicultural urban medicine, and community health. Students are required to attend the Family Medicine Clerkship/Primary Care Selective seminars as well as 4 UCAM seminars. From a scheduling point of view, UCAM combines the 8 weeks of Family Medicine Clerkship/Primary Care Selective with 4 extra weeks of elective credit. The principles of urban medicine will be blended throughout the 12 weeks, as will the project. Each student will participate in a community health project and complete a journal about his/her experience. The community health project ideally combines the EBM focus of the Family Medicine clerkship project with a longitudinal project. Prereq: FMCH 7600 and FMCH 7700

FMCH 7512. Urban Community Ambulatory Medicine (UCAM). (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Expands primary-care clerkship (PCC) into 16 weeks of primary care experience in one underserved urban clinic. Students attend PCC seminars during first eight weeks, followed by weekly seminars covering patient diversity, indigenous medicine, and community health. Prereq: 7511, InMd 5508, InMd 7509

FMCH 7513. Rural Physician Associate Program (RPAP): Orthopaedic SurgeryRSU. (2-4 cr.; P-N or Audit; Periodic Fall & Spring) Community-based elective with extensive orthopaedic surgery experience in a rural setting; Prereq: Accepted into RPAP

FMCH 7515. RPAP: Emergency Medicine. (4 cr.; H-N only; Every Fall, Spring & Summer) TBD

FMCH 7516. Research in Human Sexuality. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) This elective consists of clinical and/or laboratory research related to human sexuality in areas such as incest, rape, gender dysphoria, compulsive sexual behavior, sex offenses, and sexual dysfunction. It is adaptable to the specific interests of the student and faculty.

FMCH 7518. Inpatient Family Medicine. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Students will participate in the family medicine residency inpatient teaching service. This service consists of a variety of patients including pediatric, obstetric, geriatric, and other adult patients. Supervision and teaching are provided by a family medicine faculty who participates daily in didactic teaching, x-ray rounds, and hospital rounds. Members of the team include a medical student, first and second year resident, and the chief resident. These individuals share responsibility for patients on the service and perform initial histories and physicals, write daily orders and progress notes, complete discharge summaries, and communicate with consultants and family members. Students will also attend daily noon conferences. Call is required at some sites. Prereq: FMCH 7600 or FMCH 7523; and MED 7500

FMCH 7519. Clinical Practice of Occupational Medicine. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer) Students perform complete occupational health history, set up basic problem-solving approaches to occupational health problems.

FMCH 7520. Rural Rotation in Family Medicine. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This course is intended for students interested in observing and participating in Family
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FMCH 5721. Topics in Immigrant Health. (4 cr. ; H-N only; Every Fall) Course is designed to offer an intensive multidimensional exploration of immigrant health using clinical, multimedia, academic and on-line learning. The course will include an individualized in-depth project and an individualized learning plan will be developed between each student and the course director after assessing the student's experience, background and interest. This course will combine clinical experiences at a variety of sites which serve immigrant patients with text-based and web-based reading, on-line research, group and individual community visits and on-line and class discussions to provide students with an opportunity to study in-depth the issues that communities and methods by which those barriers are being overcome.

FMCH 5723. Family Medicine Clerkship: Duluth. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Principles of family medicine. Students engage in preceptorship with community family physicians in clinic, hospital, patient's home, and other facilities. Weekly patient care discussions/presentations, observation. Procedures such as suturing, casting.

FMCH 5724. Rotation in Palliative Medicine and Hospice. (2-3 cr.; H-N or Audit; Every Fall & Spring) Introduces students to the field of palliative care and hospice medicine. Students will participate in patient care with hospice staff and palliative care physicians and other practitioners in the hospital, nursing home, clinic, and patient's homes. The rotation will be based out of University Medical Center, Fairview but students will rotate also at Fairview Southdale Hospital and Fairview Hospice. Students will directly work with interdisciplinary teams in their daily work, and spend time with practitioners in social work, nursing, spiritual health, music therapy, and physicians.

FMCH 5725. Cardiovascular Medicine in the Community Hospital. (2-6 cr. ; H-N or Audit; Every Fall & Spring) Students attend lectures and regularly scheduled cardiology conferences, make bedside rounds in intensive coronary care and rehabilitation coronary care units with staff/residents, and do complete patient work-ups including medical interviews and physical examinations. prereq: Med 7500

FMCH 5730. Preceptorship in Community Family Medicine. (2-4 cr.; H-N or Audit; Every Fall & Spring) This course is intended for students interested in pursuing family medicine as a career, or for students wishing to acquire a broadly-based medical background before training in another specialty. The student will usually participate in inpatient and outpatient care in the family medicine clinic and in the hospital.

FMCH 5731. Introduction to Healthcare for the Underserved. (2-6 cr.; H-N or Audit; Every Fall & Spring) Introduces students to the health care needs and challenges faced by special population groups served by Family Medicine. These include immigrant and refugee populations, minority populations, and various other underserved groups. During this rotation based in a clinic serving one or more of these population groups, the student will become familiar with the unique health needs of a population and the resources and methods used to address those needs. Issues such as communication, education, and traditional healing beliefs and systems will be addressed. Typically, 2.5 days per week will be spent in direct patient care, 1 day is reserved for students to perform independent learning around the population to be studied while the remaining 1.5 days may be spent in a variety of non-direct patient care or community-based activities, depending on the clinic site.

FMCH 5735. Community Health in Family Medicine. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Individually designed outpatient rotation. Combines clinical work in urban setting with a series of experiences in the community. prereq: At least two six-week rotations in medicine or pediatrics or obstetrics or surgery

FMCH 5737. Primary Care Sports Medicine. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer) Students will gain experience in the field of sports medicine including exposure to the disciplines of primary care sports medicine, orthopedic sports medicine, sports physical therapy, and athletic training. There will be opportunity for participation in the treatment of sports injuries and illnesses in the following venues: -Outpatient Sports Medicine Clinics with both Orthopedic Sports Medicine and Primary Care Sports Medicine Physicians.-Outpatient Orthopedic Sports Medicine Surgical Procedures -NCAA Division III and high school training room clinics and game/event coverage. -Sports Physical Therapy Rehabilitation -Sports Medicine Didactic Sessions which include: Sports Medicine Grand Rounds, Orthopedic Grand Rounds, small group lectures given by Sports Medicine faculty to fellows and residents, and monthly journal club. -Independent review of the course materials which include: textbooks, articles, and web-based resources

FMCH 5738. Sports Medicine in Duluth. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Role of sports medicine in primary care or musculoskeletal specialty practice. Students work with full-time sports medicine physicians and allied health providers (e.g., physical therapists, athletic trainers) in office practice, rehabilitation facilities, training rooms, athletic events. prereq: Duluth site: call dept of family medicine at 218-726-7916 at least one month before cancel/add deadline

FMCH 5740. Sports Medicine: USA Soccer Cup. (1-2 cr.; H-N only; Every Summer) The University of Minnesota Department of Family Medicine and Community Health Division of Sports Medicine sponsors a Sports Medicine course held immediately prior to the start of the USA Soccer Cup Tournaments every July. This course consists of didactic lectures and hands on workshops focusing on sports medicine topics with an emphasis on soccer. The FMCH Division of Sports Medicine faculty and fellows help to provide medical coverage of the tournaments. The USA Soccer Cup Tournaments are held in Blaine, MN at the National Sports Facility and are the largest youth soccer tournament in the country drawing teams nationally and internationally. The clinic at the National Sports Facility provides trainees the opportunity to evaluate and treat a large number of youth soccer players with sports medicine injuries and illnesses.

FMCH 5744. Outpatient: HIV Management in Family Medicine. (2-3 cr.; H-N or Audit; Every Fall, Spring & Summer) This course will expose the student to the full scope of HIV patients as seen in an active HIV clinic. The patients include gay men, IV drug users, and persons infected through heterosexual contact. The patients represent a wide range of socio-economic backgrounds. In addition, the student will have the opportunity to observe the operation of Park House, the HIV day health center and HealthSpan Home Care and Hospice. prereq: Med 7500

FMCH 5751. Rural Community Ambulatory Medicine PCC. (12 cr. [max 24 cr.]; H-N only; Every Fall, Spring & Summer) Twelve-week course. Four weeks in a Twin Cities Family Residency clinic, eight weeks in a selected Rural Community. Exposure to patients from diverse backgrounds in an outpatient setting to rural medicine, delivery systems, and community health. Small-group seminars, one-day Hospice experience, project, final exam.

FMCH 5760. Alcohol and Drug Addiction Treatment Center. (2-3 cr.; H-N or Audit; Every Fall, Spring & Summer) Intensive exposure to current approaches to therapy and rehabilitation of chemically dependent patients. For most of these patients, alcohol is the most abused drug. The course includes participant observation in group therapy sessions and lectures.

FMCH 5761. Health Psychology. (3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of psychology and the biological sciences. Emphasis will be on the biopsychosocial model of patient care and the role of the health psychologist in providing care. The course will include lectures, reading assignments, and a research project.

FMCH 5762. Introduction to Complementary and Alternative Therapies. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will cover the history and evolution of complementary and alternative medicine, as well as the current state of the field. The course will include lectures, readings, and a research project.

FMCH 5763. Complementary and Alternative Medicine in the Community. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into community health settings. The course will include lectures, readings, and a research project.

FMCH 5764. Complementary and Alternative Medicine in the Hospital. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into hospital settings. The course will include lectures, readings, and a research project.

FMCH 5765. Complementary and Alternative Medicine in the Clinic. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into clinic settings. The course will include lectures, readings, and a research project.

FMCH 5766. Complementary and Alternative Medicine in the Home. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into home settings. The course will include lectures, readings, and a research project.

FMCH 5767. An Introduction to Complementary and Alternative Therapies. (3 cr.; O-N or Audit; Periodic Fall & Spring) The course will cover the history and evolution of complementary and alternative medicine, as well as the current state of the field. The course will include lectures, readings, and a research project.

FMCH 5768. Complementary and Alternative Medicine in the Community. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into community health settings. The course will include lectures, readings, and a research project.

FMCH 5769. Complementary and Alternative Medicine in the Hospital. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into hospital settings. The course will include lectures, readings, and a research project.

FMCH 5770. Complementary and Alternative Medicine in the Clinic. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into clinic settings. The course will include lectures, readings, and a research project.

FMCH 5771. Complementary and Alternative Medicine in the Home. (2-3 cr.; O-N or Audit; Periodic Fall & Spring) The course will focus on the integration of complementary and alternative medicine into home settings. The course will include lectures, readings, and a research project.
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FSOS 4294. Research Internship. (1-4 cr.; Student Option; Every Fall, Spring & Summer) Research project with faculty. May include planning, proposal writing, literature review, data collection/coding/cleaning/analysis, and reporting. prereq: [FSOS major, at least jr] or instr consent

FSOS 4160H. Honors Capstone Project. (1-4 cr.; FSoS 4101 or instr consent) Individualizes the honors experience by connecting aspects of major program with special academic interests.

FSOS 4191. Independent Study in Family Social Science. (1-4 cr.; FSoS 4101 or instr consent) Independent reading or writing or research under faculty supervision. prereq: Sr, instr consent

FSOS 4296. Field Study: Working With Families. (1-12 cr.; FSoS 4101 or instr consent) Directed paraprofessional work experience related to student's area of study. prereq: 2101 or instr consent

FSOS 5014. Quantitative Family Research Methods I. (3 cr.; FSoS 4101 or instr consent) Family research methods, issues associated with multiple levels of analysis. Conducting family-focused data analyses using basic/intermediate methods (through ANOVA and multiple regression), including power analysis. Ethical issues involved in family research such as IRB/HIPAA regulations. prereq: Grad student or instr consent

FSOS 5015. Family Research Laboratory. (1 cr.; FSoS 4101 or instr consent) Application of basic family research methods into experiential learning using statistical software. Analyses that correspond with problem situations in 5014 and that involve secondary data analyses. Using statistical software for basic family research. Preparation to work with quantitative family data sets. prereq: Grad student or instr consent

FSOS 5032. Family Systems Theories and Interventions. (3 cr.; FSoS 4101 or instr consent) Systemic/cybernetic frameworks as they apply to diverse families. Thinking systemically about families across multiple ecological systems.

How to identify crucial epistemological issues in theoretical/applied areas of family science. Theoretical frameworks. Experiential role-playing, guest presenters, videos, field work, research projects, reading clubs, class discussion. prereq: Grad student or instr consent

FSOS 5193. Directed Study in Family Social Science. (1-6 cr.; FSoS 4101 or instr consent) Independent study. prereq: instr consent

FSOS 5429. Counseling Skills Practicum I. (3 cr.; FSoS 4101 or instr consent) Basic counseling skills. Counselor needs/motivations, non-verbal communication, basic/advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasizes building from client strengths, learning through role-playing.

FSOS 4155. Legal-Economic Controversies in Families. (3 cr.; Student Option; Every Fall & Spring) Interdisciplinary course for critical thinking about legal-economic controversies across family life span. Principles of argumentation/debate are used to analyze controversies for public decision making about controversial family issues. prereq: 3101 or instr consent


FSOS 5702. Prevention Science Research Methodology. (3 cr.; A-F or Audit; Every Fall & Spring) This course is intended to provide students with broad exposure to topics in research methodology within the field of prevention science. Prevention science as a discipline focuses on the etiology and prevention of social, physical and mental health problems and the translation of that information to promote health and well-being. This course will emphasize research methodology as it pertains to preventive interventions in youth and family contexts. The course is intended to serve as a survey of a wide range of topics within these areas, with research design, measurement issues, and analytic methods representing the major foci. Topics will be covered with attention to the community contexts within which prevention research often occurs as well as the ethical and human subjects issues that may arise. Students who successfully complete the course are expected to be able to interpret and critically evaluate prevention research
methodology as well as identify appropriate methodical strategies to address research questions within prevention science.

FSOS 5703. New Topics in Prevention: Implementation and Dissemination. (3 cr.; A-F or Audit; Every Fall & Spring)
This is an interdisciplinary course focused on the new science of implementation and dissemination of evidence-based/empirically-supported family-focused psychosocial prevention programs. Course content will include an overview of conceptual and theoretical foundations of implementation research, key research questions, methods for evaluating implementation and dissemination efforts, and case examples from the empirical literature. The course will take an ecological perspective to the implementation of family-based prevention programs, addressing questions such as how widespread efforts to install programs in communities can ensure that programs create change in children and families.

FSOS 5900. Special Topics in Family, Youth, and Community. (1-4 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Topics not dealt with in regular courses. Topics vary by offering.

FSOS 5902. Family Education Perspectives. (3 cr.; A-F only; Every Fall) Origins, evolution, and critique of alternative perspectives on family education. Implications for educators, programs, and participants. Online course that requires collaborative learning.


FSOS 5932. Introduction to Parent Education. (1 cr.; A-F only; Every Fall & Summer) Philosophy, history, and models of parent education. Ethical, critically reflective professional practice. Observation of parent and family education practice.


FSOS 5942. Everyday Experiences of Families. (2 cr.; A-F only; Every Spring & Summer) Culture and everyday experiences of diverse families. Relevance to parent education and to professional development of parent educators. Research/theoretical knowledge woven with observation/personal reflection.


FSOS 5944. Parent Education Curriculum. (2 cr.; A-F only; Every Fall) How parent learning and development, child development, and family systems theories influence curriculum approaches and materials in parent education. Student develop construct, critique curriculum on self-selected topics in parent and family education.

FSOS 5945. Teaching and Learning in Parent Education. (2 cr.; A-F only; Every Fall) Students select/use parent education teaching strategies/processes to meet needs of various populations of adult learners. Critical reflection, ethical practices, parent educator competencies. prereq: 5943 or instr consent


FSOS 5949. Student Teaching in Parent Education. (2 cr.; A-F only; Every Spring) Supervised parent education practice to meet individual student needs and interests. Online discussion, reflection, and cooperative learning. prereq: Application for student teaching; FSOS 5937, 5942, 5943, 5944, 5945.

FSOS 8001. Conceptual Frameworks in the Family. (3 cr.; A-F only; Every Fall) Major theoretical models about families, emphasizing sociohistorical context.

FSOS 8002. Advanced Family Conceptual Frameworks. (3 cr.; A-F only; Every Spring) Builds on FSOS 8001 by focusing specifically on family level research questions. Family development/critical theoretical perspectives that can be used to understand/study family processes/contemporary ecological issues. prereq: 8001 or instr consent

FSOS 8003. Current Issues in Family Science. (3 cr.; Student Option; Every Spring) Content, theories, and methodologies in family science. Emphasizes findings of recent/emerging areas of research. Readings covering a wide range of topics. Critical examination of research studies. Targeted class discussion.


FSOS 8007. Ethical Issues and Moral Dilemmas in Family Life. (3 cr.; Student Option; Periodic Fall & Spring) Multidisciplinary perspectives of ethics, social norms, family law, family policy, family economics, and family decision-making. Focuses on differing perspectives of individuals representing various ethnicities, socio-economic levels, religions, and sexual orientations.

FSOS 8013. Quantitative Family Research Methods I. (3 cr.; A-F only; Every Spring) Quantitative research process, from developing research question to putting findings to use. Major course project basis for class discussion. Family research. Applying research knowledge to study of families. prereq: [5014 or equiv], [8001 or equiv], [two stat courses or instr consent]

FSOS 8014. Quantitative Family Research Methods II. (3 cr.; A-F only; Every Spring) Approaches to qualitative family research evaluation. Phenomenological, feminist, grounded theory, content analytic, ethnomethodological, ethnographic, program evaluation. Theory, research examples, student projects.

FSOS 8015. Advanced Qualitative Family Research Methods. (3 cr.; A-F only; Every Fall) Applying qualitative research methods to understand individual/collective meaning, experience within/across diverse family systems. prereq: 8013 or instr consent

FSOS 8031. Family of Origin. (3 cr.; S-N or Audit; Periodic Fall & Spring) In-depth study of each student's family of origin in a group of other students and a clinical faculty therapy supervisor. prereq: Preference given to marriage and family therapy students

FSOS 8033. Problems in Families. (3 cr.; Student Option; Periodic Spring) Family therapy assessment/treatment approaches to problems such as depression, alcoholism, and sexual abuse, and to challenges of varying family structures, such as single家长/remarried families. prereq: [8032 or equiv], instr consent

FSOS 8034. Marriage and Family Therapy Supervision. (3 cr.; Student Option; Periodic Fall) Theories of supervision, structures for supervision, methods of supervision, evaluation process, legal/ethical issues. Therapist-client-supervisor relationships, potential problems, contextual issues. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent
FSOS 8035. Assessment of Couples and Families. (3 cr.; A-F or Audit; Periodic Fall) Issues in research and clinical assessment. Assumptions and values underlying assessment approaches. Specific assessment techniques discussed, evaluated, and administered. Ethical, legal, and practical issues. prereq: 8014 or equiv or instr consent

FSOS 8036. Couple/Marriage and Family Therapy Research. (3 cr.; A-F only; Periodic Fall & Spring) Historic/contemporary approaches to C/ MFT research with emphasis on prevention, intervention, dissemination from variety of perspectives. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent

FSOS 8037. Ethical, Legal, and Professional Issues in Mental Health Practice: Issues with Couples and Families. (2-10 cr.; A-F or Audit; Periodic Fall & Spring) Boundaries and triangles, gender inequities, family law, confidentiality and reporting requirements, dual roles, client diversity, and value clashes. prereq: [8032, practicum or internship exper] or [grad student in cooperating mental health practice prog who has completed 1 course on therapy with children

FSOS 8039. Clinical Interventions for Couples. (3 cr.; A-F or Audit; Periodic Fall) Interventions into problems faced by couples at various ages and stages of their relationship. Developing and implementing effective strategies for problem solving, relationship maintenance, and partner growth, including integration of sex therapy into ongoing couple therapy. prereq: 8032 or equiv or instr consent

FSOS 8043. Family Theory Development: A Systemic Perspective. (3 cr.; Student Option; Periodic Fall & Spring) Concepts and principles of systems and ecosystems and their applications in family science; emphasizes theoretical integration and development of research models with appropriate methodologies. prereq: 8001 or equiv or instr consent, FSOS PhD student beyond 1st yr

FSOS 8047. Integrative Research Seminar. (3 cr.; Student Option; Every Spring) For advanced doctoral students primarily in family social science who are working on independent research projects. Giving and receiving of constructive criticism and support in integrating theories, methods, and applications in order to create a totality that is logically coherent and conceptually and methodologically sound. prereq: 8001 or equiv, 8013 or equiv, 8014 or equiv

FSOS 8101. Family Stress, Coping, and Adaptation. (3 cr.; Student Option; Periodic Fall & Spring) Helping families become more resilient to stress by decreasing vulnerability to crises and traumatic stress disorders. Students develop research or intervention proposal on family stress, coping, adaptation, crisis, trauma, or resilience. prereq: 8001 or equiv, research methods course

FSOS 8104. Family Policy Seminar. (3 cr.; Student Option; Periodic Spring) Distinguishing family policy research from other family research. Conceptual frameworks, methods, and roles family policy research can play in policy-making and knowledge-building processes.

FSOS 8105. Family Gerontology. (3 cr.; Student Option; Periodic Spring) Integrates gerontology and family studies; new lines of inquiry, qualitative and quantitative, into aging families. Family gerontological research, family relationships, family and long-term care institutions, theoretical frameworks and research methods, and research and interventions. prereq: 4154 or equiv or instr consent


FSOS 8107. Family Values Research: Theories and Critical Methods. (3 cr.; Student Option; Periodic Fall) Interdisciplinary seminar on critical modes of inquiry in the family domain that require designing studies using normative theories, examining values as units of observation, and solving practical problems by collaborative strategies designed to encourage change. prereq: 8013 or equiv, 8014 or equiv or instr consent; WCFE 8920 recommended

FSOS 8150. Topics in Family Social Science. (1-6 cr.; Student Option; Every Fall, Spring & Summer) Special seminars on timely topics. prereq: FSOS grad student or instr consent

FSOS 8151. Preparation for Independent Teaching in Family Studies. (1-3 cr.; FSOS grad cr; teaching assistant exper recommended

FSOS 8160. Topics in Marriage and Family Therapy. (1-6 cr.; Student Option; Periodic Fall) Special seminars on timely topics. prereq: FSOS grad student or instr consent

FSOS 8193. Directed Study in Family Social Science. (1-6 cr.; Max 12 cr.; FSOS grad cr; teaching assistant exper required) Directed study. prereq: Doctoral student in FSOS or related field

FSOS 8200. Orientation for Family Social Science. (1 cr.; S-N or Audit; Every Fall) TBD

FSOS 8201. Teaching Family Courses in Higher Education I. (3 cr.; S-N or Audit; Periodic Fall & Spring) Students cooperatively plan, administer, and evaluate (with a graduate faculty supervisor) an undergraduate core course. Improvement of teaching and evaluation methods, and conceptualization and presentation of research-based course in family studies. prereq: 12 FSOS grad cr; teaching assistant exper recommended

FSOS 8202. Teaching Family Courses in Higher Education II. (3 cr.; S-N or Audit; Periodic Fall & Spring) Under faculty supervision, students teach an undergraduate course in family social science for which they have appropriate academic preparation and professional experience. prereq: 8201 or equiv

FSOS 8275. Clinical Consultation with Couples and Families. (3 cr.; S-N or Audit; Periodic Fall & Spring) Supervised students serve as a consultation group working with community clinicians and their clients, utilizing a one-way window and observation room; opportunities for cotherapy. prereq: instr consent; required for grad FSOS majors in marriage and family therapy prog

FSOS 8295. Couple/Marriage Family Therapy Practicum. (1-12 cr.; S-N only; every Fall, Spring & Summer) Clinical placement doing marriage/family clinical practice. Supervision of couple/marriage. Family therapy in community setting. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent

FSOS 8296. Couple/ Marriage Family Therapy Internship. (1-12 cr.; S-N only; every Fall, Spring & Summer) Supervised clinical/other professional practical experiences in couple/marriage, family therapy. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent

FSOS 8297. Supervision of Supervision. (1-3 cr.; Max 12 cr.; S-N or Audit; every Fall, Spring & Summer) Hands-on practicum to gain AAMFT-approved supervisor status. prereq: MFT student, instr consent

FSOS 8333. FTE: Masters. (1 cr.; No Grade Associated; every Fall, Spring & Summer) No description. prereq: Master's student, adviser and DGS consent

FSOS 8444. FTE: Doctoral. (1 cr.; No Grade Associated; every Fall, Spring & Summer) No description. prereq: Doctoral student, adviser and DGS consent

FSOS 8550. Advanced Topics in Family Social Science. (1-6 cr.; A-F or Audit; every Fall & Spring) Special seminars on topics suited to student needs.

FSOS 8560. Advanced Clinical Topics in Marriage and Family Therapy. (1-6 cr.; Max 36 cr.; A-F or Audit; Periodic Spring) Special advanced topics or seminars.

FSOS 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; Max 12 cr.; No Grade Associated; every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for
Finance (FINA)

FINA 1905. Freshman Seminar. (1-3 cr. [max 6 cr.]; A-F only; Every Fall) Topics vary. See Class Schedule. prereq: Fr


FINA 4221. Principles of Corporate Finance. (2 cr.; A-F only; Every Fall & Spring) Theoretical/applied corporate finance, impact on investment decisions. Financing decisions, payout decisions, tax effects, managerial incentives. prereq: 3001, CSOM major, actuarial science major

FINA 4242W. Corporate Investment Decisions. (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Managing firm's investment in working capital/ fixed assets. Capstone course requiring application of corporate valuation principles from earlier coursework to cases involving working capital management, making capital budgeting decisions, targeting/evaluating firm performance, assessing mergers/acquisitions, and other topics. prereq: 3001, 4121 or 4121H, 4321 or 4321H, 4422, 4522, CSOM major

FINA 4321. Portfolio Management and Performance Evaluation. (2 cr.; A-F or Audit; Every Fall, Spring & Summer) Investment environment. Concepts used to manage security portfolios. Risk/return tradeoffs, diversification. Asset allocation, Active portfolio management versus indexed portfolios. Portfolio performance evaluation. prereq: 3001, CSOM major, can take concurrent registration is required (or allowed) in 4522


FINA 4325. Behavioral Finance. (2 cr.; A-F only; Every Spring) How to use psychology/realtistic settings to guide/develop alternative theories of financial market. How insights of behavioral finance complement traditional paradigm/shed light on trading patterns, behavior of asset prices, corporate finance, various Wall Street practices. prereq: 4321 or 4321H

FINA 4329. Security Analysis Capstone. (2 cr.; A-F only; Every Fall & Spring) Valuation of equity securities. Principles. Relationship between various valuation approaches. Tools to test self-designed security selection rules. prereq: 4121 or 4121H, 4321 or 4321H, 4422, 4522, ACCT 5100 or ACCT 5101

FINA 4422. Financial Modeling. (2 cr.; A-F only; Every Fall & Spring) Projecting financial statements to identify financing needs and perform DCF analysis in decision making. APV-, FCF-, and WACC-based methods. prereq: 3001, 4221, ACCT 5100 or 5101, CSOM major

FINA 4522. Options & Derivatives I. (2 cr.; A-F only; Every Fall & Spring) Forwards/futures, options, swaps. Markets these derivatives trade in, their valuation, how they are used to speculate/Manage risk in the financial markets. Multi-period binomial model. prereq: 3001, 4121 or 4121H, 4321 (can be concurrent) or 4321H (can be concurrent), CSOM major

FINA 4529. Derivatives II Capstone. (2 cr.; A-F only; Every Spring) Quantitatively advanced material such as Black-Scholes model for valuing option sensitivities (the Greeks). Value-at-risk methods. Valuation/uses of credit derivatives such as default swaps/collateralized debt obligations. prereq: 4522 or 4523

FINA 4621. The Global Economy (Macro). (2 cr.; A-F only; Every Fall & Spring) Survey of macroeconomic policies in emerging markets and developed countries. International dimensions of corporate finance. Exchange rates, interest rate parity, trade deficit/surplus. prereq: 3001, CSOM major

FINA 4622. International Finance. (2 cr.; A-F only; Every Fall) Corporate investment, risk management decision making in international context. International capital markets, cost of capital in emerging economies. Measuring/managing currency risk. prereq: CSOM major, 3001, 4121 or 4121H, 4221

FINA 4920. Topics in Finance. (2-4 cr.; Student Option; Periodic Fall, Spring & Summer) Topics vary.


FINA 6112. Financial Management of Depository Institutions. (2 cr.; A-F only; Every Fall & Spring) Commercial banks, other depository institutions. Asset/liability management, risk management, geographic expansion, investment banking, public policy issues. Lectures, student presentations, project. prereq: MBA 6230, MBA student

FINA 6222. Mergers and Acquisitions. (2 cr.; A-F only; Every Spring)
FINA 6241. Corporate Finance Analysis and Decisions. (4 cr.; A-F only; Every Fall & Spring) Theoretical/ applied understanding of corporate financial decisions. Adjusted present value, economic value added options. Impact of financing decisions on real asset valuation, managerial incentives, corporate strategy. prereq: MBA 6241, MBA student

FINA 6242. Advanced Corporate Finance Analysis and Decisions. (4 cr.; A-F only; Every Fall) Theory/practice of efficiently managing working capital, fixed assets. Emphasizes mergers/ acquisitions, corporate restructuring, real options. Use of derivatives as financing tools, in real deal structure. prereq: 6241, MBA student

FINA 6321. Portfolio Analysis and Management. (2 cr.; A-F only; Every Fall) Introduces analytical concepts used to manage security portfolios from perspective of an institutional investor. Market microstructure. Margin purchasing, short selling. Portfolio risk management, risk/return tradeoffs, strategic/ tactical asset allocation, active versus passive management. Portfolio revision, performance evaluation. prereq: MBA 6120, MBA 6230, MBA student

FINA 6322. Financial Modeling. (2 cr.; A-F only; Every Fall, Spring & Summer) Financial modeling tools to build, maintain, and interpret comprehensive financial models that provide the framework for understanding businesses and their historical performance, plans/strategies, and market values. Financial analytics/modeling skills. prereq: MBA 6230, MBA student

FINA 6323. Advanced Financial Modeling. (2 cr.; A-F only; Every Fall) Advanced financial modeling tools to build, operate, and understand business performance, M&A and equity and credit securities analysis models that have become central to sophisticated financial analysis of all operating businesses, transactions, and securities. How to analyze by way of financial models. prereq: 6322, MBA student

FINA 6324. Securitization Markets. (2 cr.; A-F only; Every Fall & Spring) Splitting risks and return to investors able to analyze and take on those risks. Reasons for development of securitization. Products, their similarities in character. How to build simple models and analyze examples of actual securitized liabilities. prereq: 6121, MBA student

FINA 6325. Behavioral Finance. (2 cr.; A-F only; Every Spring) Psychology/realistic settings that guide/develop alternative theories of financial market. How behavioral finance complements traditional paradigm on investors' trading patterns, behavior of asset prices, corporate finance, various Wall Street institutions/practices. prereq: MBA student

FINA 6341. World Economy. (4 cr.; A-F only; Every Fall, Spring & Summer) Tools to predict/ understand ramifications of major economic events. Financial crises. Changes in monetary, fiscal, financial policies. Strategies for promoting long-run economic growth. Examples from U.S., Europe, Japan, developing countries. prereq: MBA 6230, MBA student

FINA 6421. Topics in Corporate Finance. (2-4 cr.; A-F only; Periodic Fall) Advanced-level coverage of topics in corporate finance. Analytical foundations reviewed/ expanded. Opportunities for applying concepts in complex settings. Major report or presentation. prereq: MBA 6230, MBA student

FINA 6422. Mergers and Acquisitions. (2-4 cr.; A-F only; Every Spring) Various means for corporate managers to achieve growth through mergers/acquisitions. Leverage skills mastered in core curriculum. Examine both buyer/seller motivations in context of M&A transactions/strategic alliances. Private equity in M&A marketplace. prereq: 6241, MBA student

FINA 6500. Active Fund Management. (2-4 cr.; A-F only; Every Fall & Spring) Lectures, assignments, modules, hands-on real-money experience through Golden Gopher Growth Fund or Golden Gopher Fixed Income Fund. Prereq: [6121 or 6321], 6322, 6323, Acct 6100, MBA student, approved application: [Acct 6160 or & Acct 6160] recommended; must be taken [fall, spring] or have written approval to enroll for only one sem.


FINA 6529. Advanced Topics in Fixed Income and Derivatives. (2 cr.; A-F only; Every Fall) Economics and mechanics of derivatives. First phase focuses on theoretical and institutional foundations for various derivatives instruments and markets. Second phase is practicum in which student groups build working models of derivatives. prereq: (credit will not be granted if already received for 6541)


FINA 6801. Finance Independent Study. (1-6 cr.; max 12 cr.; A-F only; Periodic Fall & Spring) Independent study. prereq: MBA student, instr consent

FINA 8802. Theory of Capital Markets I: Discrete Time. (2 cr.; Student Option; Every Spring) Modern asset pricing theory. Static/discrete time frameworks. Fundamental asset pricing equation. Classical finance models: CAPM, consumption-based CAPM, APT. Complete markets, representative agent, Pareto optimality. Challenges to theories. Approaches such as habit formation, heterogeneous agents (incomplete markets) model. prereq: [Econ 8101, Econ 8102, business admin PhD student] or instr consent

FINA 8803. Theory of Capital Markets II: Continuous Time. (2 cr.; Student Option; Every Spring) Continuous-time financial economics. Emphasizes mathematical/statistical tools. Its processes, Girsanov's theorem, risk-neutral pricing. How to formulate/analyze continuous-time models. prereq: [Econ 8101, Econ 8102, Bbsiness admin PhD student] or instr consent

FINA 8804. Advanced Continuous Time Finance. (2 cr.; Student Option; Every Fall) Pricing of fixed income securities, optimal capital structure, general equilibrium. Classic/ current papers in continuous-time literature. prereq: 8802, 8803

FINA 8810. Topics in Asset Pricing. (2 cr.; max 4 cr.; A-F or Audit; Fall Even Year) Current topics in asset pricing literature. Students read papers on these topics, rederive the main results, identify the main assumptions and thus identify ideas on how to improve upon the current literature. prereq: Business admin Phd student or instr consent

FINA 8812. Corporate Finance I. (2 cr.; Student Option; Every Fall & Spring) Corporate control, managerial incentives, corporate governance, capital structure. What assets are collected within firm. What determines boundaries of firm. Empirical evidence in support of theoretical models. Modern theories of firm, based on incomplete contracts. How corporate finance decisions expand/limit scope of firm. prereq: [Econ 8103, Econ 8104, business admin PhD student] or instr consent

FINA 8813. Corporate Finance II. (2 cr.; Student Option; Every Fall & Spring) Theoretical corporate finance. Initial public offering, dividend policy. Financial distress and its resolution. Financial intermediation, applications of auctions in finance. prereq: [8812, business admin PhD student] or instr consent

FINA 8820. Topics in Corporate Finance. (2 cr.; max 4 cr.; A-F or Audit; Fall Odd Year) Current topics in corporate finance literature. Students read current papers, rederive the
main results, identify the main assumptions and thus identify ideas on how to improve on the current literature. prereq: Business admin PhD student or instr consent


**FINA 8823. Empirical Corporate Finance.** (; 2 cr.; Student Option; Every Spring) Current empirical research on corporate finance. Mergers/acquisitions, equity offerings, event studies, tests of market efficiency, impact of corporate governance, compensation policies, initial public offerings. prereq: 8802, 8803

**FINA 8890. Seminar: Finance Topics.** (; 2-4 cr. [max 16 cr.]; A-F only; Every Fall & Spring) Current topics/problems of interest considered in depth. Topics vary. Prereq: [(8802, 8812, 8822, 8823) or equiv], business admin student] or instr consent

**FINA 8892. Independent Study in Finance.** (; 1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Problems or developments of special interest to the student. prereq: Business admin PhD student or instr consent

**FINA 8894. Directed Research in Finance.** (; 1-8 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Individualized directed research on a project of interest to the student, approved and advised by faculty. prereq: Business admin PhD student specializing in finance or instr consent

**Financial Mathematics (FM)**

**FM 5001. Preparation for Financial Mathematics I.** (; 3 cr.; Student Option; Every Fall) Mathematics needed for MFM program. prereq: Grad MFM major or MFM program director approval

**FM 5002. Preparation for Financial Mathematics II.** (; 3 cr.; Student Option; Every Spring) Mathematics needed for MFM program. prereq: 5001, program director approval

**FM 5011. Mathematical Background for Finance I.** (; 4 cr.; Student Option; Every Fall) Mathematics needed for MFM program. Focuses on finance. prereq: [5001, 5002] with grade of at least B or [MFM program director approval, grad MFM major]

**FM 5012. Mathematical Background for Finance II.** (; 4 cr.; Student Option; Every Spring) Mathematics needed for MFM program. Focuses on finance. prereq: 5011, grad MFM major, program director approval

**FM 5021. Mathematical Theory Applied to Finance I.** (; 4 cr.; Student Option; Every Fall) Bridge between theory and application. prereq: [5011 or concurrent registration is required (or allowed) in 5011], grad MFM major, program director approval

**FM 5022. Mathematical Theory Applied to Finance II.** (; 4 cr.; Student Option; Every Spring) Bridge between theory and application. prereq: 5021, [5012 or concurrent registration is required (or allowed) in 5021], grad MFM major, program director approval

**FM 5031. A Practitioner’s Course in Finance I.** (; 4 cr.; Student Option; Every Fall) Practical course taught by industry professionals. Focuses on hands-on real-world problem solving. prereq: [5021 or concurrent registration is required (or allowed) in 5021], grad MFM major, program director approval

**FM 5032. A Practitioner’s Course in Finance II.** (; 4 cr.; Student Option; Every Spring) Taught by industry professionals. Focuses on hands-on real-world problem solving. prereq: 5031, [5022 or concurrent registration is required (or allowed) in 5022], grad MFM major, program director approval

**FM 5091. Computation, Algorithms, and Coding in Finance I.** (4 cr.; Student Option; Every Fall) Implements popular finance models and numerical techniques using mainstream computational tools/languages. prereq: Grad MFM major, program director approval

**FM 5092. Computation, Algorithms, and Coding in Finance II.** (4 cr.; Student Option; Every Spring) Implements popular finance models and numerical techniques using mainstream computational tools/languages. prereq: 5091, grad MFM major, program director approval

**FM 5990. Topics in Financial Mathematics.** (; 1-2 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) The course will focus on a special topic in quantitative finance that supplements the regular curriculum of the Master of Financial Mathematics program. The course features experts, often finance industry practitioners, who share their experience and knowledge. prereq: enrolled in the Master of Financial Mathematics program or instr consent free-time activities, careers, and the Finnish culture. prereq: 1001

**FIN 1003. Intermediate Finnish I.** (; 5 cr.; Student Option; Every Fall) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments. prereq: 1002

**FIN 1004. Intermediate Finnish II.** (; 5 cr.; Student Option; Every Spring) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments. prereq: 1003

**FIN 3011. Advanced Finnish.** (; 3 cr.; Student Option; Every Fall) Designed to help students achieve advanced proficiency in Finnish. Discussion of fiction, film, journalistic, and professional prose is complemented by grammar, vocabulary building exercises, and review of oral/written modes of communication. prereq: 1004 or 4004

**FIN 3012. Advanced Finnish.** (; 3 cr.; Student Option; Every Spring) Discussion of novels, short stories, plays, articles. Structural, stylistic, vocabulary-building exercises. prereq: 3011 or 4011

**FIN 3670. Topics in Finnish Studies.** (; 3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Interdisciplinary social science topics on Finnish people, culture, and society. In English.

**FIN 4001. Beginning Finnish for Graduate Research I.** (; 5 cr.; Student Option; Every Fall) Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include every day subjects (shopping, directions, family, food, housing, etc.). Meets concurrently with 1001.

**FIN 4002. Beginning Finnish for Graduate Research II.** (; 5 cr.; Student Option; Every Spring) Continues the presentation of all four language modalities (listening, reading, speaking, writing) with a proficiency emphasis. Topics include free-time activities, careers, and the Finnish culture. Meets concurrently with 1002.

**FIN 4003. Intermediate Finnish for Graduate Research I.** (; 5 cr.; Student Option; Every Fall) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments. Meets concurrently with 1003.

**FIN 4004. Intermediate Finnish for Graduate Research II.** (; 5 cr.; Student Option; Every Spring) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic
Fisheries and Wildlife (FW)

FW 1001. Orientation in Fisheries, Wildlife, and Conservation Biology. (1 cr.; A-F or Audit; Every Fall) Survey of technical requirements and education needed for careers in fisheries, wildlife, and conservation biology. Introduction to fields of work, problems, career opportunities.

FW 2001W. Introduction to Fisheries, Wildlife, and Conservation Biology. (ENV,Wi; 3 cr.; Student Option; Every Fall) Fish, wildlife, and other forms of biodiversity. Single species, populations, ecosystems, and landscape approaches. Experiential/interactive course. Decision-case studies. prereq: BIOL 1001 or BIOL 1009

FW 2003. Introduction to Marine Biology. (3 cr.; Student Option; Every Spring) Nature of oceans, their role sustaining life on planet. Diversity/ecology of organisms that live in coastal, deep, open seas. Effects of humans on marine life. Resilience of marine life, its importance to human society. Cultures of oceanic peoples. Selected topics. prereq: BIOL 1001 or BIOL 1009 or BIOL 2002 or ESCE 1106 or ESCE 1106 or INSTR 2116

FW 3106. Vegetation Sampling for Habitat Assessments. (1 cr.; A-F or Audit; Every Summer) Common vegetation sampling methods used for habitat assessments. Identify approximately 75 vascular plant species typical of Minnesota terrestrial and aquatic ecosystems using taxonomic keys and readily observable traits. Importance of plants for providing food, cover, and nesting habitat.

FW 3108. Field Methods in Research and Conservation of Vertebrate Populations. (3 cr.; A-F or Audit; Every Spring & Summer) Planning/implementation of research/management projects. Collect/analyze data in groups. Group/individual oral/written reports. Keep field journal. prereq: [soph, jr, sr], FW major

FW 3480. Topics in Fisheries and Wildlife. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

FW 3925. Human Dimensions of Fisheries and Wildlife Management. (3 cr.; A-F only; Every Spring) Human dimensions of fish and wildlife concerns. Theory and methods from social sciences to address challenges and issues of managing fish and wildlife resources. Integrating social science information into fish and wildlife decision-making. Guest lecturers.

FW 4001. Biometry. (4 cr.; A-F or Audit; Every Fall) This course covers the basic foundations of statistical methods. In contrast to traditional methods of teaching statistics based on analytical formulas and hand-calculations, we will initially emphasize simulation-based methods (randomization tests, bootstrapping) for analyzing data. Students will learn how to implement common statistical methods (e.g., one and two sample tests, interval estimation techniques, linear regression) in the R programming language, and gain experience analyzing real data from a variety of fields, with particular emphasis on biological examples and applications.

FW 4101. Herpetology. (4 cr.; Student Option; Spring Odd Year) Reptiles/amphibians, their systematics, behavior, ecology, physiology, development, and morphology. Diversity of reptiles/amphibians. Focuses on Minnesota fauna. Lab. prereq: BIOL 1001 or BIOL 2012

FW 4102. Principles of Conservation Biology. (ENV; 3 cr.; Student Option; Every Spring) Introduction to themes/concepts of diverse, dynamic, and interdisciplinary field. Biological/social underpinnings of conservation problems/solutions. prereq: Introductory biology course

FW 4103. Principles of Wildlife Management. (3 cr.; Student Option; Every Spring) Foundation for understanding discipline of wildlife management. Preparation for upper division wildlife courses. prereq: Intro biology course, [jr or sr]

FW 4136. Ichthyology. (4 cr.; Student Option; Every Fall) Fish biology, adaptations to different environments and modes of living, and evolutionary relationships. Laboratory emphasizes anatomy and identification of Minnesota fishes.

FW 4291. Independent Study: Fisheries. (1-5 cr.; [max 15 cr.]; Student Option; Every Fall, Spring & Summer) Individual field, library, and lab research in fisheries. prereq: instr consent

FW 4292. Special Lectures: Fisheries. (1-5 cr.; [max 15 cr.]; Student Option; Every Fall, Spring & Summer) Lectures in special fields of fisheries given by visiting scholar or regular staff member. prereq: Grad student or instr consent

FW 4301. Conservation Genetics. (3 cr.; A-F or Audit; Spring Even Year) This course introduces students to fundamental principles of population genetics and molecular phylogenetics and explores their applications to problems in the conservation, management, and restoration of biodiversity.

FW 4391. Independent Study: Wildlife. (1-5 cr.; Student Option; Every Fall, Spring & Summer) Individual field, library, and lab research in wildlife. prereq: instr consent

FW 4401. Fish Physiology and Behavior. (3 cr.; Student Option; Every Fall) Fish mechanisms/behavior. Links between fish biology, fisheries ecology, management, aquaculture. Homeostasis, neurobiology, bioenergetics, reproduction, movement. prereq: 4136, BIOL 2012, CHEM 1021 (may be taken concurrently)

FW 5003. Human Dimensions of Biological Conservation. (3 cr.; Student Option; Every Fall) Survey of social, psychological, economic, policy aspects of managing/conserving wildlife, fisheries, and related resources. prereq: [Biol 1001 or Biol 1009], Biol 3407

FW 5051. Analysis of Populations. (4 cr.; Student Option; Every Spring) Regulation, growth, general dynamics of populations. Data needed to describe populations, population growth, population models, regulatory mechanisms. prereq: [4001 or STAT 3011 or ESPM 3012], [BIOL 3407 or BIOL 3408W or BIOL 3807], Senior or grad student

FW 5136. Ichthyology. (4 cr.; Student Option; Every Fall) Fish biology, adaptations to different environments and modes of living, and evolutionary relationships. Laboratory emphasizes anatomy and identification of Minnesota fishes.

FW 5292. Special Lectures: Fisheries. (1-5 cr. [max 15 cr.]; Student Option; Every Fall & Spring) Lectures in special fields of fisheries given by visiting scholar or regular staff member. prereq: Grad student or instr consent

FW 5392. Special Lectures: Wildlife. (1-5 cr. [max 15 cr.]; Student Option; Every Fall & Spring) Lectures given by visiting scholar or staff member.

FW 5401. Fish Physiology and Behavior. (3 cr.; Student Option; Every Fall) Fish mechanisms/behavior. Links between fish biology, fisheries ecology, management, aquaculture. Homeostasis, neurobiology, bioenergetics, reproduction, movement.

FW 5459. Stream and River Ecology. (3 cr.; Student Option; Every Fall) Structure/dynamics of running waters from ecosystem perspective. Historical perspective, basic hydrology/fluvial geomorphology, terrestrial-aquatic interactions, detrital dynamics, metabolism, drift, trophic relations, biotic/abiotic interactions, ecosystem experiments and natural alterations, stability/succession, ecosystem dynamics in a watershed. prereq: Limnology course or instr consent
FW 5601. Fisheries Population Analysis. (3 cr.; A-F or Audit; Every Fall) Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management. prereq: [4001 or Stat 5021], Biol 3407, [Math 1142 or Math 1271]

FW 5603W. Habitats and Regulation of Wildlife. (WI; 3 cr.; A-F or Audit; Every Fall) Environmental interactions of wildlife at population/community levels. Environmental threats from human activities. Habitat management practices. Objectives, policies, regulations in population management. prereq: [4102 or 4103], [Biol 3407 or Biol 3408 or Biol 3807]


FW 5625. Wildlife Handling and Immobilization for Research and Management. (2 cr.; S-N or Audit; Every Spring) Practical techniques to maximize human/animal safety and encourage effective operations. Preparation procedures, legal responsibilities, capture drugs/delivery systems, safety measures, ethical issues, basic veterinary procedures for handling wildlife. Field course. Uses live animals. prereq: General biology, [grad student or vet med student or FW sr]

FW 8051. Statistical Modeling of Ecological Data using R and WinBugs/JAGS. (4 cr.; Student Option; Every Spring) Regression methods for modeling ecological data. Real world examples from ecology, as well as environmental/natural resource sciences/management. Computer-based solutions using R/Bayesian modeling software. prereq: Graduate-level statistics class, [working knowledge of program R or instr consent]

FW 8200. Seminar. (1-4 cr.; max 8 cr.; S-N or Audit; Every Fall & Spring) Oral and written student reports on selected topics from current literature in fisheries biology and management and wildlife. Lectures by and discussions with faculty and visiting specialists.

FW 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

FW 8394. Research in Fisheries. (1-4 cr.; Student Option; Every Fall, Spring & Summer) Directed research.

FW 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

FW 8452. Conservation Biology. (3 cr.; A-F or Audit; Every Fall) Seminar examining population- to system-level biological issues (genetics; demographic processes in community, ecosystem, and landscape scale interaction; restoration ecology; ex situ strategies for restoration and recovery) and societal issues (social, economic, cultural perspectives; sustainable development strategies; roles of institutions; international and U.S. policies).

FW 8459. Stream and River Ecology. (3 cr.; Student Option; Fall Even Year) Structure/dynamics of running waters from ecosystem perspective. Historical perspective, basic hydrology/fluvial geomorphology, terrestrial-aquatic interactions, detrital dynamics, metabolism, drift, trophic relations, biotic/abiotic interactions, ecosystem experiments and natural alterations, stability/succession, ecosystem dynamics in a watershed. prereq: Limnology course or instr consent

FW 8461. Advanced Topics in Fish Physiology. (1 cr.; Student Option; Periodic Fall) Lectures, discussion, current literature. Complements 5459. prereq: Vertebrate physiology course or instr consent

FW 8462. Advanced Topics in Fish Behavior. (1 cr.; Student Option; Periodic Fall & Spring) Current literature. Complements 5459. prereq: 5459 or behavior course or instr consent

FW 8465. Fish Habitats and Restoration. (3 cr.; Student Option; Fall Odd Year) Mechanisms underlying physiology/behavior that shape fish community structure in specific north temperate habitats. Techniques and planning procedures for restoring lakes/streams. prereq: Intro ecology course or instr consent

FW 8494. Research in Wildlife. (1-4 cr.; Student Option; Every Fall) Directed research. prereq: instr consent

FW 8576. Biology and Management of Large Mammals. (2 cr.; A-F or Audit; Every Fall) Ungulates. Ecology, population dynamics, energy, nutrition, predation, disease/parasites, social behavior. Research approaches, management implications/practices. Key information on North American species. prereq: [Ecology course, [wildlife, forestry, and ecology grad student]] or instr consent

FW 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

FW 8777. Thesis Credits: Master’s. (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

FW 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Food Science and Nutrition (FSCN)

FSCN 1001. Orientation to the Majors: Food Science and Nutrition. (1 cr.; S-N only; Every Fall) Advising, student opportunities, networking, what kinds of jobs will be available after graduating.

FSCN 1011. Science of Food and Cooking. (PHYS; 4 cr.; Student Option; Every Fall & Spring) Souffles, custards, sauces, coffee brewing, candy making used to examine physics/chemistry of heat transfer, foams, gels, emulsions, extractions, crystallization.

FSCN 1012. Sports Nutrition. (2 cr.; Student Option; Every Fall, Spring & Summer) Physiological function and metabolic fate of all six classes of nutrients ingested by active individuals to improve athletic performance. Impact on physiology of ergogenic aids and various dietary supplements. Overview of these components in fulfilling energy/recovery needs for continual/progressive athletic performance. Web-based course.


FSCN 1090. Topics. (1-4 cr.; Student Option; Periodic Fall & Spring) Topics in Food Science/Nutrition. Different courses semester to semester depending on what is offered. First runs of new courses, special topics, visiting lecturers may be hosted.

FSCN 1102. Food: Safety, Risks, and Technology. (CIV; 3 cr.; Student Option No Audit; Every Fall & Spring) Introduction to inherent risks/safety of food supply. Use of public policy and food technology to reduce risks. Microbiological, chemical, and environmental hazards, government/industry controls.

FSCN 1112. Principles of Nutrition. (3 cr.; Student Option; Every Fall, Spring & Summer) Fundamental concepts of nutrition, nutrient functions, human nutritional requirements, food sources. Evaluating nutrition information and food safety. Role of nutrition in chronic disease, public policy, and the environment. prereq: High school biology and chemistry
FSCN 1905. Topics: Freshman Seminar. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring) Topics vary.

FSCN 2001. Healthy Foods, Healthy Lives: A Food System Approach to Cooking. (3 cr. ; Student Option; Every Spring) Skills/resources for food choices based on nutritional, environmental, local/global societal implications. Ethical/civic themes that guide food choices. Discussion/writing on how environmental, cultural, social, health issues impact personal food choices. prereq: soph, jr, sr or instr consent

FSCN 2002. Healthy Foods, Healthy Lives - Cooking on a Student's Budget. (1 cr. ; Student Option; Every Fall & Spring) How microbes impact our world in deadly/ life-saving ways. Roles of bacteria, fungi, and viruses as agents of human diseases; in food spoilage/food borne diseases; and in food preservation/health promotion. Preventing plant diseases, food/drug production, cleaning up oil spills. Genetic engineering.

FSCN 3102. Introduction to Food Science. (; 3 cr. ; Student Option; Every Fall) Introduction to chemical/physical properties of foods. Evaluating interaction/reaction of foods due to formulation, processing, preparation. prereq: CHEM 1022 or [CHEM 1062 and CHEM 1066]

FSCN 3301. Food Choices: Healing the Earth, Healing Ourselves. (; 3 cr. ; Student Option; Every Spring) Link between our food/diet, agricultural practices, and health of planet. Food security. Cultural/personal context of food choices. Ways that food is produced, especially industrial monoculture. Food choices and the earth's bio diversity. Land use, water use, pollution, energy needs, climate change. Alternatives: organic/sustainable, fair trade. Economic policies/choices. Global tradeoffs. prereq: Jr or sr or grad student

FSCN 3480. Topics in Food Science and Nutrition. (1-4 cr. ; Student Option; Every Fall, Spring & Summer) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

FSCN 3612. Life Cycle Nutrition. (3 cr. ; Student Option; Every Fall) Nutritional changes throughout lifecycle. Pregnancy, lactation, childhood, adulthood, aging. Topics relevant to lifecycle changes (e.g., body composition, immunity, sports nutrition). prereq: CHEM 1061/1065

FSCN 3614. Nutrition Education and Counseling. (3 cr. ; Student Option; Every Fall) Effective communication skills are essential for all food and nutrition professionals whether working in clinical, community, management, or food service settings. This course is divided into two components: nutrition education and counseling. These two components will first teach the necessary knowledge and skills required of entry level dietitians such as educational theory and techniques, counseling theory and methods, interviewing techniques, and health literacy. You will also develop and practice these skills through application verbally in breakout sessions as well as written. The written component for the education section will include an interview paper; several informal activities in class which will help develop and practice skills to complete the final project of developing a nutrition education lesson plan. The syllabus will focus on the nutrition education component. prereq: 1112

FSCN 3615. Sociocultural Aspects of Food, Nutrition, and Health. (GP; 3 cr. ; A-F only; Every Spring) Sociocultural aspects of regional/cultural diversity in food preferences and food behavior, food habits, demographics, lifestyles, food consumption, and expenditures. Effect of socioeconomic status, religious beliefs, age, and cultural meaning of foods on food choices.

FSCN 3731. Food Service Operations Management Laboratory. (; 2 cr. ; A-F or Audit; Every Fall) Experience in managing a food service operation. On- and off-campus commercial and institutional restaurants used as labs. Required field trips, prereq: [3102 or concurrent registration is required (or allowed) in 3102], [3732 or concurrent registration is required (or allowed) in 3732]

FSCN 3732. Food Service Operations Management. (; 3 cr. ; A-F or Audit; Every Fall) Planning, preparing, delivering, serving, managing foods served away from home.

FSCN 4096. Professional Experience Program: Internship. (1-4 cr. ; max 24 cr. ; A-F only; Every Fall, Spring & Summer) Apply knowledge from Food Science BS or Nutrition BS program to real-life problems in professional internship. Performance evaluated for credit. prereq: To register, students must fill out FScN Internship Agreement form, available at http://fscn.cfans.umn.edu. Contact fscnug@umn.edu with questions.

FSCN 4112. Food Chemistry and Functional Foods. (3 cr. ; Student Option; Every Fall) Most important food constituents, their occurrence, structures, functional properties, and health benefits. Proteins, lipids, carbohydrates, water. Vitamins, minerals, enzymes, phytochemicals, food additives, contaminants. prereq: 3102, BIOC 3021

FSCN 4121. Food Microbiology. (; 3 cr. ; Student Option No Audit; Every Spring) Microorganisms involved in food-borne disease, food fermentations, and food spoilage. Methods for their control/detection. Food microbiology. Foodborne pathogens. Microbial food spoilage. Control of microorganisms in food. prereq: BIOC 3021, [2031 or VBS 2032 or MCB 3301]

FSCN 4122. Food Fermentations and Biotechnology. (; 2 cr. ; Student Option; Every Fall) Major food fermentations important for food industry. Microbiological components. Impact of biotechnology on food production. Genetic tools. Improvement of microbes used in food production by biotechnological approaches. prereq: [MCB 3301, BIOL 4003] or instr consent


FSCN 4311. Food Quality. (; 3 cr. ; Student Option; Every Fall) This course is designed to give students an overview of the management systems, statistical procedures, and regulatory requirements involved with producing quality food and ingredients. The course material includes risk assessment and management, good manufacturing practices, hazard analysis critical control point (HACCP), statistical methods for process control, total quality management, and food and drug laws. The course is intended primarily for upper division undergraduates majoring in food science. prereq: jr

FSCN 4210. Topics in Food Science and Nutrition. (; 1-4 cr. ; max 8 cr. ; Student Option; Every Summer) In-depth investigation of specific topic in nutrition/food science not yet covered by other courses, topic announced in advance. prereq: instr consent

FSCN 4291. Independent Study. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer) Individual lab or library research in an area related to food science or nutrition. prereq: Undergrads, instr consent

FSCN 4311. Chemical Reactions in Food Systems. (; 2 cr. ; Student Option; Every Spring) Chemical structure of major food constituents, carbohydrates, lipid, and proteins. Reaction/interaction pathways. Function within complex food matrix under various storage/processing conditions. prereq: 4112, 4312W

FSCN 4312W. Food Analysis. (WI; 4 cr. ; Student Option; Every Fall) The course covers major analytical tools needed for any investigation in food science and technology, whether by the food industry, governmental agencies, or universities. Specifically, the course covers: application of quantitative and qualitative physical, chemical, and instrumental methods used for analysis and examination of food constituents, ingredients, and products; sensory evaluation
techniques; and evaluation of methods and interpretation of results. The course covers methods used for: compositional analysis of foods; chemical characterization of foods and food constituents; and spectroscopic, chromatographic, and spectrometric analysis used for the detection, identification, and quantification of food macro- and micro-components. In this course the students will learn to identify the appropriate methods of analysis based on the investigation purpose, either nutrition labeling, quality control, product development, or scientific research. prereq: FSCN 4112

FSCN 4332. Food Processing Operations. (3 cr.; A-F or Audit; Periodic Fall & Spring) Engineering principles applied to commonly used food processing operations. Blanching, pasteurization, sterilization, frying, baking, milling, extrusion. Meat processing, water treatment, waste management. prereq: 4331 or BAE 4744

FSCN 4349. Food Science Capstone. (2 cr.; A-F only; Every Fall & Spring) Planning of process or product development project. Defining goals, preparing/following time line, reviewing literature, coordinating with experts, procuring supplies, writing progress reports. Determining ingredient specifications, lab/pilot plant production. Chemical, microbiological, sensory testing. Oral/written presentations. prereq: 4112, 4121, 4131, 4312, 4332, BBE 4744, Food Science Major, senior

FSCN 4481. Sensory Evaluation of Food Quality. (1 cr.; A-F only; Every Spring) Fundamentals of sensory perception. Test designs and methods used in studying sensory qualities of foods and consumer responses to foods. prereq: 3102, Stat 3011

FSCN 4612. Advanced Human Nutrition. (4 cr.; Student Option; Every Fall) Advanced study of digestion/absorption of nutrients. Research techniques in nutrition, including human/epidemiological studies. Health promotion, disease prevention theories. prereq: 1112, [CHEM 1022 or CHEM 1062 and CHEM 1066, [BioC 3021 or PHSL 3051 or ANSC 3301 or BIOL 3211]

FSCN 4613. Experimental Nutrition. (2 cr.; Student Option; Every Spring) Lab in chemical/biochemical methods of analysis of nutritional status. prereq: 4612, BioC 3021, Stat 3011

FSCN 4614. Community Nutrition. (DSJ; SOCS; 3 cr.; A-F only; Every Spring) Nutrition risks associated with different age, sex, ethnic, and socioeconomic groups. Community needs assessment. Program planning and evaluation. Programs developed to address the needs and interests of people at different stages of the life cycle, ethnic or cultural backgrounds, and literacy levels. prereq: FSCN 1112

FSCN 4621W. Nutrition and Metabolism. (WI; 4 cr.; Student Option; Every Fall) Carbohydrate, lipid, protein metabolism. Uses systems/holistic approach to emphasize how metabolic pathways interrelate. prereq: 4612, BioC 3021, ANSC 3301. If a prerequisite is missing, students must obtain approval from academic adviser or course instructor in order to enroll.

FSCN 4622. Nutritional Toxicology, the basic science of diet-related toxicants. (3 cr.; A-F only; Every Spring) Concepts of toxicology. Molecular mechanism behind dietary chemical-induced toxicities. Impact/risk of dietary chemicals for human health. prereq: BioC 3021; designed for students majoring in [nutrition or food science or toxicology]

FSCN 4664. Senior Capstone: Becoming a Registered Dietitian. (1 cr.; S-N or Audit; Every Fall) Preparation for advancement in career as registered dietitian, including completion of dietetic internship application. Current issues in dietetics. prereq: [4665 or concurrent registration is required (or allowed) in 4665], Nutrition/dietetics subplan of nutrition major or instr consent

FSCN 4665. Medical Nutrition Therapy I. (3 cr.; A-F or Audit; Every Fall) Nutrition assessment and support. Pathology, management, and nutrition therapy for disorders of the gastrointestinal, immune, and pulmonary systems, and cancer. prereq: 4612, Phil 3051, BioC 3021

FSCN 4666. Medical Nutrition Therapy II. (3 cr.; A-F or Audit; Every Spring) Pathology, management, and nutrition therapy for disorders of the cardiovascular, endocrine, urinary, and neuromuscular and skeletal systems. Nutrition intervention for inborn errors of metabolism, and eating disorders and obesity. prereq: FSCN 4665

FSCN 4667. Senior Seminar for the Didactic Program in Dietetics. (2 cr.; S-N only; Every Fall) Preparation for advancement in career as registered dietitian, including completion of dietetic internship application. Current issues in dietetics. prereq: Senior Nutrition Major with DPD subplan, [FSCN 4665 or concurrent registration is required (or allowed) in 4665], FSCN 4667. Medical Nutrition Therapy I.

FSCN 4732. Food and Nutrition Management. (3 cr.; A-F or Audit; Every Spring) Financial and human resource management applied to a variety of business and institutional settings. Field trips may be required. prereq: 3732

FSCN 5122. Food Fermentations and Biotechnology. (2 cr.; A-F only; Every Fall) Major food fermentations important for today's food industry, with particular focus on microbiological components. Fermentations cover all major commodity food groups of dairy, cereal, meat, vegetables, fruits. prereq: MICB 3301, BIOL 4003

FSCN 5123. Molecular Biology for Applied Scientists. (1 cr.; A-F only; Every Fall) Half semester course. Two hours per week for 8 weeks. Basics of molecular biology/ how it has been used for biotechnological applications. Origins of molecular biology from discovery of DNA as inheritance material within cells to advent of gene cloning/sequencing technologies. prereq: MICB 3301 or FSCN 2021 or instr consent

FSCN 5131. Food Quality for Graduate Credit. (3 cr.; A-F only; Every Fall) Management systems, statistical procedures, regulatory requirements involved with producing quality food/ingredients. Risk assessment/management, good manufacturing practices, hazard analysis critical control point (HACCP), statistical methods for process control, total quality management, food/drug laws. prereq: Food Science grad student

FSCN 5312. Food Analysis. (4 cr.; A-F only; Every Fall) Analytical tools needed for investigation in Food Science/Technology, whether by food industry, governmental agencies, or universities. Application of quantitative/ qualitative physical, chemical/instrumental methods used for analysis/examination of food constituents. Sensory evaluation techniques, evaluation of methods/interpretation of results. prereq: 4112, Stat 3011

FSCN 5441. Introduction to New Product Development. (2 cr.; Student Option; Fall Even, Spring Odd Year) Interactive course that introduces students to the principles of new product development, from identification and testing of new product concepts, through prototype testing, to basic process design using examples from industry. prereq: 4111, 4331

FSCN 5461. Food Packaging. (2 cr.; Student Option; Fall Odd Year) Materials, principles, and procedures of packaging as they apply to food products. Emphasis is on consumer products, but the principles also apply to bulk and institutional foods and ingredients. prereq: 1102, 3102, Phys 1102 or Phys 1302


FSCN 5521. Flavor Technology. (2 cr.; Student Option; Spring Even Year) Overview of flavor chemistry/related technology. Analytical techniques, mechanisms of flavor development (chemical/biogenesis), off-flavors, industrial production/application of food flavorings. prereq: 4112

FSCN 5541. Dairy Product Chemistry and Technology. (2 cr.; Student Option; Fall Odd Year) Designed for upper division Food Science undergraduate/graduate students. Physiology of milk production in ruminants. Resulting composition. Chemical, physical, microbiological properties of milk components. How milk products are manufactured. prereq:
FSCN 5601. Management of Eating Disorders. (3 cr.; Student Option; Every Fall & Spring)
Etiology, occurrence, course, treatment, prevention of eating disorders from a multidisciplinary perspective. Roles and responsibilities of eating disorder treatment team members of varying types across various treatment milieus. Prereq: Junior, senior or graduate student in nutrition or health related program or instructor consent.

FSCN 8310. General Seminar. (1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Presentations by faculty, graduate students, and outside speakers. prereq: instr consent

FSCN 8318. Current Issues in Food Science. (2 cr. [max 4 cr.]; A-F or Audit; Every Spring)
Current issues in Food Science and how they impact the food industry. Prerequisites: FSCN 4112, FSCN 4121, Department Consent.

FSCN 8320. Advanced Topics in Food Science. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Recent research or special topics.

FSCN 8330. Research Topics. (1 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Seminar in which faculty member or group of faculty/graduate students discuss research progress or review/discuss current research literature.

FSCN 8331. Food Proteins. (2 cr.; Student Option; Spring Even Year)
Protein biochemistry as applied to food systems/processing. Forces that determine protein structure. Isolation/characterization of food proteins. Structure/function relationships in handling/processing food protein systems. prereq: 4112, 4312

FSCN 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description. prereq: Master’s student, adviser and DGS consent

FSCN 8335. Carbohydrate Chemistry in Food and Nutrition. (2 cr.; Student Option; Every Spring)
Carbohydrates as food components, their use as food ingredients. Reactions of mono/di/polysaccharides during food processing. Biosynthesis of carbohydrates, their metabolism. Methods in carbohydrate analysis. prereq: 4112

FSCN 8336. Lipid Chemistry and Rancidity of Foods. (2 cr.; Student Option; Periodic Fall)
Chemistry of food lipid oxidation/rancidification. Protective functions of antioxidants. prereq: 4112

FSCN 8337. Flavor Chemistry. (2 cr.; Student Option; Periodic Fall)
Chemistry involved in formation, analysis, and release of flavoring materials in foods. prereq: 4111

FSCN 8338. Antioxidants in Food: Practical Applications. (2 cr.; Student Option; Every Spring)
Mechanisms of antioxidant activities in food systems. Free radical scavengers, hydroperoxide stabilizers, synergists, metal chelators, singlet oxygen quenchers, substance reducing hydroperoxides. Practical applications of antioxidants in various food systems, effect of antioxidants on health/diseases. prereq: 4111, Bioc 3021, food chemistry, organic chemistry, biochemistry

FSCN 8391. Independent Study: Food Science. (1-4 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Includes written reports. prereq: instr consent

FSCN 8444. FTE: Doctoral. (1 cr.: No Grade Associated; Every Fall, Spring & Summer)
No description. prereq: Doctoral student, adviser and DGS consent

FSCN 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

FSCN 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
No description. prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

FSCN 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
No description. prereq: Max 18 cr per semester or summer; 24 cr required

Food Systems (FDSY)

FDSY 1901. Topics: Freshman Seminar. (ENV; 3 cr.; Student Option; Periodic Fall)
Topics specified in Class Schedule.

FDSY 1902. Topics: Freshman Seminar. (DSJ; 3 cr.; Student Option; Every Fall)
Topics vary.

FDSY 2101. Plant Production Systems. (3 cr.; Student Option; Every Spring)
How food production systems fit within overall food system. Fundamentals of soils, plant nutrition, plant production metabolites as they affect food production systems. Decisions that differentiate among conventional sustainable/organic systems. prereq: College level general biology course or Hort 1001 or instr consent

FDSY 2102. Diversity of Agricultural Production Systems. (3 cr.; A-F only; Every Summer)
Examination of agricultural production systems, including organic, alternative, conventional systems. History of production systems/implications for producer lifestyles, social/natural environments, economics at local to global scales. Farm visits, producer interviews, group projects, classroom presentations.

FDSY 4101. Holistic Approaches to Improving Food Systems Sustainability. (3 cr.; A-F only; Every Spring)
Capstone course introduces soft-systems methodology (SSM). In strongly experiential/community-engaged learning environment, students will address sustainability challenges/opportunities in local food systems. prereq: [ApEc 3202, BBE 3201, 2101] or instr consent

Foreign Study (FOST)

FOST 1040. Study Abroad. (1-32 cr. [max 128 cr.]; Student Option; Every Fall, Spring & Summer)
Course used to grant credit for a new study abroad course or program that, by the time recruiting begins, has not had time to go through the normal approval process.

FOST 1201. Study Abroad. (1-32 cr.; Student Option;)

FOST 1202. Study Abroad. (1-32 cr.; Student Option; Every Fall, Spring & Summer)
Not published in catalog. prereq: dept consent

FOST 1203. Study Abroad. (1-32 cr.; Student Option; Every Fall, Spring & Summer)
Not published in course catalog. prereq: dept consent

FOST 1204. Study Abroad. (1-32 cr.; Student Option; Every Fall, Spring & Summer)
Not published in catalog. prereq: dept consent

FOST 1205. Study Abroad. (1-32 cr.; Student Option; Every Fall, Spring & Summer)
Not published in catalog. prereq: dept consent

FOST 1206. Study Abroad. (1-32 cr.; Student Option; Periodic Fall)
Not published in catalog. prereq: dept consent

FOST 1207. Study Abroad. (1-32 cr.; Student Option; Periodic Fall)
Not published in catalog. prereq: dept consent

FOST 1208. Study Abroad. (1-32 cr.; Student Option; Periodic Fall)
Not published in course catalog. prereq: dept consent

FOST 1209. Study Abroad. (1-32 cr.; Student Option; Periodic Fall)
Not published in catalog. prereq: dept consent

FOST 1400. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in Cultural Diversity. prereq: dept consent

FOST 1410. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in Cultural Diversity. prereq: dept consent
FOST 1420. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in The Environment. prereq: dept consent

FOST 1430. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in International Perspectives. prereq: dept consent

FOST 1440. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Cultural Diversity and Citizenship and Public Ethics. prereq: dept consent

FOST 1450. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
N/A prereq: dept consent

FOST 1460. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Cultural Diversity and International Perspectives. prereq: dept consent

FOST 1470. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Citizenship and Public Ethics and The Environment. prereq: dept consent

FOST 1480. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Citizenship and Public Ethics and International Perspectives. prereq: dept consent

FOST 1490. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in The Environment and International Perspectives. prereq: dept consent

FOST 1495. Study Abroad Course. (; 1-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

FOST 1500. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in Arts and Humanities. prereq: dept consent

FOST 1510. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Biological Science with Lab. prereq: dept consent

FOST 1520. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Biological Science without Lab. prereq: dept consent

FOST 1530. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Historical Perspective. prereq: dept consent

FOST 1540. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Literature. prereq: dept consent

FOST 1550. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Mathematical Thinking. prereq: dept consent

FOST 1560. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Philosophical Perspective. prereq: dept consent

FOST 1570. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Physical Science with Lab. prereq: dept consent

FOST 1580. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Physical Science without Lab. prereq: dept consent

FOST 1590. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Historical Perspective and a Designated Theme in Cultural Diversity. prereq: dept consent

FOST 1710. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Visual or Performing Arts. prereq: dept consent

FOST 1720. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Historical Perspective and a Designated Theme in Cultural Diversity. prereq: dept consent

FOST 1730. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Social Science and Cultural Diversity. prereq: dept consent

FOST 1740. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Arts and Humanities and a Designated Theme in Citizenship and Public Ethics. prereq: dept consent

FOST 1750. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Arts and Humanities and a Designated Theme in Cultural Diversity. prereq: dept consent

FOST 1760. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Biological Science with Lab and a Designated Theme in Citizenship and Public Ethics. prereq: dept consent

FOST 1770. Study Abroad. (; 1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a diversified core in Biological Science with Lab and a Designated Theme in Social Science. prereq: dept consent
FOST 1780. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Philosophical Perspective and a designated Theme in Citizenship and Public Ethics. prereq: dept consent

FOST 1790. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and Citizenship and Public Ethics. prereq: dept consent

FOST 1800. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Biological Science with a Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 1810. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Biological Science without Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 1820. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Biological Science with a Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 1830. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective and a Designated Theme in The Environment. prereq: dept consent

FOST 1840. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Physical Science with Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 1850. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Physical Science without Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 1860. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and a Designated Theme in The Environment. prereq: dept consent

FOST 1870. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and a Designated Theme in International Perspectives. prereq: dept consent

FOST 1880. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall & Spring)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective and a Designated Theme in International Perspectives. prereq: dept consent

FOST 1890. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall & Spring)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in International Perspectives. prereq: dept consent

FOST 1900. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective and a Designated Theme in International Perspectives. prereq: dept consent

FOST 1910. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Visual and Performing arts and a Designated Theme in International Perspectives. prereq: dept consent

FOST 1920. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3000. Study Abroad: Outside Program. (0-20 cr. [max 200 cr.]; S-N only; Every Fall, Spring & Summer)
Study abroad outside program placeholder course. prereq: dept consent

FOST 3010. Directed Study Abroad. (0-18 cr. [max 180 cr.]; S-N only; Every Fall, Spring & Summer)

FOST 3020. Exchange Study Abroad. (0-18 cr. [max 40 cr.]; S-N only; Every Fall, Spring & Summer)
N/A prereq: dept consent

FOST 3021. Study Abroad: Bilateral Exchange Program. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

FOST 3022. Study Abroad: China Center Exchange Program. (0-20 cr. [max 40 cr.]; S-N only; Every Fall, Spring & Summer)
Study abroad course

FOST 3023. Study Abroad: CSE Exchange Program. (0-20 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course

FOST 3024. Study Abroad: Collegiate Exchange Programs. (0-20 cr. [max 40 cr.]; S-N only; Every Fall, Spring & Summer)
study abroad course

FOST 3025. Study Abroad: Scholarship / IRSEP Exchange Program. (0-20 cr. [max 40 cr.]; S-N only; Every Fall, Spring & Summer)
Study abroad course

FOST 3026. Study Abroad: ISEP Exchange Program. (0-20 cr. [max 40 cr.]; S-N only; Every Fall, Spring & Summer)
Study abroad course

FOST 3027. Study Abroad: Departmental Affiliated Program. (0-20 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad placeholder course.

FOST 3028. Study Abroad: AC China Flagship Capstone Year Program. (0-20 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad placeholder course

FOST 3040. Study Abroad. (1-32 cr. ; A-F only; Every Fall, Spring & Summer)
Course used to grant credit for a new study abroad course or program that, by the time recruiting begins, has not had time to go through the normal approval process. prereq: dept consent

FOST 3050. Study Abroad Through UMN System. (0-32 cr. ; Student Option; Every Fall, Spring & Summer)
Study abroad through program sponsored by Duluth,Morris, or Crookston campus. prereq: dept consent

FOST 3060. Global Seminar. (3 cr. [max 9 cr.]; A-F only; Every Spring & Summer)
Short term study abroad program during May Session or winter break.

FOST 3110. HECUA-Sponsored Study Abroad Programs. (1-20 cr. [max 80 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad through Higher Education Consortium for Urban Affairs. prereq: dept consent

FOST 3111. Study Abroad: International Chinese Language Program. (0-20 cr. [max 212
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Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

**FOST 3290. University Study in New Zealand.** (1-20 cr. [max 60 cr.]; A-F only; Every Fall & Spring)

**FOST 3295. Study and Internships in Syndy Program.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3305. Study Abroad: Turkey.** (0-20 cr. [max 120 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

**FOST 3306. Study Abroad: Study and Internships in Madrid.** (0-20 cr. [max 60 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad placeholder course.

**FOST 3310. Study Abroad in Montpellier.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Semester or year at Universit? Paul Val?ry, Montpellier, France, sponsored by Global Campus and the Department of French and Italian. Students take regular courses or special courses for foreigners. All courses taught entirely in French by Paul Val?ry faculty. Many disciplines available. prereq: dept consent

**FOST 3315. Study Abroad: MSID Ecuador Program.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3316. Study Abroad: Health and Society in Ecuador.** (0-20 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

**FOST 3320. International Program in Toledo, Spain.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall, Spring & Summer)
Study through International Program of Spanish, European, and Latin American Studies in Toledo, Spain. prereq: dept consent

**FOST 3325. Study Abroad: MSID India.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3326. Study Abroad: MSID Thailand.** (0-20 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course

**FOST 3330. Study Abroad in Venezuela.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall, Spring & Summer)
Semester or summer study in Venezuela through a University of Minnesota program administered by Learning Abroad Center and VENUSA. Spanish language, Venezuelan/Latin American studies. prereq: dept consent

**FOST 3335. Study Abroad: MSID Kenya.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3340. Study Abroad in London.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course.

**FOST 3345. Study Abroad: MSID Senegal.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3350. University Study in Australia.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Not listed in catalog.

**FOST 3355. Study Abroad: University Study in Israel Program.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3360. University Study in the United Kingdom.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Not printed in catalog.

**FOST 3365. Study Abroad: University Study in South Africa Program.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3370. Study Abroad Through InterStudy.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Study abroad program cosponsored by InterStudy and the University.

**FOST 3375. Study Abroad: University Study in South Korea Program.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3380. Study Abroad: American University Cairo.** (0-21 cr. [max 42 cr.]; A-F only; Every Fall, Spring & Summer)
Placeholder course for students studying at American University Cairo.

**FOST 3385. Study Abroad in Tanzania Program.** (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

**FOST 3390. Study Abroad: GlobaLinks, Austrelearn.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Study abroad program sponsored by Austrelearn and approved by University of Minnesota.

**FOST 3391. Study Abroad: GlobaLinks, AsiaLearn.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Study abroad program approved by AsiaLearn and approved by University of Minnesota.

**FOST 3392. Study Abroad: GlobaLinks, EuroLearn.** (1-20 cr. [max 120 cr.]; A-F only; Every Fall & Spring)
Study abroad program sponsored by EuroLearn and approved by University of Minnesota.

**FOST 3400. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in Cultural Diversity. prereq: dept consent

**FOST 3410. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

**FOST 3420. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in Citizenship and Public Ethics. prereq: dept consent

**FOST 3430. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Designated Theme in International Perspectives. prereq: dept consent

**FOST 3440. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Cultural Diversity and Citizenship and Public Ethics. prereq: dept consent

**FOST 3450. Study Abroad.** (1-10 cr.; Student Option; Every Fall, Spring & Summer)
N/A prereq: dept consent

**FOST 3460. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Cultural Diversity and International Perspectives. prereq: dept consent

**FOST 3470. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Citizenship and Public Ethics and The Environment. prereq: dept consent

**FOST 3480. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in Citizenship and Public Ethics and International Perspectives. prereq: dept consent

**FOST 3490. Study Abroad.** (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as two Designated Themes, in The Environment and International Perspectives. prereq: dept consent

**FOST 3495. Study Abroad Course.** (1-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.
FOST 3500. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Arts and Humanities. prereq: dept consent

FOST 3510. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) N/A prereq: dept consent

FOST 3520. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Biological Science without Lab. prereq: dept consent

FOST 3530. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective. prereq: dept consent

FOST 3540. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Literature. prereq: dept consent

FOST 3550. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Mathematical Thinking. prereq: dept consent

FOST 3560. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Philosophical Perspective. prereq: dept consent

FOST 3570. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Physical Science with Lab. prereq: dept consent

FOST 3580. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Physical Science without Lab. prereq: dept consent

FOST 3590. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science. prereq: dept consent

FOST 3600. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Visual or Performing Arts. prereq: dept consent

FOST 3710. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Cultural Diversity. prereq: dept consent

FOST 3720. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective and a Designated Theme in Cultural Diversity. prereq: dept consent

FOST 3730. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Study Abroad prereq: dept consent

FOST 3740. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective and a Designated Theme in Citizenship and Public Ethics. prereq: dept consent

FOST 3750. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and Cultural Diversity. prereq: dept consent

FOST 3760. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Biological Science with a Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 3780. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Physical Science with Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 3800. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Biological Science without Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 3840. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Physical Science with Lab and a Designated Theme in The Environment. prereq: dept consent

FOST 3850. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Historical Perspective and a Designated Theme in Citizenship and Public Ethics. prereq: dept consent

FOST 3860. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer) Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and Citizenship and Public Ethics. prereq: dept consent

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requirements as a diversified Core in Social Science and a Designated Theme in The Environment. prereq: dept consent

FOST 3870. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Arts and Humanities and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3880. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Philosophical Perspective and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3890. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Literature and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3900. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Social Science and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3920. Study Abroad. (1-10 cr. [max 30 cr.]; Student Option; Every Fall, Spring & Summer)
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Visual and Performing Arts and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3991. Study Abroad: SOR London Semester & Quarter Programs. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

FOST 3993. Study Abroad: SOR CAPA Sydney. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

FOST 3994. Study Abroad: SOR CAPA Australian Catholic University. (0-20 cr.
Course taken through study abroad that counts toward the Liberal Education graduation requirements as a Diversified Core in Arts and Humanities and a Designated Theme in International Perspectives. prereq: dept consent

FOST 3995. Study Abroad: SOR DIS. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

FOST 3996. Study Abroad: SOR GlobaLinks. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

FOST 3997. Study Abroad: SOR Rome. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course

FOST 3998. Study Abroad: SOR SFS. (0-20 cr. [max 60 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

FOST 3999. Study Abroad. (1-20 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

FOST 5010. Study Abroad Directed Study placeholder course. (0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

FOST 5020. Global Experience Program. (0-6 cr. [max 18 cr.]; Student Option; Every Fall & Summer)
The course is used to award credit for work successfully completed on the Global Experience Program study abroad internship program. Evaluation standards and work load are determined by the graduate faculty member who signs the Global Experience Program learning contract required of each participant. Number of contact hours varies from location to location. prereq: Must have graduate student status

Foreign Study - SPAN (FSSP)

FSSP 5960. Preparatory Seminar for SPAN Overseas Research. (4 cr.; A-F or Audit; Every Summer)
Preparatory seminar for SPAN overseas research. prereq: dept consent

FSSP 5970W. Seminar for SPAN Overseas Research. (WI; 4 cr.; A-F or Audit; Every Summer)
Seminar for SPAN overseas research. prereq: dept consent

Forest and Natural Res. Mgmt. (FNRM)

FNRM 1001. Orientation and Information Systems. (1 cr.; A-F or Audit; Every Fall)
Forest resources, recreation resource management, urban forestry programs. Forestry and natural resource careers.

Qualification requirements for government positions, competencies, internships, and experiences to compete for jobs in industry.
Course planning, mentoring, alumni contacts. Leadership, organization, process. Lab equipment/software, GUs, the Internet, spreadsheets, Lumina, periodical indexes.

FNRM 1101. Dendrology: Identifying Forest Trees and Shrubs. (3 cr.; Student Option; Every Fall)
Identification nomenclature, classification, and distribution of common/important forest trees/shrubs. Use of keys. Field/lab methods of identification.

FNRM 1901. Freshman Seminar. (ENV; 1-3 cr.; Student Option; Every Fall & Spring)
In-depth study of issues/topics related to natural resources and the environment. Topics vary each semester. prereq: freshman

FNRM 2101. Identifying Forest Plants. (1 cr.; A-F or Audit; Every Summer)
Field identification of common northwoods trees, shrubs, and nonwoody vascular plants. Emphasizes concept of plant communities, soil site relationships, and wildlife values. Taught at Cloquet Forestry Center.

FNRM 2102. Northern Forests Field Ecology. (2 cr.; A-F or Audit; Every Summer)
Field examination of natural history of northern/boreal forests with respect to soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology. Taught at the Cloquet Forestry Center. prereq: Biol 1001 or Biol 1009

FNRM 2104. Measuring Forest Resources. (1 cr.; A-F or Audit; Every Summer)
Introduction to land survey, tree/forest stand measurement (mensuration), and forest sampling techniques. Taught at Cloquet Forestry Center.

FNRM 3101. Park and Protected Area Tourism. (3 cr.; A-F or Audit; Fall Odd Year)
Interaction of resource based tourism with cultural/natural environments. Impacts of tourism on environment.

FNRM 3104. Forest Ecology. (4 cr.; A-F or Audit; Every Fall)
Form and function of forests as ecological systems. Characteristics and dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions focus on research topics in forest ecology, exercises applying course concepts, and current issues in forest resource management. Required weekend field trip. Prereq: Biol 1001, 1009 or equivalent introductory biology course; 1 semester college chemistry recommended.

FNRM 3114. Hydrology and Watershed Management. (3 cr.; Student Option; Every Fall)
Hydrologic cycle and water processes in upland/riparian systems. Applications of hydrological concepts to evaluate impacts of forest and land management activities.
on water yield, streamflow, groundwater erosion, sedimentation, and water quality. Concepts, principles, and applications of riparian/watershed management. Regional/ national/global examples. Forest ecosystems. prereq: [BIOL 1001 or BIOL 1009], [CHEM 1015, CHEM 1017] or CHEM 1021], MATH 1151] or instr consent

**FNRM 3131. Geographical Information Systems (GIS) for Natural Resources.** (TS; 4 cr.: A-F only; Every Fall & Spring)
Spatial data development/analysis in science/ management of natural resources. Data structures/sources/collection/quality. Geodesy, map projections, spatial/tabular data analysis. Digital terrain analysis, cartographic modeling, modeling perspectives, limits of technology. Lab exercises. Both onsite and fully online options for course enrollment. prereq: Soph or jr or sr or UHP fr

**FNRM 3201. Introduction to Travel and Tourism.** (3 cr.: A-F only; Every Spring)
Travel/tourism is one of the world's largest industries. Course introduces the nature, structure, and complexity of the industry. Begins with overview of travel/tourism? definition, evolution of travel/tourism, and magnitude globally. Examine types and functions of various sectors, tourism distribution system and role of various stakeholders in creation/delivery of tourism. Explore motivations for travel as means of understanding demand for tourism.

**FNRM 3203. Forest Fire and Disturbance Ecology.** (3 cr.: A-F or Audit; Every Spring)
Ecology, history, management, control of fire, wind, insect infestation, deer browsing, other disturbances in forests, including disturbance regimes of boreal, northern hardwood, savannas of North America. Influence of disturbance on wildlife habitat, urban/wildland interfaces, forest management, stand/landscape dynamics. Tree mortality in fires, successional patterns created by fires, interactions of life history traits of plants with disturbances.

**FNRM 3204. Landscape Ecology and Management.** (3 cr.: A-F or Audit; Every Fall)
Introduction to landscape ecology at different scales in time/space. Development/implications of broad-scale patterns of ecological phenomena, role of disturbance in ecosystems, characteristic spatial/temporal scales of ecological events. Principles of landscape ecology as framework for landscape research, analysis, conservation, and management. prereq: Ecology course

**FNRM 3205. Productivity and Ecology of Forest Soils.** (3 cr.: Student Option; Every Fall)
Soil-site factors affecting plant/wildlife communities. Site quality estimation, site modification/enhancement. Effects of forest management and other human-related disturbances on forest soil functions. prereq: Soil 1125 or Soil 2125 or instructor consent

**FNRM 3206. Park and Protected Area Management Field Studies.** (2 cr. [max 3 cr.]; A-F only; Every Summer)
Directed field study of park/protected areas. Recreation planning/visitor management, cultural/natural resource management, nature-based tourism management, resource interpretation. Communication across local, state, federal, tribal park, protected areas in northern Minnesota. prereq: Sophomore status or higher

**FNRM 3218. Measuring and Modeling Forests.** (3 cr.: A-F or Audit; Every Spring)
Sampling design, survey techniques to assess resource conditions. Applying metrics/sampling methods to forest vegetation. Calculating tree/ stand volume. Modeling approaches. Case studies of modeling to project future growth. Landscape processes, characterization, modeling. prereq: [ESPM 3012 or STAT 3011], MATH 1151

**FNRM 3262. Remote Sensing and Geospatial Analysis of Natural Resources and Environment.** (3 cr.: Student Option; Every Fall)
Introductory principles and techniques of remote sensing and geospatial analysis applied to mapping and monitoring land and water resources from local to global scales. Examples of applications include: Land cover mapping and change detection, forest and natural resource inventory, water quality monitoring, and global change analysis. The lab provides hands-on experience working with satellite and aerial imagery and image processing methods and software. Prior coursework in Geographic Information Systems and introductory statistics is recommended.

**FNRM 3411. Managing Forest Ecosystems: Silviculture.** (3 cr.: Student Option; Every Fall)
Management of forest ecosystems for sustaining ecological integrity, soil productivity, water quality, wildlife habitat, biological diversity, commodity production in landscape context. Silvics, forest dynamics, disturbances, regeneration, restoration, silvicultural systems. Ramifications of management choices. Weekend field trip. FEMC track students should take FNRM 5413 concurrently.

**FNRM 3431. Timber Harvesting and Road Planning.** (2 cr.: Student Option; Every Spring)
Introduction to forest operations. Terminology, basic engineering, equipment and harvesting system options, productivity/costs. Relationship to forest management and silviculture. Road planning, forest management guidelines, approaches for mitigating potential impacts to soil/water resources. Environmental implications of method/equipment choices. Selling timber. Sale design, layout, and administration. Two all-day field trips. prereq: FNRM 3411 or instr consent

**FNRM 3471. Forest Planning and Management.** (3 cr.: A-F or Audit; Every Fall)
Management science as applied to forest decision-making to help develop better forest management plans. Helps students develop a basic understanding of common analytical tools from operations research and how they are applied to forestry problems to help explore many potential solutions. Also reviews traditional approaches based on simulation. Emphasizes trade-off information, interpretation of model results, and linkages between stand-level economic analysis and forest-wide planning. Reviews recent modeling efforts in Minnesota. Includes synthesis of information from multiple natural resource disciplines. Guest speakers demonstrate value of analyses in planning. Emphasizes homework assignments with some group work. An individual project requires an informal class presentation. prereq: recommended ESPM 3261 and [3218 or 3411]

**FNRM 3501. Arboriculture: Selection and Maintenance of Trees.** (3 cr.: Student Option; Every Spring)
Selection, growth, propagation, and maintenance of trees for urban spaces. Tree selection, site preparation, plant health care management. Prevention, diagnosis, and remediation of urban tree risks such as insects, pathogens, pollution, development, and climate change.

**FNRM 4232W. Managing Recreational Lands.** (WI; 4 cr.: A-F or Audit; Every Spring)

**FNRM 4293. Directed Study.** (1-5 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)
Study/project on topic of personal interest in consultation with faculty member. Initial proposal, reports of accomplishments. prereq: instr consent

**FNRM 4501. Urban Forest Management: Managing Greenspaces for People.** (3 cr.: Student Option; Every Spring)
Management concepts for green infrastructure of cities, towns, and communities. Urban forest as a social/biological resource. Emphasizes management of urban forest ecosystem to maximize benefits to people. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values, perceptions. How urban forestry can be a tool to improve community infrastructure.

**FNRM 4511. Field Silviculture.** (2 cr.: Student Option; Every Summer)
Collection of field data to prepare/write silvicultural prescriptions for regeneration, thinning, and harvesting in context of landscape, watershed, and wildlife habitat issues. Field exercises in forest entomology, pathology, tree improvement, and non-timber forest products. Tree planting. Marking stands for harvest. Taught at the Cloquet Forestry Center. Field trips to forests managed by state/industry.

**FNRM 4515. Field Remote Sensing and Resource Survey.** (2 cr.; Student Option; Every Summer)
Field applications of remote sensing, sampling/measurements for forest and other natural resources. Offered at the Cloquet Forestry Center.

**FNRM 4521. Field Timber Harvesting and Road Planning.** (2 cr.; Student Option; Every Summer)


**FNRM 5101. Park and Protected Area Tourism.** (3 cr.; A-F or Audit; Fall Odd Year)

Interaction of resource-based tourism with cultural/natural environments. Impacts of tourism on environment.

**FNRM 5104. Forest Ecology.** (4 cr.; A-F or Audit; Every Fall)

Form and function of forests as ecological systems. Characteristics and dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions on research topics, exercises, and current issues in forest resource management. Required weekend field trip. Introductory biology course recommended.

**FNRM 5114. Hydrology and Watershed Management.** (3 cr.; Student Option; Every Fall)

Hydrologic cycle and water processes in upland/riparian systems. Applications of hydrological concepts to evaluate impacts of forest and land management activities on water yield, streamflow, groundwater erosion, sedimentation, and water quality. Concepts, principles, and applications of riparian/watershed management. Regional/international/global examples. Forest ecosystems.

**FNRM 5131. Geographical Information Systems (GIS) for Natural Resources.** (4 cr.; A-F or Audit; Every Fall)

Geographic information systems (GIS), focusing on spatial data development and analysis in the science and management of natural resources. Basic data structures, sources, collection, and quality; geodesy and map projections; spatial and tabular data analyses; digital elevation data and terrain analyses; cartographic modeling and layout. Lab exercises provide practical experiences complementing theory covered in lecture. prereq: Grad student or instr consent

**FNRM 5153. Forest Hydrology & Watershed Biogeochemistry.** (3 cr.; Student Option; Spring Odd Year)

This rigorous course examines hydrology and biogeochemical cycling in forested watersheds. Topics include role of forests in hydrologic processes (precipitation, runoff generation, and streamflow) and exports (sediment, carbon, and nitrogen). Readings from primary literature, active discussion participation, research/review paper. prereq: [Basic hydrology course, one course in ecology, and one course in chemistry (upper div or grad student)] or instr consent

**FNRM 5161. Northern Forest Field Course.** (2 cr.; A-F or Audit; Every Summer)

Field identification of common trees, shrubs, and nonwoody vascular plants. Plant communities, soil site relationships, wildlife values. Natural history of northern/boreal forests in terms of soils, ecological characteristics of trees, community, environment relationships, stand development, succession, and regeneration ecology. Land survey, tree/forest stand measurement, forest sampling techniques. Taught at the Cloquet Forestry Center.

**FNRM 5201. Introduction to Travel and Tourism.** (3 cr.; A-F only; Every Spring)

Nature, structure and complexity of tourism industry. Overview of travel/tourism: definition, evolution, magnitude globally. Types/functions of various sectors, tourism distribution system, role of various stakeholders in creation/delivery of tourism. Motivations for travel as means of understanding demand for tourism. prereq: Grad student or instr consent

**FNRM 5203. Forest Fire and Disturbance Ecology.** (3 cr.; A-F or Audit; Every Spring)

Ecology, history, management, control of fire, wind, insect infestation, deer browsing, other disturbances in forests, including disturbance regimes of boreal, northern hardwood, savannas of North America. Influence of disturbance on wildlife habitat, urban/wildland interfaces, forest management, stand/landscape dynamics. Tree mortality in fires, successional patterns created by fires, interactions of life history traits of plants with disturbances. prereq: Grad student or instr consent

**FNRM 5204. Landscape Ecology and Management.** (3 cr.; A-F or Audit; Every Fall)

Introduction to landscape ecology at different scales in time/space. Development/implications of broad-scale patterns of ecological phenomena, role of disturbance in ecosystems. Characteristic spatial/temporal scales of ecological events. Principles of landscape ecology as framework for landscape research, analysis, conservation, and management. prereq: Grad student or instr consent

**FNRM 5205. Productivity and Ecology of Forest Soils.** (3 cr.; Student Option; Periodic Fall)

Soil-site factors affecting plant/wildlife communities. Strategies for estimation, site modification/enhancement. Effects of forest management and other human-related disturbances on forest soil functions. prereq: Introductory Soils course recommended

**FNRM 5206. Park and Protected Area Management Field Studies.** (2 cr. [max 3 cr.]; A-F only; Every Summer)

Directed field study of park/protected areas. Recreation planning/visitor management, cultural/natural resource management, nature-based tourism management, resource interpretation/communication across local, state, federal tribal park/protected areas in northern Minnesota. prereq: Sophomore status or higher

**FNRM 5218. Measuring and Modeling Forests.** (3 cr.; A-F or Audit; Every Spring)

General sampling design and survey techniques to assess current resource conditions. Application of metrics/sampling methods to forest vegetation. Calculation of tree/stand volume, selection of modeling approaches. Case studies of modeling to project future growth. Landscape processes, characterization, and modeling.

**FNRM 5228. Advanced Topics in Assessment and Modeling of Forests.** (3 cr.; A-F or Audit; Fall Even Year)

Application of recently developed mathematics, computer science, and statistics methodologies to natural resource functioning, management, and use problems. Specific topics, software, and methodologies vary. prereq: 3218, Math 1272, Stat 5021

**FNRM 5232. Managing Recreational Lands.** (4 cr.; A-F or Audit; Every Spring)

Federal recreation land management policy/organization. Conceptual frameworks for recreation resource & visitor use management. Visitor-caused impacts. Using management tools to reduce impacts/conflicts. prereq: Grad student or instr consent

**FNRM 5259. Visitor Behavior Analysis.** (3 cr.; Student Option; Every Fall)

Recreation, leisure, and tourism are significant parts of the world, national, and state economies. Understanding visitor behavior is important and has significant implications for organizations, agencies, and businesses related to parks, tourism destinations, and museums. In this class, you will learn to apply both social science theory and methods to understand consumers, with an emphasis on visitors to parks and protected areas. You will immediately apply your learning of survey development, interviewing, observation and content analysis to real-world situations in class projects. This is an on-line course.

**FNRM 5262. Remote Sensing and Geospatial Analysis of Natural Resources and Environment.** (3 cr.; Student Option; Every Fall)

Introductory principles and techniques of remote sensing and geospatial analysis applied to mapping and monitoring land and water resources from local to global scales. Examples of applications include: Land cover mapping and change detection, forest and natural resource inventory, water quality monitoring, and global change analysis. The lab provides hands-on experience working with satellite and aerial imagery and image processing methods and software. Prior coursework in Geographic Information Systems and introductory statistics is recommended. prereq: Grad student or instr consent

**FNRM 5264. Advanced Forest Management Planning.** (3 cr.; Student Option; Every Fall)

Modeling tools for forest planning to better integrate forest resource conditions/uses and better understand trade-offs and potential

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
management strategies. Analyzing facets of forest management that add complexity including multiple-market interactions, temporal detail, spatial objectives, planning under uncertainty, and risk/reward strategies. Optimization models, decomposition and heuristic techniques designed to capitalize on characteristics of forestry problems. Case studies involving recent or ongoing large-scale applications. Student projects with opportunity to tailor to student interests or expertise.

**FNRM 5411. Managing Forest Ecosystems: Silviculture.** (3 cr.; Student Option; Every Fall) Management of forest ecosystems for sustaining ecological integrity, soil productivity, water quality, wildlife habitat, biological diversity, commodity production in landscape context. Silvics, forest dynamics, disturbances, regeneration, restoration, silvicultural systems. Ramifications of management choices. Weekend field trip. EMCF track students should take FNRM 5413 concurrently.

**FNRM 5412. Advanced Remote Sensing and Geospatial Analysis.** (3 cr.; Student Option; Every Spring) This course builds on the introductory remote sensing class, FNRM 3262/5262. It provides a detailed treatment of advanced remote sensing and geospatial theory and methods including biophysics of remote sensing, measurements and sensors, data transforms, data fusion, lidar processing and derivatives, advanced classification algorithms (including Object-Based Image Analysis), multitemporal analysis, and empirical modeling. Independent lab activities will be used to apply the course topics to real-world problems. Prior coursework in Geographic Information Systems, remote sensing, and statistics is necessary. prereq: 3262 or grad student or instr consent

**FNRM 5413. Managing Forest Ecosystems: Silviculture Lab.** (1 cr.; Student Option; Every Fall) Development of silvicultural prescriptions to achieve various landowner objectives. Timber cruise, growth/yield simulations, stand density management diagrams, thinning schedules, use of forest vegetation simulator. Field trips, computer labs, lectures. prereq: FNRM major or minor or grad student; FNRM-FECM track students should take FNRM 3411/5411 concurrently or instructor consent

**FNRM 5431. Timber Harvesting and Road Planning.** (2 cr.; Student Option; Every Spring) Forest operations. Terminology, engineering, equipment/harvesting system options, productivity/costs. Relationship to forest management and silviculture. Road planning, forest management guidelines. Mitigating potential impacts to soil/water resources. Environmental implications of method/equipment choices. Selling timber. Sale design, layout, and administration. Two all-day field trips.

**FNRM 5471. Forest Planning and Management.** (3 cr.; A-F or Audit; Every Fall) Management science as applied to forest decision-making to help develop better forest management plans. Helps students develop a basic understanding of common analytical tools from operations research and how they are applied to forestry problems to help explore many potential solutions. Also reviews traditional approaches based on simulation. Emphasizes trade-off information, interpretation of model results, and linkages between stand-level economic analysis and forest-wide planning. Reviews recent modeling efforts in Minnesota. Includes synthesis of information from multiple natural resource disciplines. Guest speakers demonstrate value of analyses in planning. Emphasizes homework assignments with some group work. An individual project requires an informal class presentation. prereq: Grad student

**FNRM 5480. Topics in Natural Resources.** (1-3 cr.; Student Option; Periodic Fall & Spring) Lectures in special fields of natural resources given by visiting scholar or faculty member. Topics specified in Class Schedule

**FNRM 5501. Urban Forest Management: Managing Greenspaces for People.** (3 cr.; Student Option; Every Spring) Management concepts for green infrastructure of cities, towns, and communities. Urban forest as social/biological resource. Emphasizes management of urban forest ecosystem to maximize benefits. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values, perceptions. How urban forestry can be a tool to improve community infrastructure.

**FNRM 5611. Field Silviculture.** (1 cr.; Student Option; Every Summer) Collection of field data to prepare/write silvicultural prescriptions for regeneration, thinning, and harvesting in context of landscape, watershed, and wildlife habitat issues. Field exercises in forest entomology, pathology, tree improvement, and non-timber forest products. Tree planting, marking stands for harvest. Taught at Cloquet Forestry Center. Field trips to forests managed by state/industry.

**FNRM 5615. Field Remote Sensing and Resource Survey.** (1 cr.; Student Option; Every Summer) Field applications of remote sensing, sampling/measurement methods to inventory/mapping of forest and other natural resources. Offered at the Cloquet Forestry Center.

**FNRM 5621. Field Timber Harvesting and Road Planning.** (1 cr.; Student Option; Every Summer) Design, layout, and administration of timber sales. Forest road planning and design. Protecting residual trees during harvesting operations. Timber appraisal, forest management guidelines. Road location and profiling. Planning/layout considerations. Field trips to visit timber harvesting and road planning sites with public and private organizations. Taught at the Cloquet Forestry Center.

**FNRM 8101. Research Problems: Physiological Ecology.** (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance. prereq: instr consent

**FNRM 8102. Research Problems: Forest-Tree Genetics.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8103. Research Problems: Forest Hydrology.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8104. Research Problems: Forest Ecology.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8105. Research Problems: Silviculture.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8106. Research Problems: Urban Forestry--Biology and Management.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8107. Seminar: Forest Resources.** (1 cr.; Student Option; Every Fall & Spring) Assigned topics, problem analyses, and research reports.

**FNRM 8201. Research Problems: Forest Economics.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8202. Research Problems: Forest Biometry and Measurements.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8203. Research Problems: Forest Recreation.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8204. Research Problems: Forest Policy.** (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8205. Research Problems: Spatial Data Analysis.** (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8206. Research Problems: Forest Management.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.

**FNRM 8207. Economic Analysis of Natural Resource Projects.** (2 cr.; A-F or Audit; Every Fall, Spring & Summer) Economics of public/private forestry/watershed management projects. Commercial profitability analysis, cost-benefit analysis, preparing feasibility studies. Case studies developed/presented. prereq: instr consent

**FNRM 8208. Research Problems: Environmental Learning and Leadership.** (1-5 cr.; Student Option; Every Fall, Spring & Summer) Independent research under faculty guidance.
FREN 100. Reading French in the Arts and Sciences. (6 cr.; S-N only; Every Spring) Basic reading knowledge of French language. Intensive reading/translation of texts from a wide variety of disciplines. Students successfully completing the course obtain language certification in French.

FREN 1001. Beginning French. (5 cr.; Student Option; Every Fall, Spring & Summer) Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

FREN 1002. Beginning French. (5 cr.; A-F or Audit; Every Fall, Spring & Summer) Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings. prereq: 1001 or equiv

FREN 1003. Intermediate French. (5 cr.; Student Option; Every Fall, Spring & Summer) Development of listening, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration. prereq: 1002 or Entrance Proficiency Test

FREN 1004. Intermediate French. (5 cr.; Student Option; Every Fall, Spring & Summer) Development of listening, reading, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration. prereq: 1003 or Entrance Proficiency Test

FREN 1022. Accelerated Beginning French. (5 cr.; Student Option; Every Fall & Spring) For students who have studied French in high school or at community colleges and who do not place high enough on placement exam to enter 1003. An accelerated review of FREN 1001 followed by the material covered in FREN 1002. prereq: 2 or more yrs high school French

FREN 1501. Gateways to French and Francophone Studies: English Only. (AH,GP; 3 cr.; A-F or Audit; Every Fall & Spring) This course, taught in English by a member of the Department's regular faculty, will introduce students to French and Francophone Studies and the faculty in the Department. In addition, students will participate in two major activities: a "Reacting to the Past" role-playing game set during the French Revolution, and an "Encountering the Present" activity in which they will gather oral histories of French-speaking immigrants.

FREN 1502. Gateways to French and Francophone Studies: Bilingual. (AH,GP; 3 cr.; A-F or Audit; Every Fall & Spring) This course, taught mainly in English by a member of the department's regular faculty, will introduce students to French and Francophone Studies today. Students will complete some reading assignments in French. Prerequisite: French 1004. Students who have not yet completed 1004 should enroll instead in French 1501. The course has several components. To learn about the historical breadth of French culture and the way it informs cultural and political topics today, students will read at least one significant, complete text from the period before the French Revolution and one from the period after it, discussing them in small groups. An ongoing series of guest presentations throughout the semester will introduce students to the various fields of French and Francophone Studies and the faculty in the Department. In addition, students will participate in two major activities: a "Reacting to the Past" role-playing game set during the French Revolution, and an "Encountering the Present" activity in which they will gather oral histories of French-speaking immigrants.

FREN 1904. Freshman Seminar. (GP; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

FREN 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall) Topics specified in Class Schedule. prereq: Freshman

FREN 1907W. Freshman Seminar. (LITR; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

FREN 1908W. Freshman Seminar. (LI; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

FREN 1909W. Freshman Seminar. (GP; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

FREN 1910W. Freshman Seminar. (LITR; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

FREN 3018. French Oral Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Intensive work in oral expression, listening comprehension. Incorporates wide variety of cultural topics. prereq: 3014, 3015

FREN 3019W. Advanced Writing in French: Genre, Style, Rhetoric. (WI; 3 cr.; A-F only; Every Fall) Workshop in journalistic/prose writing in French. Theme of journalistic/literary readings varies. Article, editorial, review, essay, biography, tale, prose poem. Word order, sequence of tenses, indirect discourse, literary tenses. Overview of stylistics/use of rhetorical figures. prereq: 3016

FREN 3010. French Expression. (3-6 cr.; Student Option; Every Fall & Spring) Intensive work in oral/written communication.

FREN 3011. Medieval Stories. (3 cr.; Student Option; Periodic Fall) Reading/discussion of major forms of medieval (comic, bawdy, moralizing, fantasy, historical) in modern French translation. Explores their relationship to development of French culture, especially urbanization, class relations, marriage, role of Church. prereq: 3101

FREN 3015. Advanced French Grammar and Communication. (3 cr.; Student Option; Every Fall, Spring & Summer) Advanced study of French with particular emphasis on grammar review, vocabulary building, oral communication skills, and language usage in cultural contexts. prereq: 1004 or equiv or instr consent

FREN 3016. Advanced French Composition and Communication. (3 cr.; Student Option; Every Fall & Spring) Advanced study of grammar in context; emphasis on writing for varied communicative purposes, reading for style and content, translation. prereq: 3015

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powers, ethics/politics, violence/sacred. prereq: 3101W

FREN 3140. Topics in Medieval and Renaissance Literature. (3 cr. [max 9 cr.]; Student Option; Every Spring)
Different aspects of French literature/culture of medieval/Renaissance periods (11th-16th century). Content varies depending on instructor. Literary, historical, or social problem. Period, author, genre, or topic of interest. Readings may be literary, critical, cultural, historical, political, etc. Specific content posted in department and in Course Guide. prereq: 3101

FREN 3181. Mapping Enlightenment in 17th- and 18th-Century French Prose. (3 cr.; Student Option; Periodic Fall)
The themes, values, and critical strategies of the social and intellectual movement designated by the term Enlightenment. The legacy of the Enlightenment project will also be evaluated. prereq: 3101

FREN 3240. Topics in Ancien Regime Literature. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Different aspects of French literature/culture from early modern period (17th/18th centuries). Content varies depending on instructor. Literary, historical, or social problems. Period, author, genre or topic of interest. Readings may be literary, critical, cultural, historical, political, etc. Specific content posted in department/ Course Guide. prereq: 3101

FREN 3250. French Poetry. (3 cr. [max 9 cr.]; Student Option; Every Spring)
The historical, political, and social contexts of the evolution of French poetry from its origins to the modern era. While studying primarily lyric poetry, epic and dramatic poetry may also be considered when appropriate. prereq: 3101

FREN 3260. Dramas of Culture: 20th-Century French and Francophone Theater. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Key movements, dramatists, and contexts of 20th-century French and Francophone theater. Areas of study include naturalist and symbolist legacies as well as existentialist, avant-garde, and contemporary performance and drama. prereq: 3101

FREN 3310. Literature of Revolution and Upheaval. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
A study of revolutionary movements in France seen through novels placed in historical context. Content may vary, but course will deal with radical historical, cultural and literary changes in France primarily in the modern period. prereq: 3101

FREN 3330. Literature and the Making of Modern France: 20th-Century Perspectives. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Developments of literary culture of 20th-century France in the context of historical events and social transformations. prereq: 3101

FREN 3333. The Idea of Paris: Writing and Viewing the City. (GP; 3 cr.; Student Option; Fall Odd Year)
Meanings that Paris acquired in modern French cultural imagination, particularly as a protean metaphor, myth or allegory for effects of urban, national, global modernity. Literature, painting, photography, film, architecture, urban theory from Enlightenment to present. prereq: 3101W

FREN 3340. Topics in Modern French Literature. (3 cr. [max 9 cr.]; Student Option; Periodic Spring)
Modern French literature/culture, defining modern period as that of post-Republic France. Content varies depending on instructor. Literary, historical, or social problem. Period, author, genre, or topic of interest. Specific content posted in department/ Course Guide. prereq: 3101

FREN 3350. Topics in Literature. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Focuses on a problem, period, author, or topic of interest. Specific content posted in department and listed in Course Guide. prereq: 3101

FREN 3351. Quebecois Literature. (3 cr.; Student Option; Periodic Fall & Spring)
Study of écritures of Quebec as a production in French Canada. Literature will be studied in relation to other North American literatures and to Francophone literature produced elsewhere in the world. prereq: 3101

FREN 3410. Quebecois Literature. (3 cr.; Student Option; Periodic Fall & Spring)
Study of written produced in Quebec as a literature of its own, not simply as a part of Canadian literature. Literature will be studied in relation to other North American literatures and to Francophone literature produced elsewhere in the world. prereq: 3101

FREN 3431. Topics in Francophone African Literature and Cultures. (3 cr.; Student Option; Fall Odd Year)
Issues relevant to cultures/societies of francophone Sub-Saharan Africa as reflected in literature, film, and cultural critique. prereq: 3101

FREN 3479. Francophone Writers of the African Diaspora. (3 cr.; Student Option; Fall Even Year)
A study of francophone North Africa, Africa, the Caribbean of the colonial and/or post-colonial era, examined in its historical, cultural, or ideological contexts. Reading selections may include texts by immigrant or exiled writers in French. prereq: 3101W

FREN 3521. History of the French Language. (3 cr.; Student Option; Fall Odd Year)
Origins/development of French language from Latin to contemporary French. Selected texts. Present stage/development. prereq: 3101, 3500 or Ling 3001 or instr consent

FREN 3531. Sociolinguistics of French. (GP; 3 cr.; Student Option; Periodic Fall)
Explores variation in the use of French associated with factors such as medium (oral/ written), style (formal/informal), region, social and ethnic. prereq: 3101. Credit will not be granted if credit has been received for: 3531; Ling 3001 or 5001, grad

FREN 3541. Oral Discourse of French. (3 cr.; Student Option; Periodic Fall & Spring)

FREN 3571. Old French in Action: Medieval French Language through Songs, Tales, and Plays. (3 cr.; A-F only; Periodic Fall)
This course introduces students to Old French grammar, vocabulary, and phonetics through language exercises and the reading and performance of original texts. Along the way, students will learn about the genres of medieval French literature, how these texts originated, circulated, and how artists today work from medieval manuscripts to create new performances. Coursework will alternate between language lessons, oral and written exercises, the reading, translation, and discussion of Old French texts, and recitation and interpretive performance. This course is designed for undergraduates and will be based entirely on material available in modern editions or online in print-like format. It will also make use of audio recordings. Graduate students, honors undergraduates, and other high-achieving juniors and seniors should register for French 5571, which covers the same material and also how to read and edit texts from medieval manuscripts. prereq: 3016. Class is conducted in modern French. No prior experience of the medieval language is expected.

FREN 3601. French Civilization and Culture I. (3 cr.; Student Option; Periodic Fall)
Roman occupation of Gaul to 1715. prereq: 3015

FREN 3602. French Civilization and Culture II. (3 cr.; Student Option; Periodic Spring)
1705 to present. prereq: 3015

FREN 3611. Deciphering Courtly Literatures of Medieval France. (GP; LITR; 3 cr.; A-F only; Fall Even Year)
Cultural practices of 12th-century Angevin/ Capetian courts. Lyrics, romances, texts/artworks. Patronage, authorship, representation of self, understanding of
various "others" (women, Orthodox Christians, Muslims). prereq: 3015

FREN 3612. Reading Libertinism. (AH,CIV; 3 cr.; Student Option; Spring Even Year) Underground, subversive, philosophical countercultures that push society to limits. Why society has underground, how it shapes understanding of individual responsibility. Shifting notions of acceptable/moral behavior. Philosophizing/imaging in creating society/values. prereq: 3015, 3101 strongly recommended

FREN 3636. Human Nature from Descartes to Sade. (CIV,LITR; 3 cr.; A-F only; Spring Even Year) Explores ethical dimensions of human nature/legacy from Descartes to Sade. prereq: 3015

FREN 3650. Topics in French/Francophone Cultures. (3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) French/francophone cultures in various historical, social, political, geographical contexts. prereq: 3015


FREN 3736. Human Nature from Descartes to Sade. (CIV,LITR; 3 cr.; A-F only; Spring Even Year) Explores ethical dimensions of human nature/legacy from Descartes to Sade. prereq: 3015

FREN 3750. Topics in French or Francophone Literature and Culture. (3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Theme, problem, period, or topic of interest in French or Francophone literature or culture. See Class Schedule. Taught in English. prereq: Non-French major; knowledge of French helpful


FREN 3896. Internship in a French-Speaking Milieu. (1-4 cr.; A-F only; Every Fall, Spring & Summer) Volunteer or paid work in French-speaking milieu, undertaken at initiative of individual students. Work under direction of work supervisor/advisor chosen from among regular or adjunct faculty. Complete two-three written assignments designed to enhance language/field-specific learning. prereq: 3016, 3014 [3018 strongly recommended], [3022 strongly recommended] for students undertaking internships in business, government, or law

FREN 3995. Directed Teaching. (1-5 cr. [max 20 cr.]; S-N or Audit; Every Fall) Directed teaching. prereq: dept consent

FREN 4001. Beginning French for Graduate Student Research. (5 cr.; A-F only; Every Fall, Spring & Summer) Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings.

FREN 4002. Beginning French for Graduate Student Research. (5 cr.; A-F only; Every Fall, Spring & Summer) Description: Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings. prereq: 1001 or equiv

FREN 4003. Intermediate French. (5 cr.; A-F only; Every Fall, Spring & Summer) Development of listening, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration. prereq: 1002 or Entrance Proficiency Test

FREN 4004. Intermediate French for Graduate Student Research. (5 cr.; Student Option; Every Fall, Spring & Summer) Development of listening, reading, writing, and speaking skills in the context of cultural themes related to the Francophone world. Grammar review and elaboration. prereq: 1003 or Entrance Proficiency Test

FREN 4022. Accelerated Beginning French. (5 cr.; Student Option; Every Fall & Spring) Basic listening, speaking, reading, and writing skills. Emphasis on communicative competence. Some cultural readings. prereq: 1001 or equiv prereq: Grad student

FREN 4101V. Honors: Seminar in French Studies. (WI; 2 cr.; A-F only; Every Fall & Spring) Course for French and FRIT majors only, to be taken during the final semester. The senior project is the capstone experience of the major in French and Francophone or FRIT Studies. Building on your prior coursework, your linguistic expertise in French, and your analytical skills, it gives you the opportunity to do independent, original work on a topic of particular interest to you. This project is designed to bridge two upper-division French courses: a 3-credit elective of your own choice in the areas of literature, culture, or linguistics (i.e., one of your required electives numbered 31xx?36xx) and the senior project course itself (4101W/V). The elective provides background in the general field of research, while French 4101W/V allows you to learn the basics of research and advanced academic writing while working with a faculty member and a group of peers involved in similar projects. prereq: French 3101W and at least three electives completed

FREN 4109W. Senior Project in French and Francophone Studies. (WI; 2 cr.; A-F only; Every Fall & Spring) Completion of research paper based on paper written for previous course or expansion of project undertaken in concurrent course. prereq: instr consent [completion of most major coursework or permission of DUS]

FREN 4110V. Honors Thesis. (WI; 2 cr.; A-F only; Every Fall & Spring) Directed study used to develop or complete honors thesis in French and Francophone studies. prereq: [Completion of most major coursework or permission of DUS], candidate for honors in French, instr consent

FREN 4520. Directed Readings. (1-4 cr.; A-F only; Spring & Summer) Designed to meet unique requirements agreed upon by a faculty member and a student. Individual contracts are drawn up listing contact hours, number of credits, written and other work required. Each contract will vary. prereq: instr consent

FREN 5250. Promenades Poetiques: The Subject in Motion. (3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Building on your prior coursework, your linguistic expertise in French, and your analytical skills, it gives you the opportunity to do independent, original work on a topic of particular interest to you. This project is designed to bridge two upper-division French courses: a 3-credit elective of your own choice in the areas of literature, culture, or linguistics (i.e., one of your required electives numbered 31xx?36xx) and the senior project course itself (4101W/V). The elective provides background in the general field of research, while French 4101W/V allows you to learn the basics of research and advanced academic writing while working with a faculty member and a group of peers involved in similar projects. prereq: French 3101W and at least three electives completed

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University of Minnesota Twin Cities Catalog
Fall, 2016
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
The search for the subject in poetry and poetic prose as revealed through the motif of the "promenade" and experimentation with literary forms. prereq: 3111 or above

FREN 5301. Critical Issues in French Studies. (3 cr.; Student Option; Spring Even Year)
Introduces the methods of interpretation and critical debates that have shaped and continue to define the discipline of French studies. Provides a practical introduction to graduate-level literary research. prereq: Grad or instr consent

FREN 5350. Topics in Literature and Culture. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring)
Problem, period, author, or topic of interest. See Class Schedule. prereq: 3101 or equiv

FREN 5470. Post/Colonial Francophone Literatures. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
An introduction to Francophone literature from Africa, Africa, and the Caribbean of the colonial and/or post-colonial eras in the light of relevant literary and cultural theories. prereq: 3111 or above

FREN 5501. Structure of French: Phonology. (3 cr.; Student Option; Periodic Fall)
Advanced study of sound system of contemporary French. prereq: [Ling 3001 or Ling 5001], grad student

FREN 5531. Sociolinguistics of French. (3 cr.; Student Option; Periodic Fall)
Explores variation in the use of French associated with factors such as medium (oral/ written), style (formal/informal), region, social and economic groups. prereq: Credit will not be granted if credit has been received for: 3531; Ling 3001 or 5001, grad student

FREN 5541. Oral Discourse of French. (3 cr.; Student Option; Periodic Fall)
Nature of contemporary spoken French discourse. Focuses on spontaneous, multi-speaker discourse. Readings include examples of various linguistic approaches to such discourse. Emphasizes syntactic analysis. Phonological/lexical particularities. "Macro" level analyses such as discourse analysis and conversation analysis. prereq: 3015, grad student; Ling 5001 recommended

FREN 5571. Old French in Action: Medieval French Language through Songs, Tales, and Plays. (3 cr.; A-F or Audit; Periodic Fall)
This course introduces students to Old French grammar, vocabulary, and phonetics through language exercises and the reading and performance of original texts. Along the way, students will learn about the genres of medieval French literature, how these texts originally circulated, and how artists today work from medieval manuscripts to create new performances. Coursework will alternate between language lessons, oral and written exercises, the reading, translation, and discussion of Old French texts, and recitation and interpretive performance. French 5571 is designed for graduate students, honors undergraduates, and other high-achieving juniors and seniors with particular interest in medieval language, literature, and culture. It covers the same material as French 5571 and also how to read and edit texts from medieval manuscripts. Class is conducted in modern French. No prior experience of the medieval language is expected. prereq: French 3016.

FREN 5995. Directed Teaching. (1 cr.; S-N or Audit; Every Fall)
Directed teaching. prereq: instr consent

FREN 8110. Topics in Early Medieval French Literature. (3 cr. [max 9 cr.]; Student Option; Periodic Spring)
Introduction to epic, romance, allegory, and theater in Old French readings (12th-13th centuries). Specific topics/texts studied vary. Taught in French.

FREN 8111. Introduction to Old French. (3 cr.; Student Option; Periodic Fall & Spring)
Studies in medieval French: instruction in reading Old French, sources of bibliography, and topics in medieval studies (language and literature). Taught in French.

FREN 8114. Troubadour Lyric and Old Occitan Language. (3 cr.; Student Option; Periodic Fall & Spring)
Language and literature of Old Occitan (Old Provençal), chiefly troubadours' songs. Some language instruction, reading of lyrics, consideration of social context, introduction to scholarly tradition. Knowledge of French, Spanish, Italian, or Latin desirable. Taught in English.

FREN 8120. Topics in Later Medieval French Literature. (3 cr. [max 9 cr.]; Student Option; Fall Odd Year)
Problems presented by texts written in France ca. 1300-1500. Evolution of Middle French language. Specific topics/texts vary. Taught in French. prereq: 8110 or instr consent

FREN 8125. Short Narrative in the Middle Ages. (3 cr.; A-F only; Fall Odd Year)
Short forms of medieval narrative. Examples from French literary production within context of socioeconomic history from ca. 1100 to ca. 1550. prereq: grad student

FREN 8190. Old French Workshop. (1 cr. [max 2 cr.]; S-N only; Periodic Fall)
Old French language. Runs concurrently with seminars on Old French literature. Basics of Old French syntax, semantics and phonetics. Students read portions of texts and prepare an original translation. prereq: [(Concurrent registration is required (or allowed) in 8110 or concurrent registration is required (or allowed) in 8250 or concurrent registration is required (or allowed) in 8260 or concurrent registration is required (or allowed) in 8270 or concurrent registration is required (or allowed) in 8290) if student's material is in Old French] or concurrent registration is required (or allowed) in MEST 8110 if section is crosslisted with one of the above French seminars], reading knowledge of modern French

FREN 8210. Narrative, History, and Memory: Topics. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Significance of narrative paradigm in literature, history, and cultural memory. Specific topics/ texts treated vary. Taught in French.

FREN 8220. Staging the Common. (3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)

FREN 8230. Critical Issues: Criticism and Thought. (3-9 cr.; A-F only; Fall Odd Year)
Critical issues relating to works in criticism/ thought related to French/Francophone literature, philosophy or culture.

FREN 8240. Critical Issues: French and Francophone Cinema. (3-9 cr. [max 27 cr.]; A-F only; Fall Odd Year)
Critical issues relating to French/Francophone cinema.

FREN 8250. Critical Issues: Poetry. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)
Significant critical issues relating to poetic writing of selected authors or periods.

FREN 8260. Critical Issues: Theatre. (3 cr. [max 12 cr.]; Student Option; Periodic Spring)
Significant critical issues relating to dramatic writing of selected authors or periods.

FREN 8270. Critical Issues: Prose. (3 cr. [max 12 cr.]; Student Option; Every Fall & Spring)
Significant critical issues relating to prose writing of selected authors or periods.

FREN 8271. The Novel of the Ancien Regime. (3 cr.; Student Option; Periodic Fall & Spring)
Considers major novels of the 17th and 18th centuries in connection with developments in such areas as esthetic theory, intellectual currents, social transformations, and reading practices.

FREN 8280. Ethics and Aesthetics in French and Francophone Writing. (3 cr.; A-F only; Periodic Spring)
Explores the question of philosophy's engagement with literature in the twentieth century. Traces this from Greek Antiquity (Plato, Aristotle), especially the moment of differentiation between logos and mythos, rational speech and fiction. Focuses on the breakdown of the borders between these two regimes of discourse in modernity. Explores the limits of the porosity between the two disciplines, especially by examining, instead of philosophy's blind acquiescence to the discourse of fiction, its modalities of resistance to figurative language.

FREN 8290. Critical Issues: Perspectives on an Author. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring)
In-depth study of major author's writing, critical tradition this writing has occasioned, and theoretical issues upon which this writing may be brought to bear.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
FREN 8291. Jean Genet's Writings and French Institutions. (; 3 cr.; Student Option; Periodic Fall & Spring) Jean Genet's writings at the crossroads of several disciplines (politics, psychoanalysis, religion, and law). Genet's novels, dramas, and political essays explore the power of institutional settings and strategies imagined by individuals to short-circuit their impact.

FREN 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

FREN 8371. The Rule of Reason, The Reign of Madness: Readings in Early Modern France. (; 3 cr.; Student Option; Periodic Fall & Spring) Relationship between construction of reason and madness in philosophy, legitimation of political rule, and the institution of literature in early modern France.

FREN 8410. Topics in Quebecois Literature. (; 3 cr.; [max 9 cr.]; Student Option; Periodic Spring) Quebecois in relation to other North American literatures and to Francophone literature produced elsewhere in the world. Specific topics/texts vary. Taught in French.

FREN 8420. Critical Issues: Francophone Literature. (; 3 cr.; [max 9 cr.]; Student Option; Periodic Fall) Critical issues relating to literature of Francophone world. Specific topics/texts vary. Taught in French.

FREN 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

FREN 8521. History of the French Language. (; 3 cr.; Student Option; Periodic Fall & Spring) History of French from its origins in Latin to the present day. Aspects of diachronic phonology (sound change), morphology, syntax. Taught in French.

FREN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr.; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; dept consent for 3rd/4th registrations, up to 24 combined cr.; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

FREN 8777. Thesis Credits: Master's. (; 1-18 cr.; [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

FREN 8812. Seminar: Dissertation Preparation and Writing. (; 3 cr.; Student Option; Every Fall & Spring) Initiates dissertation writing process after preliminary exams. Students work with faculty mentors, peer writing groups to develop productive writing/revising strategies. Issues related to professional research/writing. Conceptualizing the dissertation. Developing chapter outlines. Using feedback. Producing a chapter draft. prereq: Completion of doctoral prelims

FREN 8886. Thesis Credit: Doctoral. (; 1-24 cr.; [max 100 cr.]; No Grade Associated; Every Fall & Spring) (No description) prereq: max 18 cr per semester or summer, 24 cr required

FREN 8888W. Thesis Credit Dissertation Seminar. (; 1-3 cr.; [max 24 cr.]; No Grade Associated; Every Fall & Spring) A means for students to make progress on the dissertation in a structured setting. Brings together students writing on related topics. Credits are applied to doctoral thesis credits. Contact instructor for description. prereq: Doctoral student who has passed oral prelims

FREN 8888. Thesis Credit: Doctoral. (; 1-24 cr.; [max 100 cr.]; No Grade Associated; Every Fall & Spring) (No description) prereq: max 18 cr per semester or summer, 24 cr required

FREN 8990. Directed Teaching. (; 1-5 cr.; [max 25 cr.]; Student Option; Every Fall & Spring) tbd

FREN 8992. Directed Readings for Graduate Students. (; 1-5 cr.; [max 25 cr.]; Student Option; Every Fall & Spring) tbd prereq: instr consent

FREN 8994. Directed Research. (; 1-5 cr.; [max 25 cr.]; Student Option; Every Fall & Spring) tbd prereq: instr consent; may be taken as tutorial with instr consent

FRIT 1905. Freshman Seminar. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

FRIT 3600. The Renaissance. (; 3 cr.; Student Option; Periodic Spring) Relationships between the visual arts, literature, science, philosophy, and politics in Europe from about 1300-1600. Works of artists, writers, and intellectuals (e.g., Michelangelo Buonarrotti, Niccolo Machiavelli, Michel de Montaigne), different artistic and literary forms (e.g., portrait, sonnet, essay), and broad thematic issues, including the individual, antiquity, the state, and discovery. Team taught.

FRIT 3803. New Wave Cinemas: Love, Alienation and Landscape in Post-War Italian and French Film. (; 3 cr.; Student Option; Every Spring) Modernist Italian and New Wave French cinema after WWII, focusing on film syntax, constructions of gender, and the individual's relationship to the modern urban and rural landscape. Taught in English. Knowledge of Italian and French helpful but not necessary.

FRIT 3850. Topics in French and Italian Cinema. (; 3 cr.; [max 9 cr.]; Student Option; Every Fall & Summer) Theme, problem, period, filmmaker, or topic of interest in French/Italian cinema. See Class Schedule. Taught in English.

FREN 8385. France, Italy and North Africa in Films on Contemporary Migrations. (GP; 3 cr.; Student Option; Spring Even Year) Films shot in France, Italy, and North Africa (Morocco, Algeria, Tunisia). Representations of migrants, regular/clandestine immigration. Globalization, identity, hospitality, racism, modes of communication/integration. In-class films include And?o; T??chin??s Far, Yasmine Kassarit's The Sleeping Child, and Io, L'Alto. All have English subtitles. Readings in English, some available in French and Italian. prereq: Knowledge of French or Italian recommended

FRIT 3880. Topics in French and Italian Literatures and Cultures. (; 3 cr.; [max 9 cr.]; Student Option; Spring Even Year) Topic of interest in interrelations and cross-cultural exchanges that have contributed to Italian/French literature and culture, from Medieval to modern period. Topics vary with instructor. See Course Guide.

FREN 8527. Passionate Beings: Literary and Medical Problematics in Italy and France from 1800 to the Present. (; 4 cr.; Student Option; ) Literary and medical representations of the passions in France and in Italy from 1800 to the present. Texts range from theatrical works to medical treatises on the passions as ways for exploring notions of subjectivity, responsibility, order. Taught in English.

FREN 5850. Topics in French and Italian Cinema. (; 3 cr.; Student Option; Periodic Fall) Focuses on a theme, problem, period, filmmaker, or other topic of interest in French or Italian cinema. See Class Schedule. Taught in English. prereq: Knowledge of [French or Italian] helpful but not required

FRIT 5999. Teaching of French and Italian: Theory and Practice. (; 3 cr.; Student Option; Every Fall) Theoretical and practical aspects of language learning and teaching applied to French and Italian. Includes history of foreign language teaching in 20th-century United States. Taught in English.

Gay, Lesbian, Bisexual, Transgender (GLBT)

GLBT 1001. Introduction to GLBT Studies. (DSJ,SOCS; 3 cr.; Student Option; Every Fall) History of contemporary GLBT-identified communities. Terms of theoretical debates regarding sexual orientation, identity, and experience. Analyzes problems produced and insights gained by incorporating GLBT issues into specific academic, social, cultural, and political discourses.

GLBT 3211. History of Sexuality in Europe. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) History of sexuality in Europe, from ancient Greece to present. Plato's philosophy of love, St. Augustine's conception of sin,
prostitution in 15th century, sexual science of Enlightenment, industrial revolution and homosexual subcultures. Rape scares and idealism. Eugenics and Nazi Germany.

GLBT 3212. Dissident Sexualities in U.S. History. (3 cr.; A-F or Audit; Every Fall) Sexualities that have challenged dominant social/cultural norms. Transgender, bisexual, gay identities/communities. Politics of sex across lines of race/ethnicity. Controversial practices, including sex work.


GLBT 3305. Queer Cinema. (AH; 3 cr.; Student Option; Every Spring) What queer/queering signify in relation to cinema. Directors, films, styles, genres of queer cinema. Ways in which traditional narrative codes are challenged/repackaged. Ideological dimensions. Impact of political climate. Readings, screenings, discussions, assignments.

GLBT 3404. Transnational Sexualities. (GP; 3 cr.; Student Option; Periodic Fall & Spring) Lesbian/gay lives throughout world. Culturally-specific/transcultural aspects of lesbian/gay identity formation, political struggles, community involvement, and global networking. Lesbian/gay life in areas other than Europe and the United States.


GLBT 3456W. Sexuality and Culture. (DSJ, WI; 3 cr.; Student Option; Periodic Fall & Spring) Historical/critical study of forms of modern sexuality (heterosexuality, homosexuality, romance, erotic domination, lynching). How discourses constitute/regulate sexuality. Scientific/scholarly literature, religious documents, fiction, personal narratives, films, advertisements.

GLBT 3472. Gay Men and Homophobia in American Culture. (3 cr.; Student Option; Every Fall & Spring) Historical experience of gay men. Social construction of same-sex desire in American society since 1700, in context of cultural history/discourse, including literature/the arts, journalism, science/medicine, religion, and law.

GLBT 3610. Topics in GLBT Studies. (3 cr. [max 6 cr.]; Student Option; Every Spring) Topics specified in Class Schedule.

GLBT 3993. Directed Studies. (1-6 cr.; A-F or Audit; Periodic Fall & Spring) Guided individual study. GLBT topic not available through regular course offerings. Students work with faculty who share their research interests. Number of credits based on scope of project, student needs, and advising instructor's approval. prereq: GLBT studies minor, instr consent

GLBT 4101. Gender, Sexuality, and Politics in America. (DSJ, HIS; 3 cr.; Student Option; Every Fall) Ways public and private life intersect through the issues of gender, sexuality, family, politics, and public life; ways in which racial, ethnic, and class divisions have been manifest in the political ideologies affecting private life.

GLBT 4232. Chicana/o - Latina/o Gender and Sexuality Studies. (AH; DSJ; 3 cr.; Student Option; Fall Odd, Spring Even Year) Critical thinking of Chicanas/os, Latinas/os around construction of gender. Politics of sexual identity. How self is gendered in relationship to sexual, racial, class, national identities under different social structural conditions.

GLBT 4403. Queering Theory. (3 cr.; Student Option; Periodic Fall & Spring) Lesbianism and lesbian identities as products of cultural practices, relations, and meanings that are historically specific/changing. prereq: 1002 or 3102 or instr consent

GLBT 5993. Directed Study. (1-12 cr.; Student Option; Every Fall & Spring) Directed Study

Gender, Women, & Sexuality Studies

GWSS 1001. Gender, Power, and Everyday Life. (3 cr.; Student Option; Every Summer) U.S. multi/cross-cultural studies of contemporary social, cultural, and personal conditions of women's lives.

GWSS 1002. Politics of Sex. (DSJ, SOCS; 3-4 cr.; Student Option; Every Fall) Introductory survey of historical, cultural, psychological, and sociopolitical dimensions of analyzing gender/sexuality. Norms/ideologies pertaining to gender/sexuality as differently enacted/understood by social groups in different times/locations.

GWSS 1003W. Women Write the World. (GP, WI, LITR; 3 cr.; Student Option; Every Fall) Concepts in literary studies. Poems, plays, short stories, novels, essays, letters by women from different parts of world. Focuses on lives, experiences, and literary expression of women, including basic concepts of women's studies.

GWSS 1004. Screening Sex: Visual and Popular Culture. (AH; 3 cr.; Student Option; Fall Even, Spring Odd Year) Film history and theory; feminist critique of popular culture.

GWSS 1005. Engaging Justice. (CIV; 3 cr.; Student Option; Fall Odd, Spring Even Year) U.S./cross-cultural studies of social movements/political organizing around justice/equality.

GWSS 1006. Skin, Sex, and Genes. (SOCS, TS; 3 cr.; Student Option; Fall Odd Year) Interdisciplinary course that explores the tense relationships between science, medicine, and gender and sexuality.

GWSS 1007. Introduction to GLBT Studies. (DSJ, SOCS; 3 cr.; Student Option; Every Fall) History of contemporary GLBT-identified communities. Terms of theoretical debates regarding sexual orientation, identity, and experience. Analyzes problems produced/insights gained by incorporating GLBT issues into specific academic, social, cultural, political discourses.

GWSS 1902. Freshman Seminar. (DSJ; 3 cr.; A-F or Audit; Every Fall & Spring) Topics/description vary. See Class Schedule, Course Guide. prereq: Fr

GWSS 1904. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Freshman

GWSS 1905. Freshman Seminar. (3 cr. [max 0 cr.]; A-F or Audit; Periodic Fall & Spring) Topics/description vary. See Class Schedule, Course Guide.

GWSS 3002V. Honors: Gender, Race and Class in the U.S.. (DSJ, WI; 3 cr.; A-F only; Every Spring) Comparative study of women, gender, race, class, sexuality in two or more ethnic cultures in U.S.

GWSS 3002W. Gender, Race, and Class in the U.S.. (DSJ, WI; 3 cr.; Student Option; Every Fall) Comparative study of gender, race, class, sexuality in two or more ethnic cultures throughout U.S.

GWSS 3003. Gender and Global Politics. (GP, SOCS; 3 cr.; Student Option; Every Fall & Spring & Summer) Similarities/differences in women's experiences throughout world, from cross-cultural/historical perspective. Uses range of reading materials/media (feminist scholarship, fiction, film, news media, oral history, autobiography).

GWSS 3004V. Honors: Point/Counterpoint: Contemporary Feminist Debates. (CIV, WI; 3 cr.; A-F only; Periodic Fall) Contemporary debates of concern to many women. Abortion, affirmative action, marriage rights, welfare rights, sex education, children's rights, date rape. In-depth study of several issues. Debate pros/cons of relevant perspectives. Includes honors recitation. prereq: Honors

GWSS 3102V. Honors: Feminist Thought and Theory. (AH, WL, CI; 3 cr.; A-F only; Every Fall)
Course explores a range of feminist theoretical perspectives, asking how theory develops both in response to earlier theoretical traditions and in the context of diverse forms of practice, starting from the assumptions that theories emerge from (rather than just being applied to) practice, and that theory-making is itself a form of practice.

GWSS 3102W. Feminist Thought and Theory. (AH, WL, CI; 3 cr.; A-F only; Every Fall)
Course explores a range of feminist theoretical perspectives, asking how theory develops both in response to earlier theoretical traditions and in the context of diverse forms of practice, starting from the assumptions that theories emerge from (rather than just being applied to) practice, and that theory-making is itself a form of practice.

GWSS 3103. Feminist Approaches to Disability Studies. (DSJ; 3 cr.; Student Option; Periodic Spring)
Dis/ability is not a physical or mental defect but a form of social meaning making mapped to certain bodies in larger systems of power and privilege. Feminist approaches to dis/ability as a vector of oppression intersecting and constituted through other oppression such as race, class, gender, sexuality and citizenship. Dis/ability must be understood through systems of power that construct, support, regulate, and determine the life chances of those who claim, or are claimed by disability. Deconstruct the complex ideologies of ableism and the material realities of such oppression, and work toward imagining and reconstructing a more just and equitable society.

GWSS 3203. Women Writers. (LITR, WI; 3 cr.; Student Option; Every Spring)
Topics covered include women's roles and ways women writers have used various genres of literature to articulate personal and social struggles. Fiction, poetry, drama, critical nonfiction texts. Fidelity/betrayal within relationships and societal perceptions. What images of femininity do these writers convey? How do formal and stylistic devices transform meaning?

GWSS 3215. Bodies That Matter: Feminist Approaches to Disability Studies. (DSJ; 3 cr.; Student Option; Periodic Spring)
Dis/ability is not a physical or mental defect but a form of social meaning making mapped to certain bodies in larger systems of power and privilege. Feminist approaches to dis/ability as a vector of oppression intersecting and constituted through other oppression such as race, class, gender, sexuality and citizenship. Dis/ability must be understood through systems of power that construct, support, regulate, and determine the life chances of those who claim, or are claimed by disability. Deconstruct the complex ideologies of ableism and the material realities of such oppression, and work toward imagining and reconstructing a more just and equitable society.

GWSS 3290. Topics. (1-3 cr.; [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

GWSS 3301W. Women and the Arts. (AH, DSJ; 3 cr.; Student Option; Every Fall)
Study of women in the arts, as represented and as participants (creators, audiences). Discussion of at least two different art forms and works from at least two different U.S. ethnic or cultural communities.

GWSS 3302. Women Writers. (LITR, WI; 3 cr.; Student Option; Every Spring)
Topics covered include women's roles and ways women writers have used various genres of literature to articulate personal and social struggles. Fiction, poetry, drama, critical nonfiction texts. Fidelity/betrayal within relationships and societal perceptions. What images of femininity do these writers convey? How do formal and stylistic devices transform meaning?

GWSS 3303. Writing Differences: Literature by U.S. Women of Color. (DSJ, WI, LITR; 3 cr.; Student Option; Fall Odd Year)
Interpret/analyze poetry, fiction, and drama of U.S. women minority writers. Relationship of writer's history, ethnicity, race, class, and gender to her writings.

GWSS 3304. Novels and Nations. (GP, LITR; 3 cr.; Student Option; Periodic Fall)
Explore intricacies of web of fiction without losing sight of structures that hold it up.

GWSS 3305. Queer Cinema. (AH; 3 cr.; Student Option; Every Spring)
What "queer" and "queering" signify in relation to cinema. Directors, films, styles, genres of queer cinema. Why is a film not a film? What are traditional narrative codes that are subverted? Ideological dimensions. Impact of political climate. Readings, screenings, discussions, assignments.

GWSS 3306. Pop Culture Women. (AH, DSJ; 3 cr.; Student Option; Every Fall & Spring)
Contemporary U.S. feminism as political/intellectual movement. Ways in which movement has been represented in popular culture.

GWSS 3307. Feminist Film Studies. (AH, DSJ; 3 cr.; Student Option; Every Fall)
Construction of different notions of gender in film, social uses of these portrayals. Lectures on film criticism, film viewings, class discussions.

GWSS 3390. Topics: Visual, Cultural, and Literary Studies. (3 cr.; [max 6 cr.]; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

GWSS 3402. Pleasure, Intimacy and Violence. (3 cr.; Student Option; Spring Odd Year)

GWSS 3403W. Jewish Women in the United States. (DSJ, WI, HIS; 3 cr.; Student Option; Fall Even Year)
History of American Jewish women. Uses literary/religious texts, primary documents, films, and histories to analyze Jewish women's experiences in the United States and their transformation of Judaism, political activism, and their role in the bourgeois family. How they are represented, how they represent themselves. Interdisciplinary approach.

GWSS 3404. Transnational Sexualities. (GP; 3 cr.; Student Option; Fall Odd, Spring Even Year)
Lesbian/gay lives throughout world. Culturally-specific/transcultural aspects of lesbian/gay identity formation, political struggles, community involvement, and global networking. Lesbian/gay life in areas other than Europe and the United States.

GWSS 3406. Gender, Labor, and Politics. (GP, SOCS; 3 cr.; Student Option; Every Fall)
Historical developments/contemporary manifestations of women's participation in labor force/global economy. Gender as condition for creation/maintenance of exploitable category of workers. How women's choices are shaped in various locations. Women's labor organizing.

GWSS 3406H. Honors: Gender, Work, Labor. (GP, SOCS; 3 cr.; A-F only; Every Fall)
Historical developments/contemporary manifestations of women's participation in labor force/global economy. Gender as condition for creation/maintenance of exploitable category of workers. How women's choices are shaped in various locations. Women's labor organizing.

GWSS 3407. Women in Early and Victorian America: 1600-1890. (DSJ, HIS; 3 cr.; Student Option; Every Fall)
Varied experiences of women in American history from European settlement in North America to the end of the 19th century.

GWSS 3408. Women in Modern America. (AH; 3 cr.; Student Option; Every Spring)
History of women in the United States from 1890 to present. Women's changing roles in politics, in labor force, in family, and in popular culture. Work, family, sexuality, gender ideologies, women's right struggles. Different experiences of women based on race, class, religion, and region.

GWSS 3409W. Asian American Women's Cultural Production. (AH, WI, DSJ; 3 cr.; Student Option; Every Fall)
Analysis of media, art, literature, performance, on artistic contributions. History, politics, culture of Asian American women. Interpret cultural production to better understand role of race, gender, nation within American society/citizenship.

GWSS 3410. Chicana Studies: La Chicana in Contemporary Society. (AH, DSJ; 3 cr.; Student Option; Every Fall & Spring)
Scholarly/creative work of Chicanas or politically defined women of Mexican American community. Interdisciplinary. Historical context, cultural process, autoethnography.

GWSS 3412. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (DSJ, HIS; 3 cr.; A-F or Audit; Fall Even Year)
Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.

GWSS 3413. Women and Gender in Latin American History. (GP, HIS; 3 cr.; Student Option; Periodic Spring)
Changing gender norms in Latin America over time as compared with lives of women/men of diverse classes, ethnic groups. How women responded to their position in society, on continuum from accomodation to resistance.

GWSS 3415. Feminist Perspectives on Domestic Violence and Sexual Assault. (DSJ; 3 cr.; A-F only; Every Fall)
History of and contemporary thinking about public policies and legal remedies directed toward domestic violence and sexual assault.
GWSS 3490. Topics: Political Economy and Global Studies. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Topics specified in Class Schedule.


GWSS 3502. Transgender Studies Now. (DSJ; 3 cr.; Student Option: Periodic Spring) Transgender studies transforms ideas about gender, sexuality, identity, and biology. We look at knowledge as made about transgender life across disciplines and media: film, fiction, and the internet, as well as medicine, history, anthropology, and gender studies. Also asks how transgender social practices and community politics are embedded in dynamics of race, class, sexuality, nationality and ability.

GWSS 3549. U.S. Women's Legal History. (DSJ, HIS; 3 cr.; A-F or Audit; Fall Odd Year) Women's legal status, from colonial era through 20th century. Women's citizenship, civil rights. Marriage, divorce, and child custody. Reproductive/physical autonomy/integrity. Economic/educational equality. prereq: Soph or jr or sr

GWSS 3550. Topics: Social Change, Activism, Law, and Policy Studies. (3 cr. [max 6 cr.]; Student Option; Periodic Fall) Topics specified in Class Schedule.

GWSS 3615W. Women in European History: 1500 to the Present. (GP, WI, HIS; 3 cr.; Student Option; Spring Odd Year) History of women in Western Europe from early modern period to present. Organized thematically around changes crucial to women's lives in transition from early modern to modern Europe. Family/kinship structure, property, organization of work, religious, education, politics.

GWSS 3681. Gender and the Family in the Islamic World. (3 cr. [A-F only]; Periodic Spring) Experiences of Muslim women/families from historical/comparative perspective. Gender/family power relations in colonial representations, sexual politics, family, education/health, paid work, human rights, Islamic feminism. prereq: At least soph

GWSS 3993. Directed Study. (1-12 cr.; Student Option; Every Fall, Spring & Summer) TBD Prereq instr consent, dept consent, college consent.

GWSS 3994. Directed Research. (1-12 cr.; Student Option; Every Fall & Spring) TBD Prereq instr consent, dept consent, college consent.

GWSS 4001. Nations, Empires, Feminisms. (3 cr.; A-F only; Spring Even Year) Feminist critiques of the nation-state and citizenship, political economy and development, globalization, and/or empire and colonialism. Overview of the broader literature and an interrogation of specific attendant questions (such as how do feminists theorize state violence; what are feminist and queer critiques of U.S. empire; and how do feminists theorize globalization from above and below).

GWSS 4002. Politics of Engagement and Social Justice. (CIV; 3 cr.; A-F only; Fall Odd Year) Ways in which feminist scholars have thought about and worked to complicate the opposition between theory and praxis. Diverse efforts by intellectuals situated within the Western academy to produce scholarship that is committed to deinstitutionalizing knowledge production and relevant to political struggles confronted by their own material and institutional inequalities.

GWSS 4003. Science, Bodies, Technologies. (3 cr.; Student Option; Spring Odd Year) Feminist approaches to scientific methods and practices. Relationship between scientific practices and social relations, emphasizing the larger social, political, and economic context in which scientific knowledge production takes place. How scientific knowledge structures relationships of power and inequality, and constructs understandings of bodies and identities. Ways in which science shapes meanings of sex, race, gender and sexuality.

GWSS 4004. Queering Desire. (3 cr.; Student Option; Fall Even, Spring Odd Year) Core perspectives of queer theory. Recent extensions and manifestations.

GWSS 4103. Transnational Feminist Theory. (GP; 3 cr.; Student Option; Every Fall & Spring) Third World and transnational feminisms. Interrogating the categories of "women," "feminism," and "Third World." Varieties of power/oppression that women have endured/resisted, including colonization, nationalism, globalization, and capitalism. Concentrates on postcolonial context.

GWSS 4108. Senior Seminar: Writing. (1 cr.; A-F only; Every Spring) Capstone course. Conduct independent research/writing in conjunction with 3xxx-, 4xxx-, or 5xxx-level GWSS class. prereq: GWSS major [jr or sr]

GWSS 4303W. Writing Differences: Literature by U.S. Women of Color. (DSJ, WI, LITR; 3 cr.; Student Option; Fall Odd Year) Interpret/analyze poetry, fiction, drama of U.S. women minority writers. Relationship of writer's history, ethnicity, race, class, gender to writings.

GWSS 4390. Topics: Visual, Cultural, and Literary Studies. (3 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Sr or grad student or instr consent

GWSS 4401. Chicana/Latina Cultural Studies. (AH, DSJ; 3 cr.; Student Option; Fall Even Year) Readings in Chicana/Latina cultural studies. TV, film, art, music, dance, theatre, literature. Identity/sexuality. Production of culture/theory.

GWSS 4402. Rebels, Radicals, and Revolutionaries: History of Western Feminisms. (3 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Survey of main currents in history of western feminist thought, politics, and social movements from 1770s to present.

GWSS 4403. Queering Theory. (3 cr.; Student Option; Every Fall, Spring & Summer) Lesbianism/lesbian identities as products of cultural practices, relations, meanings that are historically specific/changing. prereq: Any GWSS or GLBT course

GWSS 4404. Gender, Nation, and Literature in Latin America. (3 cr.; Student Option; Periodic Fall) Latin American literature/film concerning gendered nature of Latin American politics, society, and history. Texts by (mostly) women writers/filmmakers. Texts are in English but available in Spanish or Portuguese. prereq: [1001 or course on feminist theory], [jr or sr]

GWSS 4406. Black Feminist Thought in the African and American Diasporas. (3 cr.; Student Option; Periodic Spring) Critically examine spatiality of African descendant women in Americas/larger black diaspora. Writings from black feminist/queer geographies, history, contemporary cultural criticism. Recent black feminist theorizing.

GWSS 4980. Directed Instruction. (1-8 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Guided individual reading or study.

GWSS 4993. Directed Study. (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) TBD prereq: Filled out student/faculty contract, instr consent, dept consent, college consent

GWSS 4994. Directed Research. (1-8 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Guided individual reading or study.

GWSS 5104. Transnational Feminist Theory. (3 cr.; Student Option; Fall Odd Year) Third World and transnational feminisms. Interrogating the categories of "women," "feminism," and "Third World." Varieties of power/oppression that women have endured/resisted, including colonization, nationalism, globalization, and capitalism. Concentrates on postcolonial context.

GWSS 5190. Topics: Theory, Knowledge, and Power. (3 cr.; Student Option; Fall Odd, Spring Even Year) Topics specified in Class Schedule.

GWSS 5290. Topics: Biology, Health, and Environmental Studies. (3 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule.

GWSS 5390. Topics: Visual, Cultural, and Literary Studies. (3 cr. [max 6 cr.]; Student Option; Fall Odd Year)
GWSS 5406. Black Feminist Thought in the American and African Diasporas. (3 cr.; Student Option; Periodic Fall & Spring)
Critically examines spatiality of African descendant women in Americas/larger black diaspora. Writings from black feminist/queer geographies, history, contemporary cultural criticism. Recent black feminist theorizing.

GWSS 5490. Topics: Political Economy and Global Studies. (3 cr. [max 12 cr.]; Student Option; Every Spring)
Topics specified in Class Schedule.

GWSS 5993. Directed Study. (1-12 cr.; Student Option; Every Fall, Spring & Summer) TBD

GWSS 5994. Directed Instruction. (1-12 cr. [max 36 cr.]; Student Option; Every Fall, Spring & Summer) TBD

GWSS 5995. Directed Research. (1-8 cr. [max 36 cr.]; Student Option; Every Fall & Spring) TBD

GWSS 8101. Intellectual History of Feminism. (3 cr.; Student Option; Periodic Fall & Spring)
Major trends in feminist intellectual history from 14th century to the present, especially in the United States and Europe.

GWSS 8102. Advanced Studies in Sexuality. (3 cr.; Student Option; Fall Odd Year)
Contemporary theoretical scholarship/research on selected issues related to sexuality, gender, and the body. prereq: Priority given to feminist studies grad students

GWSS 8103. Feminist Theories of Knowledge. (3 cr.; Student Option; Periodic Fall)
Interdisciplinary seminar. Feminist approaches to knowledge and to criticism of paradigms of knowledge operative in the disciplines. Feminist use of concepts of subjectivity, objectivity, and intersubjectivity. Feminist empiricism, standpoint theory, and contextualism. Postmodern and postcolonial theorizing.

GWSS 8107. Feminist Pedagogies. (3 cr.; Student Option; Spring Odd Year)
Explore feminist theories/critical approaches to pedagogy. Develop teaching philosophy statement, design syllabus, practice teach/learn problem-solving strategies for classroom. prereq: Feminist Studies grad student [Major or Minor] or instr consent

GWSS 8108. Genealogies of Feminist Theory. (3 cr.; Student Option; Every Fall)
Two-semester seminar. First term: debates in gender theory; intersections of gender theory with critical race theory, post-colonial theory, sexuality theory, social class analysis. Second term: inter-/multi-disciplinary feminist research methodologies from humanities/social sciences, prereq: Feminist studies PhD or grad minor student or instr consent

GWSS 8109. Feminist Knowledge Production. (3 cr.; Student Option; Every Spring)
Two-semester interdisciplinary seminar. First term: debates in gender theory; gender theory, critical race theory, post-colonial theory, sexuality theory, social class analysis. Second term: inter-/multi-disciplinary feminist research methods from humanities/social sciences. prereq: Feminist studies PhD or grad minor student or instr consent

GWSS 8201. Feminist Theory and Methods in the Social Sciences. (3 cr.; Student Option; Periodic Fall & Spring)
Seminar on recent theories, including feminist versions of positivist, interpretivist, critical theoretical, and postmodernist models of social science knowledge. Methodologies congenial to feminist practices of inquiry, including use of narrative in theory, feminist ethnography, discourse analysis, and comparative methods in history.

GWSS 8210. Seminar: Feminist Theory & Praxis. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Topics in feminist theory.

GWSS 8220. Seminar: Science, Technology & Environmental Justice. (3 cr. [max 6 cr.]; Student Option; Periodic Spring)
Topics related to science, technology, environmental justice.

GWSS 8230. Seminar: Cultural Criticism and Media Studies. (3 cr. [max 6 cr.]; Student Option; Periodic Spring)
Topics in literature, film, art.

GWSS 8240. Seminar: Transnational, Postcolonial, Diaspora. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Graduate topics in comparative/global studies.

GWSS 8250. Seminar: Nation, State, and Citizenship. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Topics related to nation, state, citizenship.

GWSS 8260. Seminar: Race, Representation and Resistance. (3 cr. [max 6 cr.]; Student Option; Every Spring)
Race, racialization, racial justice as related to representation/struggles for social/economic justice. Intersectional analysis of power, politics, ideology/identity. Queer of color critique, women of color feminisms, critical sex/body positive approaches. prereq: Grad student

GWSS 8270. Seminar: Theories of Body. (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
How body is configured in many social arenas. Legal decisions, public policy, medical research, cultural customs. Examine how attitudes toward male/female bodies influence social myths/discourses about social policy/ change.

GWSS 8301. Feminist Literary Criticism. (3 cr.; Student Option; Periodic Fall & Spring)
Recent developments and major issues in feminist studies of literature. Introduction to array of scholars and scholarship in field of feminist literary theory and criticism, emphasizing broad range of feminist textual analysis taking place in various University departments.

GWSS 8333. FTE: Master’s. (3 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master’s student, adviser and DGS consent

GWSS 8444. FTE: Doctoral. (3 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

GWSS 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

GWSS 8888. Thesis Credit: Doctoral. (1-24 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

GWSS 8993. Directed Study. (1-6 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 8994. Directed Instruction. (1-8 cr. [max 36 cr.]; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 8994. Directed Instruction. (1-8 cr. [max 36 cr.]; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 8995. Directed Research. (1-8 cr. [max 36 cr.]; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 8996. Feminist Studies Colloquium. (1 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring)
TBD prereq: Grad major or minor in feminist studies

GWSS 8997. Feminist Research and Writing. (1-3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Develops interdisciplinary feminist components of Ph.D. thesis or other major piece of writing. Facilitates research/writing. prereq: 8109, passed written prelims in degree granting program

GWSS 8998. Professional Development. (1-3 cr. [max 6 cr.]; S-N only; Every Spring)
Workshop addressing one of a variety of professional development issues including, but not limited to, grant writing, book reviewing, revising term papers for publication, course development, writing and presenting conference papers, preparing to enter the job market (writing a c.v./application letter, preparing for interviews, job talk). Prereq Grad student.
General Dentistry (GEND)

GEND 5151. Advanced General Dentistry Seminar I. (5-10 cr.; S-N or Audit; Every Fall & Spring)
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5152. Advanced General Dentistry Seminar II. (5-10 cr.; S-N or Audit; Every Fall)
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5153. Advanced General Dentistry Seminar III. (2-10 cr.; S-N or Audit; Every Fall & Spring)
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5254. Advanced General Dentistry Clinic I. (5-15 cr.; S-N or Audit; Every Fall & Summer)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5255. Advanced General Dentistry Clinic II. (5-10 cr.; S-N or Audit; Every Fall)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5256. Advanced General Dentistry Clinic III. (5-10 cr.; S-N or Audit; Every Fall & Spring)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5256. Advanced General Dentistry Clinic IV. (1-15 cr.; S-N or Audit; Every Summer)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5264. Advanced General Dentistry Clinic V. (1-15 cr.; S-N or Audit; Every Fall)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 6266. Advanced General Dentistry Clinic VI. (1-15 cr.; S-N or Audit; Every Fall & Spring)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

Field experience in hospital dental clinic administration for residents.

GEND 6264. General Practice Clinic IV. (10-15 cr.; S-N or Audit; Periodic Fall & Spring)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6265. General Practice Clinic V. (10-15 cr.; S-N or Audit; Every Fall)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6266. General Practice Clinic VI. (10-15 cr.; S-N or Audit; Every Fall & Spring)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

Genetics, Cell Biol/Developmnt (GCD)

GCD 2002W. Ethical and Social Challenges in Genetics. (TS;WI; 3 cr.; A-F only; Every Fall)
For nonscientists. Advances in genetics and their application to society. Ethical and social issues of advancements in genomics and genetics in our everyday lives. prereq: BIOL 1009 or equiv

GCD 3022. Genetics. (3 cr.; Student Option; Every Fall, Spring & Summer)
Mechanisms of heredity, implications for biological populations. Applications to practical problems. prereq: BIOL 2002 or BIOL 1009

GCD 3033. Principles of Cell Biology. (3 cr.; A-F only; Every Spring)
Components and activities common to eukaryotic cells. Chromosomes, membranes, organelles and the cytoskeleton, and processes including cellular communication, replication, motility, transport and gene expression. Relevance to human health and medicine. Appropriate for non-CBS majors. prereq: BIOL 1009 or equiv

GCD 3485. Bioinformatic Analysis: Introduction to the Computational Characterization of Genes and Proteins. (3 cr.; A-F only; Every Spring)
Use of computer applications in manipulation/analysis of DNA, RNA, and protein sequences. prereq: One semester of college biology

GCD 4005W. Cell Biology - Writing Intensive. (WI; 4 cr.; A-F only; Every Spring)

GCD 4025. Cell Biology, Development & Regeneration Laboratory. (3 cr.; Student Option; Every Spring)
This course is designed for juniors and seniors to learn experimental approaches and techniques to study cellular processes and stem cell biology during animal development
and tissue regeneration. Students will be exposed to the advantages of different model systems that include cultured cells, chick, C. elegans and zebrafish. Students will learn to manipulate the cytoskeleton, perform cell differentiation, RNAi and regeneration assays, and to image both fixed tissue and live animal samples with conventional light microscopes as well as cutting edge technology, including super-resolution and multi-photon microscopes. prereq: Biol 4004 or instr consent

GCD 4034. Molecular Genetics. (3 cr.; Student Option; Every Spring) Molecular genetics of prokaryotes/eukaryotes. Gene regulation, genome analysis. Modern techniques such as recombinant DNA, targeted mutations, genome manipulation, and gene chip technology. prereq: Biol 4003, Biol 4004; advanced bioscience undergrad recommended

GCD 4111. Histology: Cell and Tissue Organization. (4 cr.; Student Option; Every Spring) Structure/function of vertebrate tissues/ organs. Electron microscopy, light microscopy, physiology, cell biology of higher animals. Light microscopy of mammalian tissues. prereq: 3033 or Biol 4004 or instr consent

GCD 4134. Endocrinology. (3 cr.; Student Option; Every Spring) Survey of structure and function of invertebrate and vertebrate endocrine systems. prereq: Biol 3211 or Biol/BioC 3021 or BioC 4331 or instr consent

GCD 4143. Human Genetics. (3 cr.; Student Option; Every Spring) Principles of human genetics at the molecular, cellular, individual, and populations levels. Chromosomal and biochemical disorders; gene mapping; mutation and natural selection; variation in intelligence and behavior; genetic screening, counseling and therapy. prereq: 3022 or Biol 4003 or instr consent

GCD 4151. Molecular Biology of Cancer. (3 cr.; A-F or Audit; Periodic Spring) Regulatory pathways involved in directing normal development of complex eukaryotic organisms, how disruptions of these pathways can lead to abnormal cell growth/cancer. Causes, detection, treatment, prevention of cancer. prereq: Biol 4003

GCD 4161. Developmental Biology. (3 cr.; Student Option; Every Fall) Mechanisms that govern development from gametogenesis through fertilization. Embryogenesis/postembryonic development. Mechanisms of morphogenesis/differentiation. Classical/molecular approaches in various model organisms. Genetic models such as bacteriophage, yeast, Drosophila, C. elegans, Arabidopsis, zebrafish, and the mouse. prereq: Biol 4003; concurrent registration is required (or allowed) in BIOL 4004 recommended

GCD 4171. Stem Cells in Biology and Medicine. (3 cr.; A-F only; Every Spring) Contempory stem cell biology with emphasis on mechanisms/applications. Embryonic, tissue-specific, and induced pluripotent stem cells and potential uses in human disease. prereq: BIOL 4003; [BIOL 4004 or concurrent registration is required (or allowed) in BIOL 4004 or instr consent]

GCD 4793W. Directed Studies: Writing Intensive. (WI: 1-7 cr.; S-N or Audit; Every Fall & Summer) Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature. Written report. prereq: instr consent, dept consent

GCD 4794W. Directed Research: Writing Intensive. (WI: 1-6 cr.; max 42 cr.; S-N or Audit; Every Fall, Spring & Summer) Laboratory or field investigation of selected areas of research including written report. prereq: instr consent, dept consent

GCD 4993. Directed Studies. (1-7 cr.; S-N or Audit; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes selected readings and use of scientific literature. prereq: instr consent, dept consent

GCD 4994. Directed Research. (1-6 cr.; max 42 cr.; S-N or Audit; Every Fall, Spring & Summer) Laboratory or field investigation of selected areas of research. prereq: instr consent, dept consent

GCD 5005. Computer Programming for Cell Biology. (3 cr.; Student Option; Every Fall) Computer programming skills with applications in biology. Design/build new computer programs for applications in cell/developmental biology, including modeling of biological processes, advanced data analysis, automated image analysis. prereq: BIOL 4003, BIOL4004 (4004 may be taken concurrently or may be waived with instr consent), biological statistics, one semester of calculus

GCD 5036. Molecular Cell Biology. (3 cr.; Student Option; Every Fall) Modern, integrative approaches combining cell/ molecular biology, biochemistry, and genetics to investigate cell organization/function. Membranes, signaling, extracellular matrix, secretion, endocytosis, cytoskeleton, nucleus. Analysis of scientific papers to illustrate new concepts in and experimental approaches to cell organization/function. prereq: Biol 4004 or instr consent; [sr or grad student] recommended

GCD 6103. Human Histology. (3 cr.; P-N or Audit; Every Fall) Human histology is a lecture and laboratory class covering light and electron microscopic analysis of tissues and their organization into human organs. The emphasis is on integrating structure and its relationship to function at levels from molecules to organs. prereq: Enrolled as medical or dental student or instr consent

GCD 6110. Science of Medical Practice. (3-6 cr.; A-F or Audit; Every Fall) Combines Biochemistry/Medical Genetics aimed toward Medical/Genetic Counseling students. Biochemistry content covers genome organization, transcription, metabolism, nutrition, stem cell biology, cell signaling, cancer. Genetics content covers inheritance, genetic/genomic conditions, inborn errors of metabolism, cancer genetics, complex inheritance/genetic susceptibility to disease, birth defects. Meets with INMD 6802. prereq: Medical student or MCDB concurrent registration is required (or allowed) in G MS student with genetic counseling specialization or instr consent

GCD 8001. Genetic Counseling Clinical Internship I. (3 cr. [max 6 cr.]; A-F only; Every Summer) This is a 10-week clinical internship in genetic counseling practice. Students in this course will be assigned to an appropriate clinic affiliated with the graduate program of study in genetic counseling. Students must be enrolled in the program in order to take this course. Students will be expected to attend clinic and under the supervision of a board certified genetic counselor or medical geneticist, students are expected to log a minimum case load as defined by the Accreditation Council for Genetic Counseling (ACGC), the American Board of Genetic Counseling and the graduate program in genetic counseling at the University of Minnesota. The actual days and hours of the assigned clinic will be set by the clinical supervisor on site.

GCD 8002. Genetic Counseling Clinical Internship II. (5 cr. [max 10 cr.]; A-F only; Every Fall) This is a 15-week clinical internship course in genetic counseling practice. Students in this course will be assigned two appropriate clinics affiliated with the graduate program of study in genetic counseling. Students must be enrolled in the program in order to take this course. Students will be expected to attend clinic and will provide genetic counseling services under the supervision of a board certified genetic counselor or medical geneticist. Students are expected to log a minimum caseload that meets the criteria for clinical training by the Accreditation Council for Genetic Counseling (ACGC), the American Board of Genetic Counseling and the graduate program in genetic counseling at the University of Minnesota. The actual days and hours of the assigned clinics will be set by the clinical supervisor on site.

GCD 8008. Mammalian Gene Transfer and Expression. (2 cr.; A-F or Audit; Every Spring) Current gene transfer technology. Applications of genetic modifications in animals, particularly transgenic animals and human gene therapy. prereq: instr consent

GCD 8014. Small RNA Biology. (2 cr.; A-F or Audit; Every Spring) Small RNAs as major regulators of gene and protein expression. MicroRNAs and their potential use in diagnosis and prognosis of various disease conditions including cancers. Biology of small RNAs and their role in health and disease. prereq: MICA 8004 or BIOC 8002 or equiv or instr consent

GCD 8073. Advanced Human Genetics. (3 cr.; Student Option; Every Spring)
Application of molecular, biochemical, chromosomal, and population genetics to human variation and disease. Abnormal chromosome number and structure; abnormal enzyme, structural protein, receptor and transport; analysis of inheritance patterns; behavioral genetics; genetic basis of common disease. Current research articles in human genetics. prereq: Grad MCDG major or instr consent

GCD 8103. Human Histology. (3 cr.; Student Option; Every Fall) Light/electron microscopic anatomy of tissues and their organization into human organs. Emphasizes integrating structure, its relationship to function at levels from molecules to organs. Lecture, lab. prereq: Undergraduate biology, chemistry, math, and physics course; instr consent

GCD 8131. Advanced Molecular Genetics and Genomics. (3 cr.; Student Option; Every Fall & Spring) Literature-based course in modern molecular genetic and genomics research. Students will gain a deep understanding of the fundamental molecular mechanisms controlling inheritance in biological systems. Students will gain a facility in thinking critically and creatively about how genes work at cellular, organismal, and transgenerational levels. Course instruction emphasizes active-learning approaches, student presentations, and group projects. prereq: [3022 or BIOL 4003], [BIOC 3021 or BIOC 4331] or instr consent

GCD 8151. Cell Structure and Function. (3 cr.; Student Option; Every Fall) Structure, function, and biochemistry of cellular organelles. Cellular interactions in eukaryotes. Emphasizes membranes, secretion, trafficking, cytoskeleton, cell motility, nucleus, cell cycle, apoptosis, cell signaling, and signal transduction mechanisms. prereq: [[4034 or 8121 or BioG 8002], Biol 4004] or BMBB or MCDG concurrent registration is required (or allowed) in G grad student or instr consent

GCD 8161. Advanced Developmental Biology. (3 cr.; Student Option; Every Spring) Current concepts/experimental approaches to basic mechanisms of development. Model organisms. Embryology, cell fate determination, differentiation, pattern formation, polarity, cell migration, cell interactions. Analysis of original research articles, prereq: [BMBB or MCDG concurrent registration is required (or allowed) in G grad student or GCD4161] or [[GCD 8131 or Biol 4003], Biol 4004, GCD4034] or instr consent

GCD 8171. Literature Analysis. (3 cr.; A-F or Audit; Every Fall & Spring) Critical reading and evaluation of current literature. May include evaluation of both excellent and flawed papers. Intensive and in-depth discussions of selected papers in molecular biology, genetics, cell biology, and developmental biology. prereq: Grad MCDG major

GCD 8900. Seminar. (1-2 cr. max 8 cr.); S-N or Audit; Every Fall & Spring) Current scientific research. prereq: Grad MCDG major or instr consent

GCD 8911. Introduction to Genetic Counseling Skills and Practice. (3 cr.; A-F only; Every Fall) Course focuses on basic concepts used in clinical genetic counseling practice. Students learn the necessary skills to prepare for and implement a genetic counseling session. The class will cover a variety of areas in the genetic counseling sub-specialty of perinatal genetics as well as newborn screening. Students will practice communicating genetics and medical information in a patient-friendly manner. At the end of the semester, students will be equipped with tools to assess medical and family histories, present genetic cases, and role play genetic counseling sessions. prereq: This class is intended for Molecular, Cellular, Biology and Genetics M.S. students with genetic counseling specialization.

GCD 8912. Genetic Counseling in Practice. (4 cr.; A-F or Audit; Every Spring) Practical genetic counseling, communicating genetics and medical information to the family, helping families with decision making, prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8913. Psychosocial Issues in Genetic Counseling. (3 cr.; A-F or Audit; Every Fall) Interviewing skills, supportive counseling, and case-study analysis specific to genetic counseling, prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8914. Ethical and Legal Issues in Genetic Counseling. (3 cr.; A-F or Audit; Every Spring) Professional ethics; ethical and legal concerns with new genetic technologies. prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8920. Special Topics. (2 cr.; A-F only; Every Fall & Spring) Special topics prereq: Grad student or instr consent

GCD 8993. Directed Studies. (1-5 cr. max 15 cr.; Student Option; Every Fall, Spring & Summer) tbd prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8994. Research. (1-5 cr. max 20 cr.; S-N or Audit; Every Fall, Spring & Summer) Independent research determined by student's interests, in consultation with faculty mentor. prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8994. Research. (1-5 cr. max 20 cr.; S-N or Audit; Every Fall, Spring & Summer) Independent research determined by student's interests, in consultation with faculty mentor. prereq: MCDG MS student with genetic counseling specialization or instr consent

GID 5555. Basic Spatial Analysis. (3 cr.; Student Option; Every Fall) How to use spatial data to answer questions on a wide array of social, natural, and information science issues. Exploratory data analysis/visualization. Spatial autocorrelation analysis/regression. prereq: [STAT 3001 or equiv, MGIS student] or instr consent

GID 5571. ArcGIS I. (3 cr.; Student Option; Every Fall) First of a two-course series focusing on ArcGIS Desktop. Overview of ArcGIS system and its use for spatial data processing. Data capture, editing, geometric transformations, map projections, topology, Python scripting, and map production. prereq: [GEOG 5561 or equiv, status in MGIS program, familiarity with computer operating systems] or instr consent

GID 5572. ArcGIS II. (3 cr.; Student Option; Every Spring) Continues GIS 5571. Raster analysis, dynamic segmentation, geometric networks, geocoding, Python scripting, and data interoperability. Substantial projects include map and poster design and production. prereq: [5571, [GEOG 5561 or equiv], in MGIS program] or instr consent

GID 5573. Introduction to Digital Mapping: ArcGIS Basics. (2 cr.; A-F only; Every Fall) Desktop mapping functions using ArcGIS software. Application of systems to display/analysis of geographical data. prereq: [GEOG 5561 or equiv, in MGIS program] or instr consent

GID 5574. Web GIS and Services. (3 cr.; Student Option; Every Fall) Plan, design, develop, publish web-based GIS solution. Build websites, prepare data for web. Commercial software, Open Source software, volunteer geographic information, open GIS standards/developing web GIS application. Hands-on experience with variety of web GIS technologies/software. prereq: [GEOG 5561 or equiv, in MGIS program] or instr consent

GID 5575. Practical Surveying for GIS. (2 cr.; Student Option; Every Spring) Surveying techniques/relationship to GPS GIS professionals. Geodesy, data adjustment, datums, ellipsoids, coordinate systems, transformations. prereq: GEOG 5561 or equiv in MGIS program or instr consent

GID 5577. Spatial Database Design and Administration. (3 cr.; Student Option; Every Spring) Spatial database design, development planning/management, maintenance, security, access/distribution, and documentation. prereq: instr consent

GID 5578. GIS Programming. (3 cr.; Student Option; Every Spring) Programming techniques using Python and other languages specifically relating to GIS technologies. prereq: instr consent

GID 5590. Special Topics in GIS. (1-3 cr.; A-F or Audit; Every Fall, Spring & Summer) Topics vary according to curricular needs, technological developments in field.
GIS 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall & Spring) (No description) prereq: Master's student, adviser and DGS consent

GIS 8501. GIS Project Management and Professional Development. (3 cr.; A-F only; Every Fall) Project management/professional development. Portfolio creation, career exploration, degree program planning. GIS project management through lectures, class exercises, guest speakers. prereq: MGIS student or inst consent

GIS 8990. Research Problems in GIS. (1-6 cr.; A-F only; Every Fall, Spring & Summer) Project of sufficient scope/complexity to document student's ability to apply spatial analysis and visualization techniques to real-world problems. Supervised by faculty member. prereq: MGIS student, inst consent

GEOG 1425. Introduction to Weather and Climate. (ENV,PHYS; 4 cr.; Student Option; Every Fall & Spring) A pre-calculus introduction to the nature of the atmosphere and its behavior. Topics covered include atmospheric composition, structure, stability, and motion; precipitation processes, air masses, fronts, cyclones, and anticyclones; general weather patterns; meteorological instruments and observation; weather map analysis; and weather forecasting.

GEOG 1502. Mapping Our World. (SOCI,TS; 3 cr.; Student Option; Every Fall & Spring) Fundamental issues related to acquisition, storage, manipulation, analysis, display, and interpretation of spatially-referenced data. Emphasizes mathematical analysis of data, interpretation of cultural/physical patterns critical to development of geographical reasoning.

GEOG 1901. Freshman Seminar. (ENV; 3 cr.; A-F only; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Fr

GEOG 1905. Freshman Seminar. (; 3 cr.; Student Option; Every Fall) Topics specified in Class Schedule.

GEOG 1973. Geography of the Twin Cities. (SOCI,TS; 3 cr.; Student Option; Every Fall & Spring) The geography of the cities of the two metropolitan areas. Founded in 1849, they today comprise a metropolitan area of more than 2 million people. A unique case of the American city.

GEOG 1301W. Our Globalizing World. (GP, WI, SOCS; 3 cr.; Student Option; Every Fall, Spring & Summer) Introduction to geographical understandings of globalization and of connections/differences between places.


GEOG 1403W. Urbanism and Globalization. (BIOL, ENV; 4 cr.; Student Option; Every Fall & Spring) The geography of biodiversity and productivity, from conspicuous species to those that cause human disease and economic hardship. The roles played by evolution and extinction, fluxes of energy, water, biochemicals, and dispersal. Experiments demonstrating interactions of managed and unmanaged biotic with the hydrologic cycle, energy budgets, nutrient cycles, the carbon budget, and soil processes.

GEOG 1403H. Honors: Biogeography of the Global Garden. (BIOL, ENV; 4 cr.; A-F only; Every Fall & Spring) The geography of biodiversity and productivity, from conspicuous species to those that cause human disease and economic hardship. The roles played by evolution and extinction, fluxes of energy, water, biochemicals, and dispersal. Experiments demonstrating interactions of managed and unmanaged biotic with the hydrologic cycle, energy budgets, nutrient cycles, the carbon budget, and soil processes. prereq: Honors

GEOG 1425. Introduction to Weather and Climate. (ENV, PHYS; 4 cr.; Student Option; Every Fall & Spring) A pre-calculus introduction to the nature of the atmosphere and its behavior. Topics covered include atmospheric composition, structure, stability, and motion; precipitation processes, air masses, fronts, cyclones, and anticyclones; general weather patterns; meteorological instruments and observation; weather map analysis; and weather forecasting.


GEOG 3331. Geography of the World Economy. (GP, SOCS; 3 cr.; Student Option; Every Fall, Spring & Summer) Geographical distribution of resources affecting development; location of agriculture, industry, services; geography of communications; agglomeration of economic activities, urbanization, regional growth; international trade; changing global development inequalities; impact of globalization and finance on the welfare of nations, regions, cities.

GEOG 3361W. Geography and Public Policy. (WI; 3 cr.; Student Option; Every Fall) Nature/effects of federal policy in the United States. How documents produced as policy are crafted/implemented. Policies relating to food/agriculture, forestry, wildlife, and transportation.

GEOG 3371W. Cities, Citizens, and Communities. (DSJ, WI; 4 cr.; Student Option; Every Fall, Spring & Summer) Introduction to cities and suburbs as unique crossroads of cultural, social, and political processes. Competing/conflicting visions of city life, cultural diversity, and justice. Focuses on the American city.

GEOG 3373. Changing Form of the City. (GP, HIS; 3 cr.; Student Option; Every Spring) Urban origins, ancient cultures/cities, the medieval city, rediscovery of planning, colonial cities. Industrialization and urban expansion. Speculative cities, utopian cities, planning triumphs/disasters. Cities as reflections of society, culture, the past.

GEOG 3374. Honors: The City in Film. (AH, WI; 4 cr.; A-F only; Every Spring) Cinematic portrayal of changes in 20th-century cities worldwide. Social/cultural conflict, political/economic processes, changing gender relationships, rural versus urban areas, population development issues (especially as they affect women/children). Additional weekly meeting discusses films, readings. Project on a topic selected in consultation with instructor. prereq: honors

GEOG 3374W. The City in Film. (AH, WI; 4 cr.; Student Option; Every Spring) Cinematic portrayal of changes in 20th-century cities worldwide including social and cultural conflict, political and economic processes, changing gender relationships, rural versus urban areas, and population and development issues (especially as they affect women and children).

GEOG 3376. Political Ecology of North America. (ENV; 3 cr.; Student Option; Every Fall)
Social production of nature in North America related to questions of social/environmental justice. Economic, political, cultural, ecological relations that shape specific urban/rural environments, social movements that have arisen in response to environmental change. Importance of culture/identity in struggles over resources/environments.

GEOG 3377. Music in the City. (AH,DSJ; 3 cr.; A-F or Audit; Every Spring) Geographical conceptions of place, space, embodiment, identity. Case studies of music.


GEOG 3381W. Population in an Interacting World. (GP, WI, SOCS; 4 cr.; Student Option; Every Fall, Spring & Summer) Comparative analysis and explanation of trends in fertility, mortality, internal and international migration in different parts of the world; world population problems; population policies; theories of population growth; impact of population growth on food supply and the environment.

GEOG 3388. Going Places: Geographies of Travel and Tourism. (CIV; 3 cr.; A-F only; Every Spring) Global flows of tourism from perspective of debates about consumption, development, identity, and the environment. Close reading, field trips, discussion of films, research paper.

GEOG 3401. Geography of Environmental Systems and Global Change. (ENV; 4 cr.; A-F or Audit; Every Spring) Geographic patterns, dynamics, and interactions of atmospheric, hydrospheric, geomorphic, pedologic, and biologic systems as context for human population, development, and resource use patterns.

GEOG 3411W. Geography of Health and Health Care. (WI; 4 cr.; Student Option; Every Fall) Application of human ecology, spatial analysis, political economy, and other geographical approaches to analyze problems of health and health care. Topics include distribution and diffusion of disease; impact of environmental, demographic, and social change on health; distribution, accessibility, and utilization of health practitioners and facilities.

GEOG 3431. Plant and Animal Geography. (3 cr.; Student Option; Periodic Fall & Spring) Introduction to biogeography. Focuses on patterns of plant and animal distributions at different scales over time/space. Evolutionary, ecological, and applied biogeography. Paleobiogeography, vegetation-environment relationships, vegetation dynamics/disturbance ecology, human impact on plants/animals, nature conservation. Discussions, group/individual projects, local field trips.

GEOG 3511. Principles of Cartography. (4 cr.; Student Option; Periodic Spring) History and development of U.S. academic cartography, coordinate systems and map projections, data classification and map generalization, methods of thematic symbolization, and cartographic design. A series of computer-based lab exercises will apply conceptual lecture material to the creation of thematic maps. prereq: 3 cr in geog or instr consent

GEOG 3521. Digital Planet: Understanding Your World in the Information Age. (TS; 3 cr.; Student Option; Every Fall) Mobile geospatial information technologies--from cell phone tracking/vehicle navigation to virtual globe mapping. Potentials, limits, and concerns about their use and ongoing developments. Use GPS and video to produce a GeoDiary. Surveillance, cyberspace, and more common geospatial applications, especially those relying on mobile devices.


GEOG 3531. Numerical Spatial Analysis. (4 cr.; Student Option; Every Fall & Summer) Introduction to theoretical and applied aspects of geographical quantitative methods with a focus on spatial analysis. Emphasis placed on the analysis of geographical data for spatial problem solving in both the human and physical areas of the discipline.

GEOG 3561. Principles of Geographic Information Science. (4 cr.; Student Option; Every Fall & Spring) Introduction to study of geographic information systems (GIS) for geography and non-geography students. Topics include GIS application domains, data models and sources, analysis methods and output techniques. Lectures, readings and hands-on experience with GIS software. prereq: Jr or sr

GEOG 3573. Introduction to Digital Mapping: ArcGIS Basis. (2 cr.; A-F only; Every Fall) Desktop mapping functions using ArcGIS software. Application of systems to display/analysis of geographical data.

GEOG 3839. Introduction to Dendrochronology. (3 cr.; Student Option; Every Fall) Historical development, operational techniques, biological background, and principles of tree ring analysis. Applications of tree-ring data to investigate environmental change and past cultures. prereq: [1403, [BIOL 1001 or BIOL 1009 or equiv]] or instr consent

GEOG 3900. Topics in Geography. (3 cr.; [max 9 cr.]; Student Option; Periodic Fall & Spring) Special topics/regions covered by visiting professors in their research fields.

GEOG 3973. Geography of the Twin Cities. (SOCS; 3 cr.; Student Option; Every Fall & Spring) Social/physical characteristics of Twin Cities. Their place in U.S. urban network.

GEOG 3985V. Seniors Honors Project Seminar. (WI; 4 cr.; Student Option; Every Fall & Spring) Completion of research/writing of senior project. prereq: Honors, instr consent

GEOG 3985W. Senior Project Seminar. (WI; 4 cr.; Student Option; Every Fall, Spring & Summer) Complete the research/writing of senior project. prereq: [jr or sr], instr consent

GEOG 3992. Directed Reading. (1-8 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Guided individual reading. Prereq-instr consent, dept consent, college consent.

GEOG 3993. Directed Studies. (1-8 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Guided individual study. Prereq-instr consent, dept consent, college consent.

GEOG 3993H. Honors: Directed Studies. (1-8 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Guided individual study. Prereq honors, instr consent, dept consent, college consent.

GEOG 3994. Directed Research. (1-8 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Individual guided research. Prereq instr consent, dept consent, college consent.

GEOG 3994H. Honors: Directed Research. (1-8 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Individual guided research. Prereq honors, instr consent, dept consent, college consent.

GEOG 3995. Community Service Learning Supplemental Credit. (1-4 cr. [max 8 cr.]; Student Option; Periodic Fall) Community service learning component added to course. prereq: [concurrent registration is required (or allowed) in 3xxx or concurrent registration is required (or allowed) in 5xxx] geography course with structured community service learning component, instr consent

GEOG 3996. Senior Project Directed Research. (3-4 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer) Individual guided research course taken in fulfillment of the senior project requirement. Prereq instr consent, dept consent, college consent.

GEOG 3996H. Honors: Senior Project Directed Research. (3-4 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer) Individual guided research course taken in fulfillment of the senior project requirement. Prereq instr consent, dept consent, college consent.

GEOG 3997. Senior Project. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer) Senior Project add-on credit. Must be taken concurrently with required or elective course.
related to area of specialization. Prereq instr consent, dept consent, college consent.

GEOG 3997H. Honors: Senior Project. (3-4 cr. max: 4 cr.) [A-F only; Every Fall, Spring & Summer]
Senior Project add-on credit. Must be taken concurrently with required or elective course related to area of specialization. Prereq instr consent, dept consent, college consent.

GEOG 4001. Modes of Geographic Inquiry. (4 cr.; Student Option; Every Fall, Spring & Summer)
Examination of competing approaches to the study of geography. Environmental determinism; regional tradition; scientific revolution; behavioral geography; modeling and quantitative geography; radical geography; interpretive and qualitative approaches; feminist and postmodern geography; ecological thinking and complexity; geographic ethics.

GEOG 4002W. Environmental Thought and Practice. (WI; 3 cr.; Student Option; Periodic Spring)
Changing conceptions of nature, culture, and environment in Western social/political thought. How our understanding of humans/nonhumans has been transformed by scientific and technological practices. Interdisciplinary, reading intensive. prereq: Jr or sr

GEOG 5361. Geography and Real Estate. (4 cr.; Student Option; Every Spring)
Origins and evolution of land ownership in the United States.

GEOG 5374. The City in Film. (WI; 4 cr.; Student Option; Every Spring)
Cinematic portrayal of changes in 20th-century cities worldwide. Social/cultural conflict, political/economic processes, changing gender relationships, rural versus urban areas, population/development issues (especially as they affect women/children). Meets concurrently with 3374. Additional weekly meeting discusses films, readings. Project on a topic selected in consultation with instructor. prereq: grad student or instr consent

GEOG 5385. Globalization and Development: Political Economy. (4 cr.; Student Option; Periodic Fall & Spring)
Nature/scope of modern world system (capitalism), its impact on regional development processes. Roles of state and of international financial institutions. prereq: Sr or grad or instr consent

GEOG 5393. Rural Landscapes and Environments. (4 cr.; Student Option; Every Spring)
Analysis of three principal components of rural landscape (form of land surface, plant life that cloaks it, structures that people have placed upon it). Structures associated with agriculture, including mining, forestry, resort areas, and small towns.

GEOG 5401. Geography of Environmental Systems and Global Change. (4 cr.; Student Option; Periodic Fall)
Processes that create/change the spatial patterns of climate, vegetation, and soils. Potential of humans to alter climate, vegetation, and soil processes. Possible impacts of human-altered environmental conditions. prereq: grad student or instr consent

GEOG 5426. Climatic Variations. (3 cr.; Student Option; Periodic Fall)
Theories of climatic fluctuations and change at decadal to centuries time scales; analysis of temporal and spatial fluctuations especially during the period of instrumental record. prereq: 1425 or 3401 or instr consent

GEOG 5431. Plant and Animal Geography. (3 cr.; Student Option; Periodic Fall)
Introduction to biogeography. Focuses on patterns of plant/animal distributions at different scales over time/space. Evolutionary, ecological, and applied biogeography. Paleobiogeography, vegetation-environment relationships, vegetation dynamics/disturbance ecology, human impact on plants/animals, nature conservation. Discussions, group/individual projects, local field trips.

GEOG 5511. Principles of Cartography. (3 cr.; Student Option; Periodic Spring)

GEOG 5530. Cartography Internship. (2-7 cr. max 10 cr.) S-N or Audit; Every Fall & Spring
Provides intensive hands-on experience in contemporary map production and design, ranging from GIS applications to digital prepress. Strong computer skills essential. prereq: instr consent

GEOG 5531. Numerical Spatial Analysis. (4 cr.; Student Option; Every Fall)
Applied/theoretical aspects of geographical quantitative methods for spatial analysis. Emphasizes analysis of geographical data for spatial problem solving in human/physical areas.

GEOG 5561. Principles of Geographic Information Science. (4 cr.; Student Option; Every Fall & Spring)
Introduction to the study of geographic information systems (GIS) for geography and non-geography students. Topics include GIS application domains, data models and sources, analysis methods and output techniques. Lectures, reading, and hands-on experience with GIS software. prereq: grad

GEOG 5562. GIS Development Practicum. (3 cr.; Student Option; Periodic Fall)
Algorithms/data structures for digital cartographic data, topological relationships, surface modeling, and interpolation. Map projections, geometric transformations, numerical generalization, raster/vector processing. Hands-on experience with software packages. prereq: GIS 5571 or instr consent

GEOG 5563. Advanced Geographic Information Science. (3 cr.; Student Option; Every Fall & Spring)
Advanced study of geographic information systems (GIS). Topics include spatial data models, topology, data encoding, data quality, database management, spatial analysis tools and visualization techniques. Hands-on experience using an advanced vector GIS package. prereq: B or better in 3561 or 5561 or instr consent

GEOG 5564. Urban Geographic Information Science and Analysis. (3 cr.; Student Option; Periodic Fall)
Core concepts in urban geographic information science including sources for urban geographical and attribute data (including census data), urban data structures (focusing on the TIGER data structure), urban spatial analyses (including location-allocation models), geodemographic analysis, network analysis, and the display of urban data. prereq: 3561 or 5561

GEOG 5565. Geographical Analysis of Human-Environment Systems. (3 cr.; Student Option; Periodic Spring)
Applications of geographic information systems and other spatial analysis tools to analysis of environmental systems patterns, dynamics, and interactions. Focuses on global to landscape databases developed to analyze atmospheric, hydrospheric, geomorphic, pedologic, biologic, and human landuse systems. prereq: 3561 or 5561 or FR 4131 or LA 5573 or one intro GIS course or grad student or instr consent

GEOG 5567. Urban Geographic Information Science and Analysis. (3 cr.; Student Option; Periodic Fall)
Core concepts in urban geographic information science including sources for urban geographical and attribute data (including census data), urban data structures (focusing on the TIGER data structure), urban spatial analyses (including location-allocation models), geodemographic analysis, network analysis, and the display of urban data. prereq: 3561 or 5561

GEOG 5569. Environmental Thought. (4 cr.; A-F or Audit; Periodic Fall)
Currents of geographic thought in biophysical, GIS, human, cultural, and human-environment subfields. Focuses on concepts/paradigms through which geographers have attempted to unify/codify the discipline, around which debate has flourished, and about which interdisciplinary histories can be traced.

GEOG 5801. Problems in Geographic Thought. (3 cr.; A-F or Audit; Periodic Fall)
Currents of geographic thought in biophysical, GIS, human, cultural, and human-environment subfields. Focuses on concepts/paradigms through which geographers have attempted to unify/codify the discipline, around which debate has flourished, and about which interdisciplinary histories can be traced.

GEOG 5802. Research Methods in Geography. (3 cr.; Student Option; Every Spring)
Seminar. Overview of research designs/methods in geography. Relationships between different research paradigms (modes of inquiry), research designs, and methods. Critical readings. Analyses of research projects.

GEOG 8005. Proseminar: Population Geography. (3 cr.; Student Option; Periodic Fall & Spring)
GEOG 8006. Proseminar: Research Methods in Geography. (3 cr.; Student Option; Periodic Fall & Spring) Introduction to research design, strategies, methods of data collection, analysis, interpretation, and representation in contemporary geographic research. prereq: instr consent

GEOG 8007. Proseminar: Theories of Development and Change. (3 cr.; Student Option; Periodic Fall & Spring) Recent research themes and questions in geography and related social sciences on Third World development; development theories, conceptually grounded case studies, and grassroots-based research. prereq: instr consent

GEOG 8020. Research Seminar: Economic Geography. (3 cr.; Student Option; Periodic Fall & Spring) Contemporary research. Advanced topics, which vary with interests of faculty offering course. prereq: instr consent

GEOG 8011. Environmental Policy. (3 cr.; Student Option; Every Fall) U.S. environmental policies at federal/state level. Policy formulation, implementation, and evaluation. prereq: instr consent

GEOG 8105. Proseminar: Historical Geography. (3 cr.; Student Option; Periodic Fall & Spring) Introduction to conceptual research and empirical studies. prereq: instr consent

GEOG 8106. Seminar: Social and Cultural Geography. (3 cr.; Student Option; Periodic Fall & Spring) Role of space and place in constitution of social and cultural life, social relations, and social identities; class, space, and place; geography of race and racism; environmental racism; geography of gender and sexuality; nationalism, national identity, and territory. prereq: instr consent

GEOG 8107. Geographic Writing. (3 cr.; S-N or Audit; Every Fall) Analysis of organization and presentation of geographic research. Critiques of selected examples of geographic writing. prereq: instr consent

Sample topics: climate modeling; climatic variability; climate change and predictability; severe local storms; drought; energy balance; urban climate; statistical climatology. prereq: instr consent

GEOG 8200. Seminar: Urban Geography. (2-3 cr.; A-F or Audit; Periodic Spring) Contemporary research. Topics vary with the interests of faculty.

GEOG 8201. Explorations in the Geography of Minnesota. (3 cr.; S-N or Audit; Periodic Fall & Spring) Physical environment, agriculture, forestry, mining, land survey, population, recreation, cities/towns, transportation. Sources of information about the state. Students make short oral/written reports. Might provide springboard for a Plan B paper, thesis, or dissertation. Two or three Saturday field trips. prereq: instr consent

GEOG 8211. Environmental Policy. (3 cr.; Student Option; Every Fall) U.S. environmental policies at federal/state level. Policy formulation, implementation, and evaluation. prereq: instr consent

GEOG 8212. Africa. (3 cr.; Student Option; Periodic Fall & Spring) Advanced topics. Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8213. East Asia and China. (3 cr.; Student Option; Periodic Fall & Spring) Contemporary research, advanced topics. Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8214. South Asia. (3 cr.; Student Option; ) Advanced topics. Topics vary with interests of faculty offering course.


GEOG 8230. Theoretical Geography. (3 cr.; Student Option; Periodic Fall & Spring) Advanced topics. Topics vary with interests of faculty offering course.

GEOG 8240. Medical Geography. (3 cr.; Student Option; Periodic Spring) Geographic inquiry concerning selected problems of health and health care. prereq: instr consent

GEOG 8250. Seminar: Physical Geography. (2 cr. [max 3 cr.]; Student Option; Every Spring) Topics of contemporary research. Topics vary with interests of faculty offering course.

GEOG 8270. Seminar: Climatology. (3 cr.; Student Option No Audit; Fall Odd Year) Why certain interventionist states in third world countries have been able to guide their economies to overcome legacy of underdevelopment while most have failed
to induce development. Internal/external conditions that facilitated such departure from underdevelopment. Comparative national/provincial case studies: Taiwan, South Korea, Botswana, Brazil, India. Applying theoretical approaches to policy issues.

GEOG 8350. Seminar: World Population. (3 cr.; Student Option; Periodic Fall & Spring) Contemporary research in world population development and problems. Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8405. Seminar: Graduate Student Professional Development. (1 cr. [max 2 cr.]; S-N or Audit; Periodic Fall & Spring) Strategies for success in graduate program. Preparation for a career as a geographer. Completing/defending the dissertation. Publishing, job search, tenure process, oral presentations, non-academic career paths. prereq: Geography grad student

GEOG 8420. Teaching Practicum. (1 cr.; S-N or Audit; Every Fall & Spring) Teaching methodologies, learning objectives, course content, classroom techniques, student/course evaluation. Specific application to instruction in Geography. prereq: [Geog or MGIS] grad student or instr consent

GEOG 8444, FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

GEOG 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

GEOG 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

GEOG 8800. Seminar: Development of Geographic Thought. (3 cr.; Student Option; Periodic Fall & Spring) Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

GEOG 8970. Directed Readings. (1-5 cr.; Student Option; Every Fall, Spring & Summer) (No description) prereq: dept consent

GEOG 8980. Topics in Geography. (1-3 cr. [max 15 cr.]; Student Option; Every Fall & Spring) Seminar offered by visiting or regular faculty. Topics vary with interests of faculty. prereq: instr consent

GEOG 8990. Research Problems in Geography. (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Individual research projects. prereq: dept consent

GERI 7100. Oral Health Services for Older Adults Seminar. (2 cr.; Student Option; Every Fall & Spring) A seminar for graduate students on a broad variety of topics related to aging, oral health of older adults, and delivery of dental health services to older adults. Students present articles, complex clinical cases, and ongoing research projects for group discussion.

GERI 7200. Advanced Clinical Geriatric Dentistry. (1-10 cr.; A-F or Audit; Every Fall, Spring & Summer) Practical clinical experience in examination, diagnosis, treatment planning, and treatment of older adult patients in the dental clinic at the Amherst H. Wilder Senior Health Center.

GERI 7210. Geriatric Hospital Dentistry. (1-6 cr.; Student Option; Every Fall, Spring & Summer) Rotations at University of Minnesota Hospital Dental Clinic and/or Minneapolis V.A. Medical Center Dental Clinic. Management of elderly patients in acute care settings. Dental management of patients compromised by medical therapies such as radiation treatment or chemotherapy, as well as those with acute illnesses.

GER 1003. Intermediate German. (5 cr.; Student Option; Every Fall & Spring) Theory/practice of translation from/to German in various genres. Idiomatics, stylistics, and cross-cultural aspects of translation. prereq: 3011
GER 3021. Business German. ([; 3 cr. ; Student Option; Periodic Fall & Spring) German economy, business culture. Practice of language used in business. Reading/discussion of German business documents. Preparation of formal letters and reports. prereq: 3011 or equiv

GER 3104W. Reading and Analysis of German Literature. (LITR,WI; 3 cr. ; Student Option; Every Fall, Spring & Summer) Introduction to literary analysis. Readings from drama, prose, and lyric poetry, from 18th century to present. prereq: 3011

GER 3421. 18th-Century German Literature. ([; 3 cr. ; Student Option; Periodic Fall & Spring) German literature, 1720-1810, Enlightenment/Weimar classicism in historical/cultural context. Reading/discussion of literary/philosophical works, aesthetic criticism. prereq: 3011

GER 3431. 19th-Century Literature. ([; 3 cr. ; Student Option; Periodic Fall) Literary/cultural exploration of 19th-century German literature through an investigation of romanticism, realism, and naturalism. Reading/discussion of literary/critical texts. prereq: 3011

GER 3441. 20th-Century Literature. ([; 3 cr. ; Student Option; Periodic Fall) German literature, from 1890 to present, in historical, political, social, and cultural context. prereq: 3011

GER 3501. Contemporary Germany. ([; 3 cr. ; Student Option; Periodic Fall & Spring) Social, political, and cultural developments in Germany, from 1945 to present. prereq: 3011

GER 3510. Topics in German Studies. ([; 3 cr. ; Student Option; Every Spring) One topic in depth dealing with culture or civilization of German-speaking countries. prereq: 3011

GER 3520. Topics in Austrian and Central European Culture. ([; 3 cr. ; Student Option; Periodic Fall & Spring) Culture, politics, and economy in Austria and Central Europe. Comparative analysis of cultural/political developments. Topics vary. prereq: 3011

GER 3601. German Medieval Literature. (GP,LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year) Literary investigation of the greatest works of medieval German poetry. Readings in English. Majors will be required to write a paper with use of secondary sources in English and German. prereq: No knowledge of German required

GER 3604W. Introduction to German Cinema. (AH,WI,GP; 3 cr. ; Student Option; Fall Even, Spring Odd Year) An introduction to the study of German cinema, with a focus on the relation between German film and German history, literature, culture, and politics.

GER 3610. German Literature in Translation. ([; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring) In-depth study of authors or topics from various periods in German literature. prereq: No knowledge of German required; cr toward major or minor requires reading in German

GER 3641. German Folklore. (GP,LITR; 3 cr. ; Student Option; Fall Even, Spring Odd Year) Literary and cultural investigation of the main folklore genres: charms, legends, folktales, and ballads; their composition, origin, and role in society with a strong emphasis on their international character. Readings in English. Majors required to write a paper with use of secondary sources in English and German. prereq: No knowledge of German required; cr for major or minor by arrangement with instructor

GER 3651. Thinking Environment: Green Culture, German Literature and Global Debates. (ENV,LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year) How environmental thinking became social-political force through German literature/culture, with comparisons to global or U.S. developments. Authors include Goethe, Christa Wolf, Enzensberger.

GER 3655. Cultures of Control and Surveillance in Germany and the U.S. (CIV,HIS; 3 cr. ; Student Option; Fall Odd Year) Discourses and practices of social control and surveillance in comparative/historical perspective. Explores the central conceptual condition for modern ethics: the relationship between individual and society. Paintings, manuals, scholarly and philosophical essays, and literary texts including writings by Franz Kafka.

GER 3701. History of the German Language. ([; 3 cr. ; Student Option; Periodic Fall) Change in grammar and lexicon, 750 A.D. to present. prereq: 1004

GER 3702. Beginning Middle High German. ([; 3 cr. ; Student Option; Periodic Fall) Middle High German grammar. Selected literary texts. prereq: 1004

GER 3993. Directed Studies. ([1-4 cr. ; max 12 cr.] ; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.

GER 4001. Beginning German for Graduate Research. ([; 5 cr. ; Student Option; Every Fall, Spring & Summer) Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.). Meets concurrently with 1001. prereq: Grad student

GER 4002. Beginning German for Graduate Research. ([; 5 cr. ; Student Option; Every Fall, Spring & Summer) Listening, reading, speaking, writing. Emphasizes proficiency. Topics include free-time activities, careers, and culture of German-speaking areas. Meets concurrently with 1002. prereq: Grad student

GER 4003. Intermediate German for Graduate Research. ([; 5 cr. ; Student Option; Every Fall, Spring & Summer) Listening, reading, speaking, writing. Contextualized grammar/vocabulary. Authentic readings. Essay assignments. Meets concurrently with 1003. prereq: Grad student

GER 4004. Intermediate German for Graduate Research. ([; 5 cr. ; Student Option; Every Fall, Spring & Summer) Listening, reading, speaking, writing. Contextualized grammar/vocabulary. Authentic readings. Essay assignments. Meets concurrently with 1004. prereq: Grad student

GER 4040. German Play: Oral Interpretation and Performance of German. ([; 1-3 cr. ; Student Option; Periodic Fall & Spring) Dramatic reading of German play for pronunciation; preparation and rehearsal for production and performance of German play.

GER 5011. Advanced Conversation and Composition. ([; 3 cr. ; Student Option; Fall Odd Year) Achieving high proficiency in writing/speaking professional/academic German. prereq: 3012, [grad student or adv undergrad]

GER 5410. Topics in German Literature. ([; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring) Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

GER 5510. Topics in Contemporary German Culture. ([; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring) A topic of contemporary German culture explored in depth. prereq: 3011

GER 5610. German Literature in Translation. ([; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring) Study in depth of authors or topics from various periods in German literature. Requires no knowledge of German. prereq: No knowledge of German required; cr toward major or minor requires reading in German

GER 5630. Topics in German Cinema. ([; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring) Topics chosen may focus on specific directors, genres, film production or reception, and/ or other formal, theoretical, historical, or political issues. prereq: 3xxx film course or instr consent

GER 5651. Thinking Environment: Green Culture, German Literature and Global Debates. (ENV,LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year) How environmental thinking became social-political force through German literature/culture, with comparisons to global or U.S. developments. Authors include Goethe, Christa Wolf, Enzensberger.

GER 5711. History of the German Language I. ([; 3 cr. ; Student Option; Fall Even Year) Historical development of German, from beginnings to 1450. prereq: 3011
GER 5712. History of the German Language II. (3 cr.; Student Option; Spring Odd Year) Historical development of German from 1450 to 2000. prereq: 5711

GER 5721. Introduction to Middle High German. (3 cr.; Student Option; Fall Odd Year) Introduction to Middle High German language and literature. Study of grammar through formal description of Middle High German phonology, morphology, and syntax. Normalized MHG texts read.

GER 5722. Middle High German: Advanced Readings. (3 cr.; Student Option; Spring Even Year) Acquisition of fluency in reading Middle High German normalized as well as non-normalized texts, both poetry and prose. prereq: 5721

GER 5734. Old Saxon. (3 cr.; Student Option: Periodic Fall) Study of the poetry of Old Saxon. Detailed investigation of Old Saxon in comparison with the other Old Germanic languages.

GER 5740. Topics in Germanic Medieval Studies. (3 cr. [max 9 cr.]; Student Option: Periodic Spring) Topics specified in Class Schedule.

GER 5993. Directed Studies. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.

GER 8010. Current Debates in Literary and Cultural Theory. (3 cr. [max 12 cr.]; Student Option: Every Spring) Seminar. Close readings of theoretical constellations in texts. Topic such as text/image, history/memory/time, oral culture/literacy, public/private, authority/crisis. Draws on literary, philosophical, and theoretical work.

GER 8020. Problems in Literary and Cultural History. (3 cr. [max 12 cr.]; Student Option: Every Spring) Historiographic texts as literature and literary or filmic texts as historical documents. Homogenizing/constructive elements in historiography. Strategies of writing historical syntheses.

GER 8200. Seminar in Medieval German Literature and Culture. (3 cr. [max 9 cr.]; Student Option; Spring Even Year) Topics on specific author, group of authors, genre, or subject matter in German literature, ca. 800-1450. prereq: 5721

GER 8210. Seminar in Early Modern German Literature and Culture. (3 cr. [max 9 cr.]; Student Option: Periodic Fall & Spring) Topics on specific author, group of authors, genre, or subject matter in German literature, 1450-1750.

GER 8220. Seminar in 18th-Century German Literature and Culture. (3 cr. [max 9 cr.]; Student Option: Periodic Fall & Spring) Literary, philosophical, and aesthetic texts emerging from major 18th-century literary trends, 1720-1810. Cultural and historical contexts of Enlightenment and Weimar Classicism.

GER 8230. Seminar in 19th-Century German Literature and Culture. (3 cr. [max 9 cr.]; Student Option: Periodic Fall & Spring) Examination of an author, issue, or movement, using a variety of critical approaches.

GER 8240. Seminar in 20th-Century German Literature and Culture. (3 cr. [max 9 cr.]; A-F or Audit; Periodic Fall & Spring) Topics on literature, film, or other forms of "high" and popular culture.

GER 8300. Topics in Literature and Cultural Theory. (3 cr. [max 18 cr.]; Student Option; Periodic Fall & Spring) Authors, themes, movements, and social issues from 1700 to present. Focus varies each semester.

GER 8741. Gothic and Methods of Comparative Reconstruction I. (3 cr.; Student Option:) The oldest extant Germanic language and the prehistory of Germanic group of languages.

GER 8742. Gothic and Methods of Comparative Reconstruction II. (3 cr.; Student Option; Periodic Fall) Continuation of study of the oldest extant Germanic language and the prehistory of Germanic group of languages. prereq: 8741

GER 8751. Paleography: Medieval Manuscript Readings. (3 cr.; A-F or Audit; Periodic Spring) Introduction to techniques of reading and transcribing medieval German and Latin manuscripts.

GER 8752. Medieval Text Editing. (3 cr.; Student Option; Periodic Spring) Introduction to techniques of historical text-critical editing of medieval Germanic and Latin manuscripts.

GER 8820. Seminar: Advanced Theory. (3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Topic in critical thought, e.g., the Frankfurt School, hermeneutics, reception theory.

GER 8994. Directed Research. (1-3 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) TBD prereq: instr consent, dept consent; may be taken as tutorial with instr consent

GSD 3451V. Honors Major Project Seminar. (WI; 3 cr.; A-F or Audit; Every Fall) Major project under supervision of faculty member. Oral exam based on project. prereq: Honors student

GSD 3451W. Major Project Seminar. (WI: 3 cr.; A-F or Audit; Every Fall) Students prepare major project under supervision of faculty member.

GSD 3511W. Vikings, Knights, and Reformers: German and European Culture and Controversies to 1700. (WI: 3 cr.; Student Option; Every Fall) Survey of representative cultural-historical events in Europe (German-speaking countries, Scandinavian, the Netherlands) from early German times to 1700.

GSD 3512W. Imagined Communities: German and European Culture and Controversies, 1700 to Present. (WI: 3 cr.; Student Option; Every Spring) Survey of representative cultural-historical events in Europe (German-speaking countries, Scandinavian, the Netherlands) from 1700 to present.

GSD 5103. Teaching of Germanic Languages. (3 cr.; Student Option; Every Fall) Second language acquisition theory, methods, testing, and technology applicable to teaching of modern Germanic languages.

GSD 8001. Approaches to Textual Analysis. (3 cr.; Student Option; Every Fall) Theoretical approaches to textual analysis that shape disciplinary discussions in Germanic studies.

GSD 8002. Interdisciplinary Approaches to Textual Analysis. (3 cr.; Student Option; Spring Odd Year) Theoretical approaches in textual studies that challenge conventional notions of boundaries between disciplines and between national literatures/cultures.

GSD 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall & Spring) TBD prereq: Master's student, adviser and DGS consent

GSD 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student, adviser and DGS consent

GSD 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

GSD 8801. Dissertation Seminar. (3 cr.; S-N or Audit; Periodic Fall & Spring) For doctoral students in German and Scandinavian studies who are beginning to establish topics and do research for their dissertations. Discussion of a variety of topics related to this process as well as presentation of some written work.

GSD 8802. Dissertation Writing Seminar. (3 cr.; S-N or Audit; Periodic Fall & Spring) Critical, supportive forum for discussion of problems/issues related to dissertation research/writing. Shaping/controlling one's topic. Developing chapter outlines. Questions
GERO 5100. Topics in Gerontology. (0.5-4 cr. [max 10 cr.]; Student Option; Periodic Fall, Spring & Summer) Timely topics related to the biology, sociology, and psychology of aging and applied aging services.

GERO 5101. Milestones in the Biology of Aging. (1 cr.; Student Option; Every Spring) Biological research in aging. Original literature, including seminal, historical background papers. Progress in field of biogerontology research, prereq: NIA training grant Functional Proteomics of Aging [grad student or postdoc fellow] or biology research grad student, instr consent

GERO 5102. Hot Topics in the Biology of Aging. (1 cr.; S-N only; Fall Even Year) The goals of the course include providing the students with an essential understanding of the contemporary issues in biogerontology, including analysis of ethics issues in the field. This course is open to graduate students and post-doctoral fellows involved in the NIA training grant Functional Proteomics of Aging. Others may enroll with instr permission.

GERO 5103. Aging and Society. (2 cr.; Student Option; Every Fall) An examination of the broad range of topics and issues related to aging. Consideration of how the processes of aging affect individuals, groups, cohorts, and societies by drawing from research in sociology, psychology, gerontology, and health sciences. Comparisons are made of the processes of aging in US and other countries.


GERO 5110. Biology of Aging. (3 cr.; Student Option; Every Spring) Biological changes that occur with aging. Methods for studying aging, descriptions of population aging, theories on how/why we age. Process of aging in each body system, variation between individuals/populations. Clinical implications of biological changes with age. Guest lecturers from different disciplines.

GERO 5111. Studying Aging and Chronic Illness. (2 cr.; Student Option; Every Fall) Methodological issues unique to studies of older populations. Focuses on measurement of epidemiological characteristics. Health conditions/disorders of older Americans. Prereq: Introductory course in epidemiology or instr consent

GERO 5115. Introduction to Geriatrics. (1 cr.; S-N only; Every Fall, Spring & Summer) Online course. Major topics in geriatrics. How to diagnose/treat conditions common in caring for older people.

GERO 5125. Gerontology Service Learning. (2 cr.; Student Option; Every Fall, Spring & Summer) At least 100 hours of service to seniors or organizations serving seniors required. Longitudinal one-on-one relationship with at least two seniors. Service activities may include: friendly visiting, escorting seniors to medical appointments, chore services, teaching health education to groups of seniors and staff, participating in social or recreational activities with seniors, assisting with immunization and screening programs, assisting seniors with selection of health plans, or providing volunteer home health aide or nursing assistant services or emergency non-medical response under the supervision of a nurse. Students may use up to 25 percent of their service time for project that benefits the campus as a whole. Reading, monthly class discussions, term paper and weekly self-reflection

GERO 5191. Independent Study: Gerontology. (1-4 cr. [max 16 cr.]; Student Option No Audit; Periodic Fall, Spring & Summer) Independent study: gerontology. Prereq: Approval of [adviser, DGS] for gerontology minor

GERO 8020. Seminar in Gerontology. (2 cr.; Student Option; Every Fall & Spring) Meets weekly. Students present and discuss new or completed research projects on aging; conduct formal reviews using NIH formats; critique published papers using formal review criteria employed by gerontological journals; become familiar with large database in aging and describe how that database has been used in research for secondary analyses. Prereq: instr consent

GERO 8021. Application of Proteomics to Aging. (1 cr.; S-N only; Fall Odd Year) Proteomic technology in aging research. Faculty/student led discussions on topics relevant proteomic research. Overview of special techniques/analytical approaches complementary to proteomics, hands-on experience with data analysis, discussion of literature. Prereq: [Grad students, post-doctoral fellows involved in National Institutes on Aging training grant Functional Proteomics of Aging] or grad students or post-doctoral fellows with instr consent

GERO 8022. Fostering a Career in Aging Research. (1 cr.; S-N only; Spring Odd Year) Prepare pre-doctoral students/post-doctoral fellows for next step in academic career. Student/faculty led discussions on preparing for job interviews, including composing CV/cover letter, preparing grant applications/manuscripts, developing course syllabus based on biology of aging. Prereq: Grad students/post-doctoral fellows involved in National Institutes on Aging training grant Functional Proteomics of Aging or grad students or post-doctoral fellows with instr consent

GERO 8023. Aging Policy Seminar. (2 cr.; S-N only; Every Fall) Topics chosen to match student interest. Potential issues include Medicare, Medicaid, Social Security, policies about long-term care, preventive care for older people, employment discrimination, ethical topics. Run seminar on topic of choice, write follow-up paper. Prereq: Grad student or instr consent [recommended to have taken GER0 5105]

Global Studies (GLOS)

GLOS 1015W. Globalization: Issues and Challenges. (GP, WI; 4 cr.; Student Option; Every Fall & Spring) Increased global interconnections over past 50 years. Impact of information revolution on human rights, economic inequality, ecological challenges, and decolonization. Comparative cases from Asia, Africa, Latin America, or Middle East.

GLOS 1112. Globalization and Social Justice. (GP; 3 cr.; A-F only; Periodic Fall) How and why did the term “globalization” become commonplace, what it describes. Uses questions of social justice to explore portrayals of globalization in popular media and culture.

GLOS 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule.

GLOS 1910W. Topics: Freshman Seminar. (WI; 3 cr.; max 6 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. Prereq: Freshman Seminar.

GLOS 3143. Living in the Global. (CIV; 3 cr.; A-F only; Every Fall & Spring) Contemporary condition of global connectedness. Ways our habits, tastes, and experiences involve a stream of encounters with the global. Terrains of interconnectedness, including tourism, music, the Internet, and mass culture.

GLOS 3144. Knowledge, Power, and the Politics of Representation in Global Studies. (4 cr.; Student Option; Every Fall) Introduction to theoretical issues. Power/production of knowledge about world regions. Knowledge, power, politics in contemporary world. Colonialism, nationalism, modernity in shaping academic disciplines. Prereq: 6 cr. of approved preparatory coursework [recommended GLOS 1015W or 1112]

GLOS 3144H. Honors: Knowledge, Power, and the Politics of Representation in Global Studies. (4 cr.; A-F only; Every Fall) Introduction to theoretical issues. Power, production of knowledge about world regions. Knowledge, power, politics in contemporary world. Colonialism, nationalism, modernity
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
and intellectual mindset of both spheres. Factors that have contributed and continue to contribute to tension, anxiety, and hatred between the Muslim world and Europe and the United States.

GLOS 3645. Islamic World. (GP,SOC; 3 cr.; Student Option; Every Fall)

GLOS 3681. Gender and the Family in the Islamic World. (; 3 cr.; A-F only; Periodic Spring)
Experiences of Muslim women/families from historical/comparative perspective. Gender/family power relations in colonial representations, sexual politics, family, education/health, paid work, human rights, and Islamic feminism. prereq: At least soph; SOC 1001 recommended

GLOS 3701W. Population in an Interacting World. (GP,WI,SOC; 4 cr.; Student Option; Every Fall, Spring & Summer)
Comparative analysis/explanation of trends in fertility, mortality, internal and international migration in different parts of the world; world population problems; population policies; theories of population growth; impact of population growth on food supply and the environment.

GLOS 3705. Transnational Migration: Networks of Power and Places. (GP; 3 cr.; A-F or Audit; Fall Even Year)
How migration affects sending/receiving societies. How transnationalism or cross-border social/economic relations of individuals/households is maintained/perpetuated. Current debates on transnationalism at this stage of globalization. prereq: Soph, jr, or sr

GLOS 3900. Topics in Global Studies. (; 1-5 cr. [max 15 cr.]; Student Option; Every Fall & Spring)
Topics vary each semester. See Class Schedule.

GLOS 3910. Topics in East Asian Studies. (; 1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Selected topics in East Asian Studies not covered in regular courses. Topics reflect instructor interests.

GLOS 3911. Contemporary Chinese Society: Culture, Networks, & Inequality in China. (3 cr.; A-F or Audit; Periodic Fall)
Introduces students to sociological perspectives and analyses of cultures, social networks, and socioeconomic inequalities in post-1980 China. In addition to lectures, the instructor will show video clips about various backgrounds of China and group discussions will be organized to exchange opinions about issues of common interest. Students will gain a basic understanding of how Chinese society operates today. prereq: SOC 1001 recommended

GLOS 3920. Topics in European Studies. (; 3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Topics vary. See Class Schedule.

GLOS 3921. Europe: A Geographic Perspective. (GP; 3 cr.; Student Option; Fall Even Year)
Comparative analysis/explanation of Europe's physical, demographic, ethnic/cultural, economic, political, and urban landscapes. European integration: European Union, transformation of Eastern Europe.

GLOS 3930. Topics in Latin American Studies. (; 3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Topics vary. See Class Schedule.

GLOS 3934. Women and Gender in Latin American History. (GP,HIS; 3 cr.; Student Option; Spring Odd Year)
Changing gender norms in Latin America as compared with lives of women/men of diverse classes/ethnic groups. How women responded to their position in society, on continuum from accommodation to resistance.

GLOS 3942. History of Modern Israel/Palestine: Society, Culture, and Politics. (GP; 3 cr.; Student Option; Fall Odd Year)

GLOS 3960. Topics in South Asian Studies. (; 3 cr.; Student Option; Periodic Fall & Spring)
Topics vary. See Class Schedule.

GLOS 3961. Culture and Society of India. (GP,SOC; 3 cr.; Student Option; Spring Even Year)
Contemporary society and culture in South Asia from an anthropological perspective with reference to nationalism; postcolonial identities; media and public culture; gender, kinship and politics; religion; ethnicity; and the Indian diaspora.

GLOS 3969. 20th Century India. (; 3 cr.; A-F or Audit; Periodic Spring)
India under British hegemony in 1914 through Mahatma Gandhi/nationalist movement. World War II. British departure, creation of India/Pakistan. Nehru, Indira, Rajiv Gandhi.

GLOS 3970. Topics in African Area Studies. (; 3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Topics vary. See Class Schedule.

GLOS 3981W. Major Project Seminar. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Students formulate research questions, select topic, and develop/produce 25-30 page paper. prereq: dept consent

GLOS 3993. Directed Study. (; 1-5 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq instr consent, dept consent, college consent.

GLOS 4104. Crime and Human Rights. (3 cr.; Student Option; Periodic Fall & Spring)
Serious violations of humanitarian/human rights law. Criminalization. Impact of interventions on memories/future of cycles of violence. Case studies on Holocaust, Balkan wars, Darfur, My Lai massacre, etc. Criminal justice, truth commissions, vetting, compensation programs. prereq; SOC 1001, at least one 3xxx SOC or GLOS course recommended

GLOS 4104H. Honors: Crime and Human Rights. (; 3 cr.; A-F only; Periodic Fall & Spring)
Serious violations of humanitarian and human rights law. Criminalization. Impact of interventions on memories and future of cycles of violence. Case studies on Holocaust, Balkan wars, Darfur, My Lai massacre, etc. Criminal justice, truth commissions, vetting, and compensation programs. prereq; SOC 1001, at least one 3xxx SOC or GLOS course recommended

GLOS 4221. Globalize This! Understanding Globalization Through Sociology. (GP; 3 cr.; A-F or Audit; Periodic Fall)

GLOS 4305. Environment & Society: An Enduring Conflict. (ENV; 3 cr.; A-F or Audit; Every Fall)
Examines how natural/built environments influence human behavior/social organization. Focuses on microenvironments/their influence on individuals. Impact of macroenvironments on societal organization. Environmental movements. prereq: SOC 1001 or environmental course or inst consent

GLOS 4311. Power, Justice & the Environment. (DSJ; 3 cr.; A-F only; Every Spring)
Global debates over how nature is produced, consumed, degraded, sustained, and defended. Analytics of race/class. Politics of North-South relations.

GLOS 4315. Never Again! Memory & Politics after Genocide. (GP; 3 cr.; A-F or Audit; Spring Odd Year)
Course focuses on the social repercussions and political consequences of large-scale political violence, such as genocide, war crimes and crimes against humanity. Students learn how communities and states balance the demands for justice and memory with the need for peace and reconciliation and addresses cases from around the globe and different historical settings. prereq: 1001 or 1011V recommended, A-F required for Soc Majors/Minors.

GLOS 4344. Europe and its Margins. (; 3 cr.; A-F only; Every Fall)
Europe and its margins, an anthropological/ethnographic perspective. Key topics in the
those who fight for these rights would claim
principle of political equality but defend, even
reconciled. Liberal democracies affirm the
social, political. These forms cannot be
Course explores debates about equality.
psychological treatment. Research project
science. Human rights education, medical/
campaigns, trial observations. Forensic
Advocacy: fact-finding, documentation,
organizations, strategies, tactics, programs.
Theoretical basis of human rights movement.
GLOS 5994. Directed Research. (1-4
cr. [max 12 cr. ] ; Student Option; Every Fall &
Spring) Qualified students work on a tutorial basis.
Prereq instr consent, dept consent, college consent.

Graduate School (GRAD)

GRAD 999. Graduate Active Status. (WI: 0
cr. ; No Grade Associated; Every Fall & Summer)
Graduate active status. prereq: Grad student

GRAD 5102. Preparation for University
Teaching for Nonnative English Speakers.
(2 cr. ; S-N only; Every Fall & Spring)
Theory/practice of teaching in higher education in
the United States. Emphasizes awareness of
cross-cultural communication issues. Students
practice in a simulated instructional setting.
prereq: English Language Proficiency Rating of
4, current or anticipated TA assignment, instr consent

GRAD 5105. Practicum in University
Teaching for Nonnative English Speakers.
(1-2 cr. ; S-N or Audit; Every Fall & Spring)
Theory, advanced practice in teaching in higher
education for nonnative speakers of English.
Emphasizes interactive teaching strategies,
oral presentation skills, legal/policy issues.
prereq: [5102 or English Language Proficiency Rating
of 2 or 3], [current or anticipated TA assignment]

GRAD 8101. Teaching in Higher Education.
(3 cr. ; Student Option; Every Fall, Spring &
Summer) Teaching methods/techniques. Active learning,
critical thinking, practice teaching, and
preparing a portfolio to document/reflect upon
teaching. Readings, discussion, peer teaching,
e-mail dialog, reflective writing, co-facilitation of
course. prereq: Non-Degree Students: contact
pfcogresssentum.edu with questions
about registration. If adding a section after first
class meeting, contact your instructor as soon
as you enroll.

GRAD 8102. Practicum for Future Faculty.
(3 cr. ; Student Option No Audit; Every Fall & Spring)
Collegial support for teaching, faculty
mentorship at regional college or university.
Faculty role at various institutions. Classroom
observation/feedback, preparation for
academic job search. prereq: [9101 or equiv],
[native English speaker or [bTOEFL score of
27-30] or [ELP score of 1 from CTL]]

GRAD 8200. Teaching and Learning Topics
in Higher Education. ( ; 1 cr. [max 4 cr. ] ; A-F
only; Every Fall & Spring)
Create course materials for context/discipline.
Assess student learning. Write action plan.
Topics may include active learning in sciences,
teaching with technology, multicultural
education, teaching in clinical settings,
Learning-Community course design.

GRAD 8400. Interdisciplinary Dissertation
Writing Seminar. ( ; 1-3 cr. [max 6 cr. ] ;
Student Option; Every Fall & Spring)
Led by graduate faculty. For course
description, see sponsoring program(s). prereq;
PhD student, instr consent

Graduate Summer Research (GRD)

GRD 4999. Graduate Summer Research. ( ; 0
cr. ; No Grade Associated; Every Summer)
Graduate Summer Research

Grand Challenge Curriculum (GCC)

GCC 3001. Grand Challenge: Can We Feed
the World Without Destroying It?. (ENV; 3
cr. ; A-F Only; Periodic Fall)
In this course, we will seek solutions to the
challenges of achieving global food security
and sustainability. Together, we will work to
answer the question, "Can we feed the world
without destroying it?" The course begins
with lectures and skills workshops, followed
by a series of interactive panels with guest
experts. We will also prepare group projects
that are focused on finding innovative solutions
to this grand challenge. We will learn about
the fundamental changes occurring in the
global food system, the environment, and
our civilization as a whole. We will explore
how to approach inherently interdisciplinary
problems, how to identify solutions that are
truly sustainable in the long term, and how
science and technology can inform decision-
making.

GCC 3002. Grand Challenge: Beyond War
and Atrocity - Reconciliation and Justice.
(GP; 3 cr. ; A-F Only; Periodic Fall)
This course offers a thorough introduction to
the many ways of thinking through the delicate
relationship between reconciliatory initiatives,
processes of collective remembering and
the requirements of justice, by examining
theoretical and concrete practices in different
historical settings: responses to the Holocaust
on the part of victims and victimizers; the
Spanish "pact of oblivion" and belated
remembering; the Civil War in the USA
and Franco dictatorship; and in the Africa
the American Indian struggles for memory and justice and the
Black Redress Movement. prereq: sophomore, junior, senior

GCC 3004. Grand Challenge: The Fracking Boom - Promises and Challenges of the Hydrocarbon Renaissance. (ENV; 3 cr. : A-F only; Periodic Fall)

This course will explore the energy revolution that has been ignited by recent technological advances (primarily hydro-fracturing or “fracking”) and its many far-reaching consequences. Students will engage in understanding the economic, political, geological, environmental, and social aspects of this multi-faceted issue. After establishing the historical framework, we will discuss how the “fracking boom” has drastically altered this landscape. With a solid understanding of the role of hydrocarbons in the modern world, we will explore the promise and the perils of the fracking boom. While we will discuss all the major fracking areas, the Bakken Shale will receive special attention both because of its geographical proximity to Minnesota and because of the dramatic transformation it has spurred in North Dakota. We will explore economic and social repercussions of the Bakken boom from the interpersonal to the international, as well as issues related to environmental degradation and other potential hazards. prereq: sophomore, junior, senior

GCC 3006. Grand Challenge: Climate Change - Myths, Mysteries, and Uncertainties. (ENV; 3 cr. : A-F only; Every Spring)

Climate variations are the norm; not the exception. The geological and archaeological records are rich with evidence of a climate system that is dynamic and non-steady state. Yet we face the challenges of understanding the complexities of this system in order to manage our resources and to prepare wisely for the future. This class examines the theory behind the atmospheric greenhouse effect and radiative forcings in the climate system, and the consequences of anthropogenic climate change for present and future societies. It also explores environmental signals that are used to diagnose climate variability, The Myths, Mysteries, and Uncertainties about the climate record and the biophysical feedback processes operating in the Earth-Atmosphere system will be examined. After firmly establishing the scientific basis for climate change, the remainder of the class will focus on intersections between climate change and society. prereq: sophomore, junior, senior

GCC 3007. Grand Challenge: Toward Conquest of Disease. (ENV; 3 cr. : A-F only; Every Spring)

Since the rise of civilization, the large predators of humans have been subdued and the most dangerous predators remaining are those unseen—virus or bacteria within our bodies. They are the microbial predators that cause disease. Infectious disease has devastated human populations and even caused global population declines. Subduing and managing disease is one of the grand challenges of our time. Through an enormous global effort, we have driven smallpox in humans and Rinderpest in livestock extinct from the natural world, and guinea worm is expected to follow. Other infectious diseases are in continual decline. In this course we will combine ecological thought and ecological models with historical and future perspectives to understand the fundamental dynamics of our miniscule predators, and relate this to similar miniscule predators of wild and domestic animals, to crops, and to other plants. prereq: sophomore, junior, senior


Ensuring access to sufficient and safe water is one of the grand challenges of the 21st century. As the world’s population urbanizes, cities are at the leading edge of conflicts over water. We will evaluate changing demands on urban rivers, tracing this evolution as a hallmark of global urbanization, and challenge students to articulate their understanding of water management to local citizens and devise creative visions for better management of water. Rivers and Cities will examine urban water challenges by exploring four critical ways cities engage their river systems. This exploration will trace the evolution of urban water systems as they have been engineered to deliver drinking water, to provide power and transportation, to protect people living nearby, and to ensure a steady supply of food. Student learning will be interdisciplinary, place-based, and will engage with the community. Students will learn how and why managing water is a necessity and a challenge in Minnesota, the U.S., and the world. prereq: sophomore, junior, senior

GCC 3010. Grand Challenge: The Global Climate Challenge – Creating an Empowered Movement for Change. (CIV; 3 cr. : A-F only; Periodic Spring)

Students will explore ecological and human health consequences of climate change, the psychology of climate inaction, and will be invited to join us in the radical work of discovering not only their own leadership potential but that of others. We will unpack the old story of domination and hierarchy and invite the class to become part of a vibrant new story of human partnership that will not only help humanity deal with the physical threat of climate change but will help us create a world where we have the necessary skills and attitudes to engage the many other grand challenges facing us. Using a strategy of grassroots empowerment, the course will be organized to help us connect to the heart of what we really value; to understand the threat of climate change; to examine how we feel in the light of that threat; and to take powerful action together. Students will work in groups throughout the course to assess the global ecological threat posed by climate change, and they will be part of designing and executing an activity where they empower a community to take action. prereq:soph, jr, sr

GCC 3011. Grand Challenge: Pathways to Renewable Energy. (TS; 3 cr. : A-F only; Periodic Spring)

This interdisciplinary course will examine obstacles to energy transitions at different scales. It will explore the role of energy in society, the physics of energy, how energy systems were created and how they function, and how the markets, policies, and regulatory frameworks for energy systems in the U.S. developed. The course will closely examine the Realpolitik of energy and the technical, legal, regulatory, and policy underpinnings of renewable energy in the U.S. and Minnesota. Students will learn the drivers that can lead global systems to change despite powerful constraints and how local and institutional action enables broader change. Students will put their learning into action by developing proposals for addressing a particular challenge: What would it take to get the University of Minnesota to invest significantly in solar energy? prereq: sophomore, junior, senior

GCC 3012. Grand Challenge: Structural Violence & Medication Experience. (DSJ; 3 cr. : A-F only; Periodic Spring)

The course will use a social justice framework for learning and communicating about structural violence and the intersection of culture, the medication experience, and community health. Utilizing principles of community engagement, we will focus on examining how broader Community Health and the individual Medication Experience are impacted by the overcoming of structural violence experienced by communities locally as well as globally. Using Critical Race Theory and Social Ecological frameworks, we will come to a more complex understanding of our own social locations and the interplay of power and privilege while exploring the root causes of health disparities and the development of solutions that address inequities in health, education, housing, employment, and access to respectful health care. Students will learn to critically analyze these lived experiences while developing interactive storytelling, digital documentaries, digital essays and narratives to advance knowledge on health inequities in our community. prereq: sophomore, junior, senior

GCC 3013. Grand Challenge: Making Sense of Climate Change - Science, Art, and Agency. (CIV; 3 cr. : A-F only; Periodic Fall & Spring)

The overarching theme of the course is the role of artistic/humanistic ways of knowing as tools for making sense and meaning in the face of “grand challenges.” Our culture tends to privilege science, and to isolate it from the “purposive” disciplines?arts and humanities?that help humanity ask and answer difficult questions about what should be done about our grand challenges. In this course, we will examine climate change science, with a particular focus on how climate change is expected to affect key ecological systems (e.g., forests, farms, ocean ecosystems) and vital biodiversity such as pollinators in our community and Place. We will study the work of artists who have responded to climate change science through their work, to make sense and meaning of climate change. Finally, we have the unique opportunity to create a collaborative public art project that will become

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
part of the Northern Spark festival, an all-night art festival. prereq: sophomore, junior, senior

GCC 5001. Grand Challenge: Can We Feed the World Without Destroying It?. (ENV; 3 cr.; A-F only; Periodic Fall)
In this course, we will seek solutions to the challenge of achieving global food security and sustainability. Together, we will work to answer the question, "Can we feed the world without destroying it?" The course begins with lectures and skills workshops, followed by a series of interactive panels with guest experts. We will also prepare group projects that are focused on finding innovative solutions to this grand challenge. We will learn about the fundamental changes occurring in the global food system, the environment, and our civilization as a whole. We will explore how to approach inherently interdisciplinary problems, how to identify solutions that are truly sustainable in the long term, and how science and technology can inform decision-making.

GCC 5003. Grand Challenge: Seeking Solutions to Global Health Issues. (GP; 3 cr.; A-F only; Periodic Fall)
Complex global health problems can often only be addressed through approaches that go beyond traditional health science disciplines. Whether responding to emerging pandemics, food insecurity, maternal mortality, or civil society collapse during conflict, solutions often lie at the interface of animal, environmental, and human health. In this course, students will learn the drivers that can lead global systems to change despite powerful constraints and how local and institutional action enables broader reform. Students will put their learning into action by developing proposals for addressing a particular challenge: While there isn't a single "right" solution to global challenges, progress can be made through an interdisciplinary perspective with emphasis on ethical and cultural sensitivity, and on understanding their complexities. This exploration will help students propose realistic actions that could be taken to resolve these issues. This course will help students gain the understanding and skills necessary for beginning to develop solutions to this grand challenge. prereq: sophomore, junior, senior, graduate student

GCC 5005. Grand Challenge: Global Venture Design - What Impact Will You Make?. (GP; 3 cr.; A-F only; Periodic Fall)
Students will work in teams developing sustainable business and technical solutions to address an environmental or social challenge in India. Teams may address a challenge related to water supply, energy availability, food/agriculture production, waste management, public health or a topic mutually agreed upon by the instructor and student teams. During the semester, a product or service must be designed, and a sustainable business model must be created around it. Technical and business development professionals based in the US and India will act as mentors to provide advice to each team. Each team will have one US-based mentor and one India-based mentor. The teams are expected to use a discovery process, design thinking, ideation and input from field research in solving the challenge. A primary focus of the course is up-front work to identify the "right" problem to solve. The model should be built around the customer???s needs and wants, as they will need to pay for the product or service to achieve a scalable model. prereq: sophomore, junior, senior, graduate student

GCC 5007. Grand Challenge: Toward Conquest of Disease. (ENV; 3 cr.; A-F only; Every Spring)
Since the rise of civilization, the large predators of humans have been subdued and the most dangerous predators remaining are those unseen---vastly smaller than our bodies. They are the microbial predators that cause disease. Infectious disease has devastated human populations and even caused global population declines. Subduing and managing disease is one of the grand challenges of our time. Through an enormous global effort, we have driven smallpox in humans and Rinderpest in livestock extinct from the natural world, and guinea worm is expected to follow. Other infectious diseases are in continual decline. In this course we will combine ecological thought and ecological models with historical and future perspectives to understand the fundamental dynamics of our miniscule predators, and relate this to similar miniscule predators of wild and domestic animals, to crops, and to other plants. prereq: sophomore, junior, senior, graduate student

GCC 5008. Grand Challenge: Policy and Science of Global Environmental Change. (ENV; 3 cr.; A-F only; Periodic Spring)
Through readings, lectures, discussions, written assignments, and presentations this course introduces the critical issues underpinning global change and its environmental and social implications. The course examines current literature in exploring evidence for human-induced global change and its potential effects on a wide range of biological processes and examines the social and economic drivers, social and economic consequences, and political processes at local, national, and international scales related to global change.

GCC 5010. Grand Challenge: The Global Climate Challenge: Creating an Empowered Movement for Change. (CIV; 3 cr.; A-F only; Periodic Spring)
Students will explore ecological and human health consequences of climate change, the psychology of climate change, and the potential effects on a wide range of biological processes and examines the social and economic drivers, social and economic consequences, and political processes at local, national, and international scales related to global change.

GCC 5011. Grand Challenge: Pathways to Renewable Energy. (TS; 3 cr.; A-F only; Periodic Spring)
This interdisciplinary course will examine obstacles to energy transitions at different scales. It will explore the role of energy in society, the physics of energy, how energy systems were created and how they function, and how the markets, policies, and regulatory frameworks for energy systems in the U.S. developed. The course will closely examine the Realpolitik of energy and the technical, legal, regulatory, and policy underpinnings of renewable energy in the U.S. and Minnesota. Students will learn the drivers that can lead global systems to change despite powerful constraints and how local and institutional action enables broader reform. Students will put their learning into action by developing proposals for addressing a particular challenge: Whether responding to emerging pandemics, food insecurity, maternal mortality, or civil society collapse during conflict, solutions often lie at the interface of animal, environmental, and human health. In this course, students will learn the drivers that can lead global systems to change despite powerful constraints and local institutional action enables broader reform. Students will put their learning into action by developing proposals for addressing a particular challenge: Using a strategy of grassroots empowerment, the course will be organized to help us connect to the heart of what we really value; to understand the threat of climate change; to examine how we feel in the light of that threat; and to take powerful action together. Students will work in groups throughout the course to assess the global ecological threat posed by climate change, and they will be part of designing and executing an activity where they empower a community to take action. For:so,jr,gr

GCC 5012. Grand Challenge: Structural Violence & Medication Experience. (DSJ; 3 cr.; A-F only; Periodic Fall)
The course will use a social justice framework for learning and communicating about structural violence and the intersection of culture, the medication experience, and community health. Utilizing principles of community engagement, we will focus on examining how broader Community Health and the individual Medication Experience are impacted by the overcoming of structural violence experienced by communities locally as well as globally. Using Critical Race Theory
and Social Ecological frameworks, we will come to a more complex understanding of our own social locations and the interplay of power and privilege while exploring the root causes of health disparities and the development of solutions that address inequities in health, education, housing, employment, and access to respectful health care. Students will learn to critically analyze these lived experiences while developing interactive storytelling, digital documentaries, digital essays and narratives to advance knowledge on health inequities in our community. prereq: sophomore, junior, senior, graduate student

GDES 5013. Grand Challenge: Making Sense of Climate Change - Science, Art, and Agency. (CIV; 3 cr.: A-F only; Periodic Fall & Spring)
The overarching theme of the course is the role of artistic/humanistic ways of knowing as tools for making sense and meaning in the face of "grand challenges." Our culture tends to privilege science, and to isolate it from the questions that disciplines arts and humanities. That help humanity ask and answer difficult questions about what should be done about our grand challenges. In this course, we will examine climate change science, with a particular focus on how climate change is expected to affect key ecological systems such as forest, farms, and resources for vital biodiversity such as pollinators in our community and Place. We will study the work of artists who have responded to climate change through their work, to make sense and meaning of climate change. Finally, we will have the unique opportunity to create a collaborative public art project that will become part of the Northern Spark festival, an all-night art festival. prereq: sophomore, junior, senior, graduate student

Graphic Design (GDES)

GDES 1311. Foundations: Drawing and Design in Two and Three Dimensions. (3 cr.: A-F or Audit; Every Fall & Spring)
Design elements/principles in context of observational drawing. Integrative approach to two-dimensional design, three-dimensional design, and drawing. Broad conceptual framework for design exploration. Emphasizes perceptual aspects of visual forms. prereq: [Apparel design or graphic design or interior design] pre-major

GDES 1312. Foundations: Color and Design in Two and Three Dimensions. (3 cr.: A-F or Audit; Every Fall & Spring)
Color theory, its application in two-/three-dimensional design. Emphasizes effective use of color by studying traditional color systems, perception, and interaction. Lectures, demonstrations, extensive studio work, critiques. prereq: [Apparel design or graphic design or interior design] pre-major

GDES 1315. Foundations: The Graphic Studio. (4 cr.: A-F or Audit; Every Fall & Spring)
Graphic design process of problem-solving. Visual communication of ideas and information. Use of design software to compose with words, images, and forms. prereq: Graphic design pre-major or design minor

GDES 2196. Work Experience in Graphic Design. (1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer)
Supervised work experience in business, industry, or government, related to student's area of study. Integrative paper or project. prereq: Plan submitted/approved by [adviser or internship supervisor], written approval of supervisor, instructor consent

GDES 2342. Web Design. (3 cr.: A-F or Audit; Every Fall & Spring)
Graphic design elements/principles applied to website design. HTML, CSS. Working with interactive media and file formats. prereq: 1311, 1312, 1315, ([GDES major or pre-major, semester of portfolio review] or design minor)

GDES 2345. Typography. (4 cr.: A-F or Audit; Every Fall & Spring)
History of typographic forms, principles of composition, expressive potential of type. Design process from problem-solving through exploration, experimentation, selection, critique, and refinement. Readings, research, exercises, design production. prereq: 1311, 1312, 1315, DES 1101, [graphic design major or premajor or design minor]

GDES 2350. Design Material Topics. (1-4 cr. [max 8 cr.]; A-F or Audit; Every Spring)
Letterpress, screen, and relief printing, or bookmaking. Defined but varying range of media expression. Graphic design communication through group/individualized projects in a cohort and under supervision of faculty.

GDES 2361. Design Process: Photography. (3 cr.: A-F or Audit; Every Fall & Spring)
Photography for graphic designers: digital/film photographic developing/image manipulation, printing. prereq: [1311 or DHA 1311], [1312 or DHA 1312], [graphic design major or grad student or design minor or instr consent]

GDES 2399V. Honors - Design and its Discontents: Design, Society, Economy, and Culture. (WI; 3 cr.: A-F only; Every Fall & Spring)

GDES 2399W. Design and Its Discontents: Design, Society, Economy, and Culture. (WI; 3 cr.: A-F only; Every Spring)

GDES 3196. Field Study: National or International. (1-4 cr. [max 10 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Faculty-directed field study in national or international setting.

GDES 3311. Illustration. (3 cr.: A-F only; Every Spring)
Two aspects of illustration for contemporary graphic designer. Image making, by hand or digitally, for use in design projects. Design development. Mapping ideas/expressing thoughts visually. Not observational drawing course. prereq: GDES 1311 or ArtS 1101 or PDES 3702 or LA 1301 or Arch 3250 or Arch 2301 or instructor permission

GDES 3312. Color and Form in Surface Design. (4 cr.: A-F or Audit; Every Fall & Spring)
Use of color/form representation in two-dimensional surface applications. Historical use of color and of spatial representation in visual communication. prereq: [1311 or DHA 1311], [1312 or DHA 1312], [graphic design or apparel design or design minor or instr consent]

GDES 3351. Text and Image. (3 cr.: A-F or Audit; Every Fall & Spring)
Composition of visual information using grid structures to integrate text/image. Informational/expressive aspects of graphic design, hierarchical relationships of visual elements. Methods of text layout that enhance communication. prereq: [2345 or DHA 2345], graphic design major, pass portfolio review

GDES 3352. Identity and Symbols. (3 cr.: A-F only; Every Fall & Spring)
Representation of abstract ideas through symbols. Development of visual identity systems. prereq: pass portfolio review, graphic design major

GDES 3352H. Honors: Identity and Symbols. (3 cr.: A-F only; Every Fall & Spring)
Representation of abstract ideas through symbols. Development of visual identity systems.

GDES 3353. Packaging and Display. (3 cr.: A-F or Audit; Every Fall & Spring)
Application of graphic design principles to three-dimensional projects. Principles of three-dimensional design/space applied to labeling, packaging, and display. prereq: [2345 or DHA 2345], 3351, graphic design major, pass portfolio review

GDES 4131W. History of Graphic Design. (WI; 4 cr.: A-F or Audit; Every Fall & Spring)
Historical analysis of visual communication. Technological, cultural, and aesthetic influences. How historical events are communicated/perceived through graphic presentation/imagery. prereq: Intro history or art history course

GDES 4160H. Honors Capstone Project. (2 cr. [max 4 cr.]; A-F only; Every Fall & Spring)
Individualizes honors experience by connecting aspects of major program with special academic interests. prereq: Graphic design honors

GDES 4193. Directed Study in Graphic Design. (1-14 cr.; max 8 cr.; A-F or Audit; Every Fall, Spring & Summer) Independent study in Graphic Design under tutorial guidance. prereq: Undergrad, instr consent

GDES 4196. Internship in Graphic Design. (1-3 cr.; S-N or Audit; Every Fall, Spring & Summer) Supervised work experience relating activity in business, industry, or government to the student's area of study. Integrative paper or project may be required. prereq: Completion of at least one-half of professional sequence, plan submitted/approved in advance by [adviser, internship supervisor], written consent of faculty supervisor, instr consent

GDES 4312. Advanced Graphic Design Print Projects. (3 cr.; A-F or Audit; Every Fall) Advanced Graphic Design Print Projects offers an opportunity for students to propose, design, and produce printed graphic design products while expanding upon their experience in surface design and printing. Students will explore graphic design communication through group and individualized projects in a cohort, and under the supervision of graphic design faculty. prereq: GDES 3312 or instructor permission or grad student

GDES 4330. Surface Fabric Design Workshop. (4 cr.; max 8 cr.; A-F or Audit; Every Spring) Studio experience in the development and production of surface design. Screen printing, batik, resist dying, shibori, cyanotypes, and dye transfers are included.

GDES 4345. Advanced Typography. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Expressive visual communication of words. Fundamental legibility of "invisible art," overt expression through type. Students complete extended typographic project. prereq: [2345 or DHA 2345], 3351, graphic design major] or design grad student or instr consent

GDES 4350. Advanced Design Material Topics. (1-4 cr.; max 8 cr.; A-F or Audit; Every Spring) Letterpress, screen, and relief printing, or bookmaking. Defined but varying range of media expression. Graphic design communication through group/individualized projects in a cohort, under supervision of faculty.

GDES 4361V. Honors Thesis Studio and Writing. (WI; 3 cr.; A-F only; Every Fall & Spring) Research/design of comprehensive graphic design thesis project. prereq: [Graphic design major, 2399W, 3352, 3353] honors student, or instr consent

GDES 4361W. Thesis Studio and Writing. (WI; 3 cr.; max 4 cr.; A-F only; Every Fall & Spring) Research/design of comprehensive graphic design thesis project. prereq: [Graphic design major, 2399W, 3352, 3353] honors student, or instr consent

GDES 4362. Senior Thesis and Exhibition. (3 cr.; max 4 cr.; A-F only; Every Fall & Spring) Design, production, and exhibition of comprehensive graphic design thesis project.

GDES 4362H. Senior Thesis and Exhibition. (3 cr.; A-F only; Every Fall & Spring) Design, production, and exhibition of comprehensive graphic design thesis project.

GDES 4363. Graphic Design Portfolio. (3 cr.; S-N only; Every Fall & Spring) Preparation of professional portfolio. Graphic design thesis exhibition. Professional issues.

GDES 4371. Data Visualization Studio. (3 cr.; A-F only; Every Fall) Visual articulation of data. Expansive research, meticulous gathering of data, analysis. Develop cohesive graphical narratives/build solid foundation in craft of presenting data. prereq: 2345, [Design minors required to take 2345], or graduate student, or instructor's consent

GDES 5193. Directed Study in Graphic Design. (1-4 cr.; max 8 cr.; A-F or Audit; Every Fall, Spring & Summer) Independent study in graphic design under tutorial guidance. prereq: Jr or sr grad student

GDES 5311. Illustration. (3 cr.; A-F only; Every Spring) Image making by hand or digitally for use in design projects. Design development. Mapping out ideas/expressing thoughts visually. Not observational drawing course. prereq: 1311 or ArtS 1101 or PDes 3702 or LA 1301 or Arch 3250 or Arch 2301 or instr consent

GDES 5341. Interactive Design. (3 cr.; A-F or Audit; Every Fall & Spring) Design of interactive multimedia projects. Interactive presentations and electronic publishing. Software includes hypermedia, scripting, digital output. prereq: [2334 or 2342], design minor] or graphic design major or grad student or instr consent

GDES 5342. Advanced Web Design. (3 cr.; A-F or Audit; Every Spring) Internet-based design. Static web pages, embedded media, cascading style sheets. Design and usability of interface between humans and technology. Evaluation of visual elements that control and organize dealings with computers to direct work. Students develop designs, do usability testing. prereq: [2334 or 2342], design minor] or graphic design major or grad student or instr consent

GDES 5371. Data Visualization Studio. (3 cr.; A-F only; Every Fall) Visual articulation of data. Expansive research, meticulous gathering of data, analysis. Develop cohesive graphical narratives/build solid foundation in craft of presenting data.

GDES 5372. Data Visualization for Interactive Platforms. (3 cr.; A-F only; Every Spring) Skills/tools necessary to process large quantities of information/present them through interactive mediums. Create data visualizations for web utilizing Javascript libraries. Linear/non-linear data-driven narratives.

GDES 5383. Digital Illustration and Animation. (3 cr.; A-F or Audit; Periodic Fall & Spring) Advanced computer design. Integration of design knowledge with Macintosh computer applications. Students use software to create digital illustration and animations. Adobe Illustrator, After Effects, Flash. prereq: [2334 or 2342], design minor], [graphic design major or [grad student, experience with computer illustration] or instr consent

GDES 5386. Fundamentals of Game Design. (3 cr.; A-F or Audit; Periodic Fall & Spring) Games of all kinds. Theoretical/practical aspects of making games. Investigation of design process. Rules, strategies, methodologies. Interactivity, choice, action, outcome, rules in game design. Social interaction, story telling, meaning/ideology, semiotics. Signs, cultural meaning, prereq: [2334 or 2342], design minor] or [4384 or DHA 4384 or 5341 or DHA 5341], [graphic design major or sr grad student]] or instr consent

GDES 5388. Graphic Design Research. (3 cr.; A-F or Audit; Periodic Spring) Experience in Graphic Design research strategies and methods. Applied, theoretical, and human-centered aspects directed at project development. Design prototyping, testing, analysis. prereq: Graphic design major or grad student or instr consent

GDES 5399. Theory of Electronic Design. (3 cr.; A-F or Audit; Spring Odd Year) Theories, methodologies, histories of electronic design, its impact on visual communications. Digital artifacts, processes, paradigms. prereq: Graphic design track student or instr consent

GDES 8170. Topics in Graphic Design. (1-3 cr.; max 6 cr.; A-F or Audit; Every Fall & Spring) In-depth investigation of topic, announced in advance.

GDES 8180. Professional Seminar. (1-2 cr.; max 4 cr.; A-F or Audit; Every Fall & Spring) Professional development issues/trends.

GDES 8192. Readings in Graphic Design. (1-3 cr.; max 8 cr.; A-F or Audit; Every Fall, Spring & Summer) Independent study, review of books периодicals under tutorial guidance. prereq: instr consent

GDES 8193. Directed Study. (1-3 cr.; max 8 cr.; A-F or Audit; Every Fall, Spring & Summer) Directed study in graphic design. prereq: instr consent

GDES 8222. Plan B Master's Project. (3 cr.; S-N or Audit; Every Fall & Spring) Plan B master's project. prereq: [Design or DHA master's student], instr consent

GDES 8361. Color, Design, and Human Perception. (3 cr.; A-F or Audit; Spring Odd Year)
Perceptual and psychological aspects of color and design. Human factors of color variables and design strategies that can enhance human experience of, and interaction with, color.
prereq: Basic color theory course or instr consent

GDES 8362. The Nature of Representation in Visual Communication. (. 3 cr. ; A-F or Audit; Spring Even Year)
Theories of representation and studio production (digital, non-digital) centered around representation in culture.

GDES 8990. MFA Creative Thesis. (. 6 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)
MFA project. prereq: Completed coursework requirements for MFA in DHA w/multimedia emphasis, instr consent

Greek (GRK)

GRK 1001. Beginning Classical Greek I. (5 cr.; Student Option; Every Fall)
Introduction to grammar/vocabulary of classical Greek as written in Athens in 5th/4th centuries BCE. Forms/simple constructions. Some reading of simple, heavily adapted passages from ancient texts.

GRK 1002. Beginning Classical Greek II. (5 cr.; Student Option; Every Spring)
Continuation of Greek 1001. More complex constructions, including participles, clauses, indirect discourse. Some reading of adapted passages from ancient texts. prereq: Grade of at least C- or S in 1001 or dept consent

GRK 3003. Intermediate Greek Prose. (4 cr.; Student Option; Every Fall)
Introduction to Athenian prose authors of 5th/4th centuries BCE. Readings of continuous passages of unadapted Greek texts (history, speeches). Review of grammar/vocabulary. Some discussion of major themes/issues in Greek culture as illustrated by texts. prereq: Grade of at least [C- or S] in [1002 or 5001] or [instr consent, grad student]

GRK 5004. Intermediate Greek Poetry for Graduate Student Research. (. 4 cr.; Student Option; Every Spring)
Introduction to Greek epic poetry. Readings of selections from Homer's Iliad and Odyssey. Quantitative meter and poetic devices. Discussion of major themes and issues as developed in Homer's poetry. prereq: dept consent

GRK 5100. Advanced Reading. (. 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring)
Reading in Greek texts/authors. Texts/authors vary. prereq: [GRK 3004 or equiv], at least two yrs of college level Greek. Must contact Classical and Near Eastern Studies department for permission to register.

GRK 5200. Biblical Greek. (. 3 cr. [max 6 cr.]; Student Option; Fall Even Year)
Readings from Gospels, epistles of Paul, related literature. Emphasizes proficiency in reading Greek New Testament. Selections vary. prereq: [GRK 3004 or equiv], at least two yrs of college level Greek. Must contact Classical and Near Eastern Studies department for permission to register.

GRK 5701. Prose Composition. (. 3 cr.; Student Option; Spring Odd Year)
Moving step by step through Ancient Greek grammar, starting with simple sentences and progressing to complex ones. Course ends with students translating short passages of modern English prose into Greek. prereq: Grad student or instr consent

GRK 5705. Introduction to the Historical-Comparative Grammar of Greek and Latin. (. 3 cr.; Student Option; Periodic Fall & Spring)
Introduction to the historical-comparative grammar of Greek and Latin from their Proto-Indo-European origins to classical norms.

GRK 5800. Sight Reading for Graduate Students. (. 1 cr. [max 6 cr.]; S-N only; Every Fall & Spring)
Practice in reading Greek texts at sight. prereq: Enrollment in a grad program in Department of Classical/Near Eastern Studies

GRK 5993. Directed Studies. (1-4 cr.; max 18 cr.; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: Grad student or instr consent

GRK 5994. Directed Research. (1-12 cr. [max 18 cr.]; Student Option; Every Fall & Spring)
Supervised original research on topic chosen by student. Prereq Grad student or instr consent

GRK 5996. Directed Instruction. (1-12 cr. [max 20 cr.]; Student Option; Every Fall & Spring)
Supervised teaching internship. Prereq Grad student or instr consent.

GRK 8100. Readings in Greek Prose. (. 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring)
Reading and discussion of ancient Greek prose texts. prereq: Advanced grad student

GRK 8120. Greek Text Course. (. 3 cr. [max 15 cr.]; Student Option; Every Fall & Spring)
Students attend 3xxx Greek courses. Supplementary work at discretion of instructor. prereq: 3111 or dept consent; not for students in dept of Classical and Near East Studies

GRK 8200. Readings in Greek Verse. (. 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring)
Reading/discussion of ancient Greek poetic texts. prereq: Advanced grad student

GRK 8262. Survey of Greek Literature I. (. 3 cr.; Student Option; )
Extensive selections from all genres of Greek literature of archaic and early classical periods.

GRK 8263. Survey of Greek Literature II. (. 3 cr.; Student Option; )
Extensive selections from Greek authors of the classical and Hellenistic eras.

GRK 8300. Readings in Greek Texts. (. 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring)
Reading/discussion of literary or documentary texts from Greek antiquity. Topics may include subjects that draw on various of sources, genres, or methods. prereq: Advanced grad student

GRK 8400. Readings in Patristic Greek. (. 3 cr. [max 6 cr.]; Student Option; Fall Odd Year)
Reading/discussion of early Christian texts in Greek. prereq: Advanced grad student

GRK 8910. Seminar. (. 3 cr. [max 30 cr.]; Student Option; Periodic Fall & Spring)
Various topics in Greek literature examined in depth with emphasis on current scholarship and original student research.

Health Informatics (HINF)

HINF 5115. Interprofessional Healthcare Informatics. (. 3 cr.; Student Option; Every Fall, Spring & Summer)
Implications of informatics for practice, including nursing, public health, and healthcare in general. Electronic health record issues. Relates ethical, legislative and political issues informatics. Global and future informatics issues. prereq: Grad student or professional student or instr consent

HINF 5430. Health Informatics I. (. 3 cr.; A-F or Audit; Every Fall)
HINF 5431. Health Informatics II. (3 cr.; A-F or Audit; Every Spring)
Introductory survey of health informatics, focusing on applications of informatics
care concepts/technologies. Health informatics research, literature, evaluation. Decision
models. Computerized decision support systems. Data mining, natural language
processing, other emerging technologies. Security for health care information handling.
prereq: Junior or senior or grad student or professional student or instr consent

HINF 5436. AHC Informatics Grand Rounds. (1 cr.; max 10 cr.); S-N or Audit; Every Fall & Spring)
Presentation/discussion of research problems, current literature/topics of interest in Health Informatics.

HINF 5494. Topics in Health Informatics. (1-4 cr.; max 12 cr.); Student Option; Periodic Fall & Spring)
Topics in health informatics, prereq: Professional student or grad student or instr consent

HINF 5496. Internship in Health Informatics. (1-6 cr.; max 18 cr.); S-N or Audit; Every Fall, Spring & Summer)
Practical industrial experience not directly related to student's normal academic experience. prereq: HINF student or instr consent

HINF 5499. Capstone Project for the Masters of Health Informatics. (3 cr.; A-F only; Every Fall, Spring & Summer)
Final opportunity to apply newly acquired knowledge/skills to project involving practical problem in health informatics. Submit written project report in lieu of final examination. prereq: second semester MHI student or instr consent

HINF 5501. US Health Care System: Information Challenges in Clinical Care. (1 cr.; S-N or Audit; Every Fall & Spring)
Health care system/its unique interaction between key health system stakeholders. Relationship between patients, providers, payers, regulatory bodies. Role of information management/challenges of information standardization/exchange. prereq: Junior or senior or professional student or grad student or instr consent

HINF 5502. Programming Essentials Python. (3 cr.; max 2 cr.); S-N or Audit; Every Fall & Spring)
Computer programming essentials for health sciences/health care applications using Python 3. Intended for students with limited programming background, or students wishing to obtain proficiency in Python programming language. prereq: Junior or senior or grad student or professional student or instr consent

HINF 5510. Applied Health Care Databases: Database Principles and Data Evaluation. (3 cr.; A-F or Audit; Every Fall)
Principles of database theory, modeling, design, manipulation of databases. Taught with healthcare applications emphasis. Using relational database management system (RDBMS). Database manipulation. Structured Query Language (SQL) to compose/execute queries. prereq: Junior or senior or grad student or professional student or instr consent

HINF 5520. Clinical Informatics and Patient Safety. (2 cr.; A-F or Audit; Every Fall & Spring)
Application/operation of clinical information systems, electronic health records, decision support/application in health care system. Use of clinical information systems/association with health care delivery, payment, quality, outcomes. prereq: Junior or senior or grad student or professional student or instr consent

HINF 5530. Health Care Software Management. (2 cr.; A-F or Audit; Every Spring)
Health care software and unique interaction between key stakeholders in health care software development and implementation. Systems analysis, software development, and software life cycle management for health care applications. prereq: HINF student or instr consent

HINF 5531. Health Data Analytics and Data Science. (2 cr.; A-F or Audit; Every Spring)
Data science methods/techniques for extraction, preparation, use of health data in decision-making. prereq: Junior or senior or professional student or grad student or instr consent

HINF 5540. Interprofessional Health Informatics. (2 cr.; A-F only; Every Spring)
Informatics applications in various healthcare professions. Clinical specialties. Informatics tools to improve healthcare services/outcomes through lectures/presentations.

HINF 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

HINF 8405. Advanced Topics in Health Informatics I. (1-4 cr. [max 12 cr.]; Student Option; Every Fall)
Topics may include computer systems design for health sciences, small computer concepts/use, computers for clinical services, computer-aided medical decision making, biomedical image processing, pattern recognition, data mining. Case studies from health sciences. prereq: Professional student or grad student or instr consent

HINF 8406. Advanced Topics in Health Informatics II. (1-4 cr. [max 12 cr.]; Student Option; Every Spring)
Computer systems design for health sciences, small computer concepts and use, computers for clinical services, computer-aided medical decision making, biomedical image processing, and pattern recognition. Case studies from health sciences.

HINF 8434. Medical Decision Support Techniques. (3 cr.; A-F or Audit; Every Fall & Spring)
Examines systems based on statistical and logical approaches to decision making that include statistical prediction, rule-based systems, case-based reasoning, quantitative reasoning, and neural networks, and issues related to their use. prereq: 5432 or instr consent

HINF 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HINF 8446. Professional Studies in Health Informatics. (1-2 cr.; A-F or Audit; Every Fall & Spring)
Health informatics as a profession, including discipline, responsibilities, resources, and job opportunities. Directed experiences in consulting, teaching, writing, conducting research, and managing facilities. prereq: 5431, PubH 5452 or instr consent, grad hth inf major

HINF 8492. Advanced Readings or Research in Health Informatics. (1-6 cr. [max 24 cr.]; Student Option No Audit; Every Fall, Spring & Summer)
Directed readings or research in topics of current or theoretical interest in health informatics. prereq: HINF student or instr consent

HINF 8494. Research in Health Informatics. (1-6 cr.; A-F or Audit; Every Fall, Spring & Summer)
Directed research under faculty guidance. prereq: instr consent

HINF 8525. Health Informatics Teaching. (2 cr.; A-F only; Spring Even Year)
Use selected teaching techniques to assist in the delivery of course content in health informatics curriculum. Work with a professor who is the course director. From evaluation and feedback on their teaching technique, students develop a teaching philosophy as a final course project. prereq: HINF student or instr consent prereq: HINF student or instr consent

HINF 8535. Advanced Health Informatics Research Methods. (3 cr.; A-F only; Spring Even Year)
Application of research methods, evaluation, Design, data collection, and data analysis in the context of health informatics, including computational and health data challenges. prereq: HINF student or instr consent

HINF 8566. Doctoral Pre-Thesis Credits. (1-6 cr. [max 24 cr.]; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HINF 8770. Plan B Project. (4 cr.; No Grade Associated; Every Fall, Spring & Summer)
Research project. Topic arranged between student/instructor. Written report required. prereq: Advanced plan B MS student
HINF 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Assigned; Every Fall, Spring & Summer) (No description) prereq: Max 16 cr per semester or summer; 10 cr total required [Plan A only]

HINF 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Assigned; Every Fall, Spring & Summer) (No description) prereq: PhD candidate or department consent. Max 18 credits per semester; 24 credits required

### Health Services Management (HSM)

**HSM 3521. Health Care Delivery Systems.** (3 cr.; A-F or Audit; Every Fall) Health care (HC) delivery systems, health economics, third-party/public reimbursement, current trends in HC organizations/management/administration. Regulations, standards, quality assurance, accreditation, current ethical issues for HC providers/professionals, patients/families, communities, international health. prereq: 30 cr

**HSM 4193. Directed Study.** (1-4 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent project. Topic arranged with and supervised by Health Services Management faculty member. prereq: admitted to HSM major, minor, or certificate; department consent.

**HSM 4531. Human Resources in Health Care Settings.** (3 cr.; A-F or Audit; Every Fall & Spring) Basic understanding of human resources issues within health care organizations—management of human capital to meet organizational objectives, and building and motivating an engaged workforce. Legal principles; labor supply and demand; sourcing, recruitment, selection and orientation; compensation; benefits; diversity; performance management. prereq: 45 cr

**HSM 4541. Health Care Finance.** (3 cr.; A-F or Audit; Every Fall & Spring) General principles of financial management for health care industry. Operational knowledge of financial management theory, esp., how hospitals and their departments develop/balance operating/capital budget for business growth/development. Governmental policies, procedures, and ethical issues controlling the health care industry. prereq: Basic accounting knowledge, a course such as ACCT 2050, and knowledge of Microsoft Excel are strongly recommended. HSM pre-majors should wait for major status to take this course.

**HSM 4561. Health Care Administration and Management.** (3 cr.; A-F or Audit; Every Fall & Spring) Background knowledge and skills in business and administrative aspects of health care. Applications of behavioral and organizational theory to health care settings. Organization models, reimbursement methodologies, information systems, staff scheduling, employee evaluation, accreditation agencies, productivity management, budget planning, group leadership.

**HSM 4591. Health Care Law, Safety, and Ethics.** (3 cr.; A-F or Audit; Every Fall & Spring) Introduction to the major legal and ethical aspects and principles as applied in health services management. Topics include organization and governance of healthcare organizations; regulation; healthcare fraud and abuse; professional licensing and credentialing; compliance, quality and risk management; privacy and security of individually identifiable health information; healthcare decision-making; professional liability and malpractice. Other topics include legal and ethical issues surrounding healthcare technologies, medical research, and medical breakthroughs. prereq: 45 credits

**HSM 4596. Health Services Management Internship.** (3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Students will apply coursework and contribute knowledge of best practices through hands-on experience in a professional health services setting. prereq: HSM major, minor, or cert student; dept. consent; HSM 3521, HSM 4531, HSM 4541, HSM 4561, HSM 4591 (and ABus 3301) and HINF 5430 for HSM technology internships

**HSM 4861. Leadership and Business Planning in Health Care: Capstone.** (3 cr.; A-F only; Every Fall & Spring) The course is a core requirement in the HSM major and minor and allows students to synthesize and integrate lessons from previous courses. It covers theory and practice of leadership skills needed for high-performing health care organizations in changing and turbulent times. It emphasizes a four phase approach: environmental assessment, planning, strategy and innovation, and implementation/measurement. Students will be prepared to embrace innovation and lead business plans through to successful implementation. Students will learn to integrate a wide range of management tools through collaborative development of a strategic business plan. prereq: HSM 3521, 4531, 4541, 4561, 4591. HSM major or minor; or ICP with HSM 3521 and HSM 4531 

**HEBR 1001. Beginning Hebrew I.** (5 cr.; Student Option; Every Fall) For beginners whose goal is biblical or post-biblical Jewish studies or modern Israeli Hebrew. Leads to speaking, listening comprehension, and reading and writing Hebrew. Emphasizes communication proficiency. Cultural materials are incorporated.

**HEBR 1002. Beginning Hebrew II.** (5 cr.; Student Option; Periodic Fall & Spring) Continuation of 1001. Leads to speaking, listening comprehension, reading, and writing Hebrew. Emphasizes communication proficiency. Cultural materials. prereq: Grade of at least [C- or S] in [1001 or 4001] or instr consent

**HEBR 1101. Beginning Biblical Hebrew I.** (5 cr.; Student Option; Periodic Fall) Basic grammar and syntax preparatory to reading simple narrative texts in the Bible. Presentation and discussion of multiple approaches to problems and issues in biblical scholarship.

**HEBR 1102. Beginning Biblical Hebrew II.** (5 cr.; Student Option; Spring Even Year) Progression to more sophisticated reading of narrative, prophetic, and legal texts. Presentation/discussion of multiple approaches to problems/issues in biblical scholarship. prereq: Grade of at least [C- or S] in [1101 or 4104] or instr consent

**HEBR 3011. Intermediate Hebrew I.** (5 cr.; Student Option; Every Fall) Prepares students for CLA language requirement. Speaking, reading, writing, and comprehension of modern Hebrew. Students read/discuss prose, poetry, news, and film. Important features of biblical/classical Hebrew. Taught primarily in Hebrew. prereq: Grade of at least [C- or S] in [1002 or 4002] or instr consent

**HEBR 3012. Intermediate Hebrew II.** (5 cr.; Student Option; Every Spring) Extensive reading of simplified modern Hebrew prose selections. Students discuss poetry, newspaper, film, and TV in Hebrew. Israeli cultural experiences. Hone composition, listening comprehension, and speaking skills to prepare for proficiency exams. Biblical prose, simple poetic texts. Taught in Hebrew. Meets with 4012. prereq: Grade of at least [C- or S] in 3011 or instr consent

**HEBR 3090. Advanced Modern Hebrew.** (3 cr. [max 18 cr.]; Student Option; Every Fall) Preparation to read various kinds of authentic Hebrew texts and to develop higher levels of comprehension/speaking. Conducted entirely in Hebrew. Emphasizes Modern Israeli Hebrew. Introduction to earlier genres. Grammar, widening vocabulary. Contemporary short fiction, essays, articles on cultural topics, films, Hebrew Internet sites, TV. prereq: 3012 or instr consent

**HEBR 3101. Intermediate Biblical Hebrew I.** (4 cr.; Student Option; Fall Odd Year) Text of Hebrew Bible. Basic research tools/commentaries. Close reading of narrative biblical texts. Reading fluency, methods of research in biblical studies. prereq: Grade of at least [C- or S] in [1102 or 4105] or instr consent

**HEBR 3102. Intermediate Biblical Hebrew II.** (4 cr.; Student Option; Spring Odd Year) Text of Hebrew Bible, basic research tools and commentaries. Close reading of narrative biblical texts. Reading fluency, methods of research in biblical studies. Meets with 4107. prereq: Grade of at least [C- or S] in 3101 or instr consent

**HEBR 3951W. Major Project.** (WI; 4 cr.; Student Option; Every Fall & Spring) Research project using primary and secondary sources. Students select project in consultation with a faculty member, who directs the
research/writing. prereq: [Hebr major, three 3xxx Hebrew courses], instr consent, dept consent

HEBR 3980. Directed Instruction. (1-4 cr.; Student Option; Every Fall & Spring) Students observe/discuss classes. Gradually increased participation in preparing/presenting instructional materials to a beginning Hebrew class. Evaluation of materials, teaching techniques. Seminars on language teaching issues. Prereq college consent.

HEBR 3993. Directed Studies. (; 1-4 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent

HEBR 4001. Beginning Hebrew I for Graduate Student Research. (; 5 cr.; Student Option; Every Fall) For beginners whose goal is biblical or post-biblical Jewish studies or modern Israeli Hebrew. Leads to speaking, listening comprehension, and reading and writing Hebrew. Emphasizes communication proficiency. Cultural materials are incorporated. Meets concurrently with 1001. prereq: grad student

HEBR 4002. Beginning Hebrew II for Graduate Student Research. (; 5 cr.; Student Option; Periodic Fall & Spring) Continuation of 4001. Leads to speaking, listening comprehension, reading, and writing Hebrew. Emphasizes communication proficiency. Cultural materials. Meets with 1002. prereq: Grade of at least [C- or S] in [1001 or 4001] or instr consent

HEBR 4011. Intermediate Hebrew I. (5 cr.; Student Option; Every Fall) Prepares students for CLA language requirement. Speaking, reading, writing, and comprehension of modern Hebrew. Students read and discuss prose, poetry, news, and film. Taught primarily in Hebrew. prereq: Grade of at least [C- or S] in [1002 or 4002] or instr consent


HEBR 4104. Beginning Biblical Hebrew I for Graduate Student Research. (; 5 cr.; Student Option; Periodic Fall) Basic grammar and syntax preparatory to reading simple narrative texts in the Bible. Multiple approaches to problems and issues in biblical scholarship. Meets with 1104.

HEBR 4105. Beginning Biblical Hebrew II for Graduate Student Research. (; 5 cr.; Student Option; Spring Even Year) Progression to more sophisticated reading of narrative, prophetic, and legal texts. Presentation and discussion of multiple approaches to problems and issues in biblical scholarship. Meets with 1102. prereq: Grade of at least [C- or S] in [1101 or 4104] or instr consent

HEBR 4106. Intermediate Biblical Hebrew I. (; 3 cr.; Student Option; Every Fall) Text of Hebrew Bible. Basic research tools/ commentaries. Close reading of narrative biblical texts. Reading fluency, methods of research in biblical studies. Meets with 3101. prereq: Grade of at least [C- or S] in [1102 or 4105] or [instr consent, grad student]

HEBR 4107. Intermediate Biblical Hebrew II for Graduate Student Research. (; 4 cr.; Student Option; Odd Year) Text of Hebrew Bible, basic research tools and commentaries. Close reading of narrative biblical texts. Reading fluency, methods of research in biblical studies. Meets with 3102. prereq: Grade of at least [C- or S] in 3101 or instr consent

HEBR 4108. Intermediate Biblical Hebrew III. (3 cr. [max 18 cr.]; Student Option; Every Fall) Various authentic Hebrew texts. Comprehension/speaking. Conducted entirely in Hebrew. Emphasizes Modern Israeli Hebrew. Grammar, widening vocabulary. Contemporary short fiction, essays, articles on cultural topics, films, Hebrew Internet sites, TV. prereq: 3012 or instr consent

HEBR 5200. Advanced Classical Hebrew. (; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) In-depth reading, analysis, and discussion of classical Hebrew texts. Grammar, syntax. Introduction to text-criticism, history of scholarship, and scholarly tools. Format varies between survey of themes (e.g., law, wisdom, poetry) and extended concentration upon specific classical texts.

HEBR 5300. Post-Biblical Hebrew: Second Temple Period. (; 3 cr. [max 18 cr.]; Student Option; Fall Even Year) Readings in late-/post-biblical Hebrew literature of Persian, Hellenistic, and early Roman periods (e.g., Chronicles, Ezra-Nehemiah, Ecclesiastes, Daniel, Dead Sea Scrolls, apocrypha, pseudepigrapha). Focuses on historical development of Hebrew language and literature in relation to earlier biblical sources. prereq: Grad student or instr consent

HEBR 5990. Topics in Hebrew Studies. (; 1-4 cr. [max 12 cr.]; Student Option; Periodic Fall) Historical, linguistic, literary, religious, or humanistic study of Hebrew society/culture. Approach/method of study varies with topic. prereq: Grad student or instr consent

HEBR 5992. Directed Readings. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.


HECU 3558. Making Media Making Change: Digital Technologies, Storytelling, and Activism Digital Internship. (8 cr.; A-F only; Every Fall, Spring & Summer) Minimum of 240 hours, at Minneapolis Television Network. Create programming for show on art, social justice, community action in Minneapolis.

HECU 3591. Environmental Sustainability: Sci, Public Policy, & Cmty Action
Environmental & Climate Justice. (ENV; 4 cr.; A-F only; Every Fall)
Examine ecological and physical processes that underlie environmental degradation and learn to set up ecological monitoring through in-depth case studies of adaptive management projects. prereq: concurrent registration is required (or allowed) in 3592, concurrent registration is required (or allowed) in 3953, concurrent consent registration is required (or allowed) in 3594, dept consent

HECU 3592. Environmental Sustainability: Ecology and Socio-ecological Systems Change. (SOCS: 4 cr.; A-F only; Every Fall)
How power dynamics and a global free market impact efforts to promote sustainability. The state's role in regulating resources and distributing environmental benefits. How social movements develop a collective future and mobilize actors to realize it. prereq: concurrent registration is required (or allowed) in 3591, concurrent registration is required (or allowed) in 3593, concurrent registration is required (or allowed) in 3594, dept consent

HECU 3593. Environmental Sustainability Sci, Public Policy, & Cmty Action Field Research Method & Investigation. (BIOL: 4 cr.; A-F only; Every Fall)
Field research project on environmental issues. Students work with scientists and community members and conduct publishable research. prereq: concurrent registration is required (or allowed) in 3591, concurrent registration is required (or allowed) in 3592, 3594, dept consent

HECU 3594. Environmental Sustainability Sci, Public Policy, & Cmty Action Internship. (CIV: 4 cr.; A-F only; Every Fall)
Students work with an organization addressing issues such as how to manage infrastructure for a booming economy and population in the metropolitan area, how rural communities can maintain viable livelihoods, and how to avert environmental decline in threatened ecosystems. prereq: concurrent registration is required (or allowed) in 3591, concurrent registration is required (or allowed) in 3592, concurrent registration is required (or allowed) in 3593, dept consent

Hindi-Urdu (HNUR)

HNUR 1005. Conversational Hindi-Urdu. (3 cr.; Student Option; Every Spring)
Conversational Hindi-Urdu is targeted for students with different backgrounds and purposes. This specific course is designed for students who want to acquire only conversational skills without focusing on the Hindi-Urdu script and writing and reading components. English transliteration will be used instead.

HNUR 1011. Beginning Hindi-Urdu I. (5 cr.; Student Option; Every Fall)
Listening, speaking, reading, writing. Development of communicative competence.

HNUR 1012. Beginning Hindi-Urdu II. (5 cr.; Student Option; Every Spring)
Listening, speaking, reading, writing. Development of communicative competence. prereq: 1011 or instr consent

HNUR 3021. Intermediate Hindi-Urdu I. (5 cr.; Student Option; Every Fall)
Reading, writing, speaking, listening skills. Grammar review, basic compositions, oral presentations. prereq: 1012 or instr consent

HNUR 3022. Intermediate Hindi-Urdu II. (5 cr.; Student Option; Every Spring)
Reading, writing, speaking, listening skills. Grammar review, basic compositions, oral presentations. prereq: 3021 or instr consent

HNUR 3031. Advanced Hindi-Urdu I. (4 cr.; Student Option; Every Fall)
Continued emphasis on development of communication skills, ability to comprehend both written/spoken texts. Speak, read, write in Hindi-Urdu beyond intermediate level. prereq: 3022 or instr consent

HNUR 3032. Advanced Hindi-Urdu II. (4 cr.; Student Option; Every Spring)
Continued emphasis on development of communication skills, ability to comprehend both written/spoken texts. Speak, read, write in Hindi-Urdu beyond intermediate level. prereq: 3031 or instr consent

HNUR 3290. Hindi-Urdu Language Teaching Tutorial. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
Students tutor beginning students of Hindi-Urdu and are part of department's Hindi-Urdu language team. prereq: Grade of A in HNDI 4162

HNUR 4001. Beginning Hindi-Urdu I for Graduate Student Research. (5 cr.; Student Option; Every Fall)
Listening, speaking, reading, writing. Development of communicative competence.

HNUR 4002. Beginning Hindi-Urdu II for Graduate Student Research. (5 cr.; Student Option; Every Spring)
Listening, speaking, reading, writing. Development of communicative competence.

HNUR 4003. Intermediate Hindi-Urdu I for Graduate Student Research. (5 cr.; Student Option; Every Fall)
Reading, writing, speaking, listening skills. Grammar review, basic compositions, oral presentations. prereq: 4002 or instr consent

HNUR 4004. Intermediate Hindi-Urdu II for Graduate Student Research. (5 cr.; Student Option; Every Spring)
Reading, writing, speaking, listening skills. Grammar review, basic compositions, oral presentations. prereq: 4003 or instr consent

HNUR 4005. Advanced Hindi-Urdu I for Graduate Student Research. (4 cr.; Student Option; Every Fall)
Continued emphasis on development of communication skills, ability to comprehend both written/spoken texts. Speak, read, write in Hindi-Urdu beyond intermediate level. prereq: 4004 or instr consent

HNUR 4006. Advanced Hindi-Urdu II for Graduate Student Research. (4 cr.; Student Option; Every Spring)
Continued emphasis on development of communication skills, ability to comprehend both written/spoken texts. Speak, read, write in Hindi-Urdu beyond intermediate level. Meets with HNUR 3032. prereq: 4005 or instr consent

HNUR 5993. Directed Readings. (1-5 cr. [max 15 cr.]; S-N only; Student Option; Every Fall & Spring)
Guided individual reading or study of modern Hindi-Urdu texts. Prereq instr consent, dept consent, college consent.

History (HIST)

HIST 1000. Visions of the Past: Thematic Approaches to Understanding History. (HIS; 3-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring)
Innovative thematic approaches to human past. Historical sources, methods, and concepts. Topics such as environmental history, faith/religion in history, war/society, the family in world history, technology as a motor of history. prereq: Fr or soph or fewer than 60 cr

HIST 1011W. Civilization and the Environment: World History to 1500. (ENV,WI,HIS; 4 cr.; Student Option; Every Fall, Spring & Summer)
Sweep of history, from first prehistoric societies to dawn of modern world circa 1500. Forces that pushed humans to continually explore new environments and develop higher levels of social organization and cross-cultural interaction. prereq: Fr or soph or non-hist major

HIST 1012W. The Age of Global Contact. (GP,WI,HIS; 4 cr.; Student Option; Every Fall, Spring & Summer)
Five centuries of globalization. How the modern, interconnected world came into being. Changing material life (food, clothes, petroleum) and ideologies/beliefs. Analysis of primary documents to show how historical knowledge is produced. prereq: Fr or soph or non-hist major

HIST 1015W. Globalization: Issues and Challenges. (GP,WI; 4 cr.; A-F or Audit; Every Fall & Spring)
Increased global interconnections over past 50 years. Impact of information revolution on human rights, economic inequality, ecological challenges, and decolonization. Cases in Asia, Africa, Latin America, or Middle East. prereq: Fr or soph or non-hist major

HIST 1031W. Europe and the World: Expansion, Encounter, and Exchange to 1500. (GP,WI,HIS; 4 cr.; Student Option; Every Fall)
Europe, from Hammurabi to Columbus. Heyday of ancient Near East, Late Middle Ages. Culture, European interactions with wider world through religion, conquest, and trade. Beginning of the age of discoveries. prereq: Fr or soph or non-hist major

HIST 1032W. Europe and the World: Expansion, Encounter, and Exchange from...
1500 to Present. (GP, WI, HIS; 4 cr.; Student Option; Every Spring) Emergence of a Europe of nations/empires. Transformations through revolutions, wars, and encounters with world regions. prereq: Fr or soph or non-hist major

HIST 1102. Medieval Tales and their Modern Echoes. (GP, LITR; 3 cr.; Student Option; Every Spring) Knights of Round Table, dragon-slayers, magic djinn, pilgrims in Hell. How stories have been retold in modern fiction, film, arts. Texts from Europe/other regions of globe.

HIST 1301W. Authority and Rebellion: American History to 1865. (DSJ, WI, HIS; 4 cr.; Student Option; Every Fall) Conflict/change, from colonial era through Civil War. colonization/resistance, slavery, nation-building, westward expansion, gender roles, religion, reform, race/ethnicity, immigration, industrialization, class relations. Students use primary sources, historical scholarship. prereq: Fr or soph or non-hist major


HIST 1307. Authority and Rebellion: American History to 1865. (HIS; 3 cr.; Student Option; Periodic Fall, Spring & Summer) Conflict/change, from colonial era through Civil War. Colonization/resistance, slavery, nation-building, westward expansion, gender roles, religion, reform, race/ethnicity, immigration, industrialization, class relations. Students use primary sources, historical scholarship.


HIST 1361W. World War I: A Global History. (HIS, WI, TS; 3 cr.; A-F only; Every Fall) This class takes a global approach to the examination of World War One’s causes and consequences. We will look at how the war unfolded in Europe, Africa, and the Middle East. We will also explore the war’s impact on North America and Australasia, areas drawn into the conflict because of their unique relationships with Britain and France. We will consider the special role played by the U.S. in restoring world peace and analyze the lasting social and political cleavages occasioned by the war. We will get at the heart of how the war was fought and how it is remembered for all of its triumphs and tragedies.

HIST 1411W. The Family from 10,000 BCE to the Present. (CIV, WI, HIS; 4 cr.; Student Option; Every Fall) How family life, has played and continues to play a major role in world history. Lectures, labs, assignments. prereq: Fr or soph or fewer than 60 cr

HIST 1534. Introduction to Jewish History and Cultures. (HIS; 3 cr.; Student Option; Every Fall) Jewish history, society, culture from Second Temple period (5th century BCE) to modern era as illuminated by literature, philosophy, art, film, music, religious law/custom, artifacts of daily life. Emphasizes political, social, cultural contexts that shaped development of Jewish ideas, practices, and institutions.

HIST 1842. The Digital Revolution: Computers in the Making of the Contemporary World. (3 cr.; Student Option; Periodic Fall & Spring) Historical examination of birth of computer. Global transformations after 1945. History of technology/how technology transforms cultural life. United States history integrated with global history to show how technology, capitalism, politics, culture, environment, conspired to make computer an agent of revolutionary change.

HIST 1902. Freshman Seminar. (DSJ; 3 cr.; A-F or Audit; Every Spring) Topics specified in Class Schedule. prereq: freshman

HIST 1903. Freshman Seminar. (CIV; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule.

HIST 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule.

HIST 1907W. Freshman Seminar. (DSJ, WI; 3 cr.; A-F or Audit; Every Fall) Topics specified in Class Schedule. prereq: freshman

HIST 1908W. Freshman Seminar. (GP, WI; 3 cr. [max 6 cr.]; A-F only; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: freshman

HIST 1910W. Freshman Seminar. (WI; 3 cr.; A-F or Audit; Every Fall) Topics specified in Course Guide.

HIST 3000. Visions of the Past: Thematic Approaches to Understanding History. (HIS; 3-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Innovative thematic approaches to human past. Historical sources, methods, and concepts. Topics such as environmental history, faith/religion in history, war/society, the family in world history, technology as a motor of history. prereq: Jr or sr or at least 60 cr

HIST 3001. Public History. (3 cr.; A-F or Audit; Periodic Fall & Spring) Interpretations of collective past as produced in public venues, including museum exhibitions, films, theme parks, websites. Intellectual and political issues in history produced for public audiences. Career opportunities. prereq: instr consent

HIST 3011. Measuring the Past: Quantitative Methods for Historical Research. (MATH; 4 cr.; Student Option; Periodic Fall & Spring) Basics of quantitative historical data collection, measurement, analysis.

HIST 3051. Ancient Civilization: Near East and Egypt. (HIS; 3 cr.; Student Option; Every Fall) A broad survey of ancient Near Eastern and Egyptian history and culture from the prehistoric to the rise of Persia around 550 B.C.

HIST 3052. Ancient Civilization: Greece. (; 3 cr.; Student Option; Every Fall, Spring & Summer) A broad survey of ancient Greek culture and history from the third millennium B.C. to the death of Alexander the Great in 323 B.C.

HIST 3053. Ancient Civilization: Rome. (HIS; 3 cr.; Student Option; Every Spring & Summer) A broad survey of the culture and history of Rome from its origins to the decline and fall of the Roman Empire in the third and fourth centuries A.D.

HIST 3054. Egypt of the Pharaoths. (; 3 cr.; Student Option; Fall Even Year) History/culture of ancient Egypt from prehistoric times to the conquest of Egypt by Persians in late 6th century B.C. Emphasizes Old/New Kingdom periods.

HIST 3061. “Bread and Circuses”: Spectacles and Mass Culture in Antiquity. (CIV, HIS; 3 cr.; Student Option; Fall Odd, Spring Even Year) Development of large-scale public entertainments in ancient Mediterranean world, from athletic contests of Olympia and dramatic festivals of Athens to chariot races and gladiatorial games of Roman Empire. Wider significance of these spectacles in their impact on political, social, and economic life of the societies that supported them.

HIST 3066. Prehistoric Pathways to World Civilization. (HIS; 3 cr.; Student Option; Every Spring) How did complex urban societies first develop? This course addresses this question in ten regions of the world, including Maya Mesoamerica, Inca South America, Sumerian Near East, Shang Civilization in East Asia and early Greece and Rome.

HIST 3067W. Archaeology of Prehistoric Europe. (HIS, WI; 3 cr.; Student Option; Every Fall) How did archaeologists analyze/interpret artifacts to develop knowledge about formation of European society, from earliest evidence of human occupation to Roman period.

HIST 3081. History of Christianity I: Martyrs, Monks, Crusaders. (3 cr.; Student Option; Fall Odd, Spring Even Year) This course surveys the history of Christianity from its status as a persecuted minority religion of the Roman Empire to its dominant role in medieval Europe and Byzantium. We study Christian traditions in Asia and Africa as well as Europe with special attention to the relationship
between Christianity and culture in the ancient and medieval world.

HIST 3101. Introduction to Medieval History. (GP,HIS; 3 cr.; Student Option; Every Fall, Spring & Summer)
Europe from decline of Rome to early Renaissance. Politics, institutions, society, economy, and culture of Middle Ages.

HIST 3102. Medieval Tales and their Modern Echoes. (GP,LI,TR; 3 cr.; Student Option; Every Spring)
Knights of Round Table, dragon-slayers, magic djinn, pilgrims in Hell. How stories have been retold in modern film, fiction, art. Texts from Europe/other regions of globe.

HIST 3151W. British History to the 17th Century. (GP,WI,HIS; 4 cr.; Student Option; Every Fall)
The making of the English nation: Anglo-Saxons and Normans; development of English law and Parliament; Reformation and constitutional crisis; early Wales, Scotland, and Ireland.

HIST 3152. British History From the Seventeenth Century. (GP,HIS; 4 cr.; Student Option; Every Spring)
Civil War, Revolution, and constitutional settlement. Industrialization and growth of democracy. Rise/decline of British Empire.

HIST 3211. History of Sexuality in Europe. (3 cr.; A-F or Audit; Periodic Fall & Spring)

HIST 3212. Dissident Sexualities in U.S. History. (3 cr.; A-F or Audit; Every Fall)
History of sexuality in United States. Emphasizes sexualities that have challenged dominant social/cultural norms. Development of transgendeer, bisexual, lesbian, gay identities/communities. Politics of sex across lines of race/ethnicity. Historical debates over controversial practices, including sex work.

HIST 3244. History of Eastern Europe. (3 cr.; A-F or Audit; Every Spring)
Imperial Russia: Formation and development of national states; fascism and World War II, Jews in Eastern Europe; communist and post-communist periods.

HIST 3263. Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries. (3 cr.; Student Option; Every Odd Year)

HIST 3265. 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime. (3 cr.; Student Option; Every Spring)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.


HIST 3271. The Viking World: Story, History, and Archaeology. (3 cr.; Student Option; Every Spring)
Viking society and expansion of Viking influence abroad. Viking impact on Western Europe; interactions with Slavic lands; settlement of North Atlantic islands; and Western Europe's impact on Scandinavian lands. Analyzes archaeological, historical, linguistic, and numismatic evidence.

HIST 3281. European Intellectual History: The Early Modern Period, Antiquity to 1750. (3 cr.; Student Option; Periodic Fall)
First of a two-semester course. European thought in its historical/cultural context. Emphasizes development of philosophical/scientific thought, its relation to thinking about the individual and the community. Readings from original sources.

HIST 3282. European Intellectual History: The Modern Period, 1750-Present. (3 cr.; Student Option; Periodic Spring)
Second of a two-semester course. European thought in its historical/cultural context. Emphasizes development of philosophical/scientific thought, its relation to thinking about the individual and the community. Readings from original sources.

HIST 3283. Marx, Capital, and History: An Introduction to Marxist Theory and History. (3 cr.; Student Option; Every Fall)
Explore Marx's understanding of capitalism/its history. Marx's argument regarding historical specificity of capitalism as economic/social condition.

HIST 3284W. History through Memoir. (HIS,WI; 3 cr.; A-F only; Every Fall)
Memoirs, "non-fictional life stories," serve as a lens into the past and as a way to investigate what counts as "history." Personal narratives and professionally-produced histories are both creative non-fiction. But are memoirists responsible to the historical record in the way of historians? Do historians appreciate the power of individual experience? What is the role of personal memory in writing history?

HIST 3285. Magic and Medicine. (3 cr.; Student Option; Spring Odd Year)
Course examines how the line between magic and medicine has changed over time. From accusations of witchcraft to proclamations of scientific breakthrough, we will examine the relationship between the supernatural and the natural from the early modern period to today. Specific topics include the practice of exorcism, the concept of the "four humors," the persecution of witches, the development of "voodoo," the effectiveness of placebos, and the professionalization of medicine. Throughout, we will ask how gender, class, and race have affected the construction of "magic" and "medicine."

HIST 3286. Galileo and the Beginnings of Modern Science. (3 cr.; A-F or Audit; Every Fall)
The life and work of Galileo Galilei (1564-1642), often called the "founder of modern science." Topics: the Renaissance Italian context for Galileo's work; the arrangements of authoritative knowledge that prevailed in 16th-century Tuscany and Venice, the role that universities, the Catholic church, learned academies, and the state played in disciplining knowledge. We consider the episodes of Galileo's career and read his seminal texts with secondary commentaries upon them. Topics: his telescopic observations of 1609-10; his battles with Aristotelian natural philosophy; his experiments and arguments on behalf of experimental and mathematical physics; his defense of Copernican "heliocentric" cosmology and his trial and condemnation by the Roman Catholic Church for heresy; and his work in mathematics and mathematical physics that paved the way for Newton and Einstein. The goal will be to understand the achievements of Galileo in their specific historical and cultural context and to use these reflections for thinking about the nature of the modern science that he helped to initiate.

HIST 3347. Women in Early America: 1600-1890. (DSJ,HIS; 3 cr.; Student Option; Every Fall)
Varied experiences of American women 1600-1900. Topics include women's involvement in dispossession of native peoples, westward expansion, slavery, industrialization, reform, revolution, transformations in family life/sexuality.

HIST 3348. Women in Modern America. (3-4 cr.; Student Option; Every Spring)
Women's legal status, from colonial era to civil rights. Marriage, divorce, and child custody. Reproductive/physical autonomy/integrity. Economic/educational equality. prerequisite: Soph or Jr or Sr

HIST 3361W. World War I: A Global History. (HIS,WS,T; 3 cr.; A-F only; Every Fall)
This class takes a global approach to the examination of the causes and consequences of World War I. We will look at how the war unfolded in Europe, Africa, and the Middle East. We will also explore the war's impact on North America and Australasia, areas drawn into the conflict because of their unique relationships with Britain and France. We will consider the special role played by the U.S. in restoring world peace and analyzing the lasting social and political legacies occasioned by the war. We will get at the heart of how the war was fought and how it is remembered for all of its triumphs and tragedies.

HIST 3363. Global History of the Cold War. (3 cr.; A-F only; Fall Even Year)
This course examines the origins, unfolding, and end of the Cold War, with emphasis...
on both geopolitical conflict and its social and cultural expressions. It begins with an examination of the ideological tensions between the USSR and USA and then turns to the end of European hegemony and de-colonization across Asia and Africa. It examines the expansion of the American empire and the appearance of new communist nations in Asia, Africa, and Latin America. While we will spend time on wars, insurgencies, and alliances, we will also examine how competing blocs and their members bound themselves through trade and economic interdependencies and how they represented themselves, their ideals, and the cold war itself in the sports, music, literature and film. The course ends with the collapse of the Soviet Union and a survey of Cold War traces in the fields of geopolitics and culture.

**HIST 3401W. Early Latin America to 1825.** (GP,WI,HIS; 4 cr.; A-F or Audit; Every Fall & Spring)
Societies of Americas, Spain, and Portugal before contact. Interactions among Native Americans, African slaves, and Europeans, from colonization through independence. Religion, resistance, labor, gender, race. Primary sources, historical scholarship.

**HIST 3402W. Modern Latin America 1825 to Present.** (GP,WI,HIS; 4 cr.; Student Option; Every Fall, Spring & Summer)
National and contemporary period 1825 to present, with emphasis on social, cultural, political, and economic change.

**HIST 3411W. The Family from 10,000 BCE to the Present.** (CIV,WI,HIS; 4 cr.; Student Option; Every Fall)
How family life has played and continues to play a major role in world history. Lectures, labs, assignments, pre-rec; Jr or Sr or at least 60 cr

**HIST 3412. Soccer: Around the World with the Beautiful Game.** (CIV,HIS; 3 cr.; Student Option; Spring Odd Year)
Global history/exploration of relationship between football (soccer)/culture around world.

**HIST 3414. Missionary Encounters: Evangelism and Empire in the Early Modern World.** (CIV,HIS; 3 cr.; Student Option; Spring Odd Year)
Christian evangelism functioned as major justification for European expansion/imperialism. How interactions between missionaries/non-European "converts" wrought social, political, religious transformations in early modern world.

**HIST 3415. Migrations in Modern Global History.** (CIV,HIS; 3 cr.; Student Option; Every Fall)
Today's debates about immigration in historical/comparative perspective. Major migrations into, within, and out of Americas over 500 years. Lives/identities of U.S. immigrants compared with foreigners living/working in Latin America, Europe, and Asia. Words/voices of migrants.

**HIST 3416. Imperialism and its Critics: Ethical Issues, Literary Representations.** (CIV,LITR; 3 cr.; A-F only; Fall Even Year)
Significant episodes of several imperial nations to underscore themes of ethics/literature.

**HIST 3417. Food in History.** (ENV,HIS; 3 cr.; Student Option; Fall Odd, Spring Even Year)
Significance of food in society, from earliest times to present. Why we eat what we eat. How foods have been "globalized." Dietary effects of industrial modernity. Material culture, social beliefs. Examples from around world.

**HIST 3418. Drink in History.** (HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year)
Significance of alcohol and stimulating beverages. Interdisciplinary study of alcohol/prohibition regimes throughout history.

**HIST 3419. History of Capitalism: Uneven Development Since 1500.** (3 cr.; Student Option; Periodic Fall & Spring)

**HIST 3423. Central American Revolutions.** (CIV,HIS; 3 cr.; Student Option; Periodic Fall)
Social, political and economic issues that have shaped Central American history for nearly two centuries. Focuses on influences of colonial histories, capitalist development, ethnic/racial conflict, foreign intervention, Catholic Church, civil war throughout region. Readings cover events in Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama.

**HIST 3424. Women and Gender in Latin American History.** (GP,HIS; 3 cr.; Student Option; Spring Odd Year)
Changing gender norms in Latin America over time as compared with lives of women and men of diverse classes and ethnic groups. How women responded to their position in society, on a continuum from accommodation to resistance.

**HIST 3425. History of Modern Mexico.** (3 cr.; Student Option; Every Fall & Summer)
Mexico from independence to the present: struggles for land, liberty, and equality; ethnicity, gender, and class; economic growth, nationalism, and globalization; urbanization, immigration, demographic transition.

**HIST 3426. Pirates of the Caribbean.** (3 cr.; Student Option; Spring Odd Year)
History of early modern globalization through one of its most cosmopolitan actors, the pirate. Geographical focus in the Caribbean basin. Networks of capitalism, migration, empire, and nascent nationalism. Global phenomena through marginalized participants—pirates, maroons, rebels, criminals, paupers, and privateers. Alternate historical narratives on emergence of the modern world.

**HIST 3429. Latin American History in Film and Text.** (AH,GP; 3 cr.; Student Option; Periodic Fall, Spring & Summer)
Cinematic representations of Latin America in context of other historical/literary narratives. Experiences of Latinos in Hollywood. U.S. films compared with those produced in Latin America. Themes vary (e.g., women, revolution, colonialism).

**HIST 3431. Early Africa and Its Global Connections.** (GP,HIS; 3 cr.; Student Option; Every Fall & Spring)
Survey of African history from earliest times to 1800. Focuses on socioeconomic, political, and cultural development in pre-colonial Africa from ancient Egypt through the era of the trans-Atlantic slave trade.

**HIST 3432. Modern Africa in a Changing World.** (GP,HIS; 3 cr.; Student Option; Every Fall, Spring & Summer)
Survey of modern African history from early 19th century to present. Focuses on socioeconomic, political, and cultural development in Africa, from abolition of trans-Atlantic slave trade through postcolonial era.

**HIST 3435. History of South Africa from 1910.** (3 cr.; Student Option; Periodic Fall)
History of South Africa from union to present. Focuses on issues such as African/Afrikaner nationalism, structures of apartheid, forced population removals, divestment/sanctions, and post-apartheid era.

**HIST 3436. Contemporary African Conflicts: From Somalia to South Africa.** (3 cr.; Student Option; Periodic Fall)
Historical contexts in which specific contemporary political conflicts developed. Slave trade, colonial conquest, indirect rule, forced labor, discretionary justice, other historical issues. Patterns of human rights violations/ socio-political conflict. Cases studies might include Somalia, Democratic Republic of Congo, Rwanda.

**HIST 3444. Chicana and Chicano History: 1821-1945.** (DSJ,HIS; 3 cr.; Student Option; Every Fall)
Experiences of people of Mexican descent in the United States. Important eras in histories of Mexico, the United States, and Mexican Americans. Central role of Chicana/os in U.S. history, culture, and politics.

**HIST 3446. Chicana/o History II: WWII, El Movimiento, and the New Millennium.** (DSJ,HIS; 3 cr.; Student Option; Every Spring)
Experiences of people of Mexican descent in U.S. Notions of citizenship from WWII. Chicano civil rights movement. Impact of immigration patterns/legislation. Cultural wars, demographics. Social, economic, political changes. Meaning of racialized "Mexican" identity. How different groups of Mexicans have understood their relationships to other Americans/other Latino groups.

**HIST 3454. West African History: Early Times to 1800.** (GP, 3 cr.; Student Option; Every Fall)
West Africa from late early times to establishment/histories of states. Relations with North African, Mediterranean, Asian, American worlds. Non-centralized political authority.

**HIST 3455. West African History: 1800 to Present.** (GP; 3 cr.; Student Option; Every Spring)
West African history from late-18th century to early 20th century. Themes include study of continuities
with past. Profound changes including new 19th century state formation, European colonialism, post-colonial issues.


**HIST 3461. Introduction to East Asia I: The Imperial Age.** (; 3-4 cr. ; Student Option; Every Fall) Comparative survey of early history of China, Japan, Korea, and Vietnam. Early Chinese thought. Diffusion of Confucianism, Buddhism, and other values throughout East Asia. Political and social history of region to 1600.

**HIST 3462. From Subjects to Citizens: The History of East Asia From 1500 to the Present.** (GP,HIS; 3-4 cr. ; Student Option; Every Spring) How Asian states, societies, economies, and cultures linked with one another and with European powers. How period's historical effects still resonate. Covers India, China, Japan, Korea, and Indochina.

**HIST 3462H. Honors: From Subjects to Citizens: The History of East Asia from 1500 to the Present.** (GP,HIS; 3-4 cr. ; A-F only; Every Spring) How Asian states, societies, economies, cultures linked with one another-European powers. Historical effects. Covers India, China, Japan, Korea, Indochina.

**HIST 3466. Religion and Society in Imperial China.** (; 3 cr. ; Student Option; Periodic Fall & Spring) Varieties of religious experience in imperial China. Religion as lived practices. Textual traditions. Buddhism, Daoism, Confucianism, relations among them. Western missionary enterprise in China.

**HIST 3468. Social Change in Modern China.** (; 3 cr. ; Student Option; Every Fall) Opium War and opening of Treaty Ports in 19th century. Missionary activity and cultural influence. Changes in education system. Women's movement. Early industrialization. Socialism/collectivization after 1949. Industrialization of Taiwan. PRC's entry into world trading system.

**HIST 3469. History of Women and Family in China, 1600-2000.** (3 cr. ; Student Option; Fall Even, Spring Odd Year) Marriage/family life, foot binding, cult of women's chastity. Women in nationalist/communist revolutions. Gender relations in post-socialist China. Effect of ideologies (Confucianism, nationalism, socialism) on women/family life. Differences between ideology/social practice.

**HIST 3471. Modern Japan, Meiji to the Present (1868-2000).** (HIS; 3 cr. ; Student Option; Every Fall & Spring) Japan's early development as industrial/imperial power after Meiji Restoration of 1868. Political developments in Taisho years: social, cultural, economic trends that supported them. Militarization/mobilization for war in 1930s. Japan's war with China, Pacific War with the United States. American Occupation. Postwar economic recovery, high growth. Changing political/popular culture of 1980s, 90s.

**HIST 3476. War and Peace in Japan Through Popular Culture.** (; 4 cr. ; A-F or Audit; Periodic Fall & Spring) War-related issues in Japan. Animation films, comics from 1940s to 1990s. Mobilization of culture for WWII. Conflict between constitutional pacifism and national security. Japan's role in cold war and post-cold war worlds.

**HIST 3477. Samurai, Geisha, and How They Became Japanese.** (3 cr. ; A-F or Audit; Periodic Spring) How samurai, geisha, and Zen Buddhism came to be considered as the quintessential Japanese tradition in 20th century. Modernity, nationalism, orientalism, international politics, globalization.

**HIST 3478. Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present.** (3 cr. ; Student Option; Spring Odd Year) Rise of East Asian Economies, 1930-Present.

**HIST 3479. History of Chinese Cities and Urban Life.** (; 3-4 cr. ; A-F or Audit; Periodic Fall & Spring) Introduction to traditional Chinese cities, their urban planning. Ideal city plan in Confucian classics compared with physical layout of some major cities. Models about Chinese cities, influence of the models on our understanding of Chinese history/society.

**HIST 3483. Hmong History Across the Globe.** (; 3 cr. ; Student Option; Fall Odd, Spring Even Year) Hmong interaction with lowland Southeast Asian states (Laos, Vietnam) and Western colonial powers (French, American) since 19th century. Changes to religious, social, political, and gender institutions. Aspirations for political autonomy.


**HIST 3486. Hmong Refugees from the Secret War: Becoming Americans.** (3 cr. ; Student Option; Spring Odd Year) Socio-economic, political, gender, cultural/religious changes in Hmong American community during last three decades. How Hmong are racialized in American society. Impact to first/second generations.


**HIST 3489. 20th Century India.** (3 cr. ; A-F or Audit; ) India under British hegemony in 1914 through Mahatma Gandhi and his nationalist movement; World War II; the British departure; creation of India and Pakistan; Nehru; Indira and Rajiv Gandhi.

**HIST 3492. Hinduism.** (3 cr. ; Student Option; Periodic Fall & Spring) Development of Hinduism focusing on sectarian trends, modern religious practices, myths/rituals, pilgrimage patterns/religious festivals. Interrelationship between Indian social structure/Hinduism.

**HIST 3493. Islam: Religion and Culture.** (; 3 cr. ; Student Option; Every Fall) Religion of Islam, faith, practices, sectarian splintering. Expansion outside original home to status of world religion. Institutions. Status in Europe, America, and Americas. prereq: Soph or jr or sr.

**HIST 3494W. Christ in Islamic Thought.** (WI; 3 cr. ; Student Option; Periodic Spring) Course examines the history of the figure of Christ in Islamic thought, from the beginnings of Islam in the Qur'an and the Hadith to the recent 2013 book by Reza Aslan, Zealot. The course is based on close reading of primary sources from regions extending from Spain to Iran, and in various languages (in translation): Arabic, Greek, French, Farsi, and Italian. Course demonstrates how much the interpretation of the figure of Christ in Islamic thought belonged to specific historical contexts. prereq: None

**HIST 3502. Ancient Israel: From Conquest to Exile.** (; 3 cr. ; Student Option; Periodic Fall) Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focuses on issues raised by archaeological data related to Israelite conquest of Canaan.

**HIST 3503. Ancient Iran.** (; 3 cr. ; Student Option; Periodic Fall & Spring) Development of ancient Iranian culture under Achaemenians and Sassanians. Impact of Zoroastrian religion on Iranians, on Hellenism, and on domains such as Bactria. Iran's contribution to cultures of Silk Road.

**HIST 3504. The Cultures of the Silk Road.** (3 cr. ; Student Option; Every Fall & Spring) Past/present state of the cultures that flourished in Central Asia (present-day CA republics, Iran, Afghanistan) after Alexander the Great and declined with opening of sea routes.

**HIST 3505. Survey of the Modern Middle East.** (GP; 3 cr. ; Student Option; Every Fall) Historical history of Middle East in modern era. Socio-economic/intellectual issues. Decline...
Cultural/intellectual trends that have defined Student Option; Periodic Fall & Spring)

HIST 3546. Islam and the West. (3 cr.; Student Option; Spring Odd Year) Iranian history from the fall of the Sassanids (7th C. CE) to the present. Sh'ite Islam in a world context. Iran's entrance into modern world politics.

HIST 3509. Approaches to the Study of the Middle East. (3 cr.; A-F or Audit; Periodic Fall & Spring) Intensive reading/discussion course. Ways in which historians/social scientists have studied Middle East. Problems they have encountered. Paradigms, issues, and debates in Middle Eastern Studies.

HIST 3511. Muslims and Jews: Conflict and Co-existence in the Middle East and North Africa since 1700. (GP,HIS; 3 cr.; Student Option; Fall Odd Year) Diversity of social/cultural interactions between Muslims and Jews and within Islam and Judaism since 1700. What enabled the two religious communities to peacefully coexist? What were causes of conflict? Why is history of Muslim-Jewish relations such a contested issue?


HIST 3513. North Africa since 1500: Islam, Colonialism, and Independence. (3 cr.; Student Option; Spring Odd Year) History of Maghrib (Morocco, Algeria, Tunisia, Libya, disputed territories of Western Sahara) from time of Ottoman expansion/Sharifian dynasties (Sa'dian/Awlad) in 16th/17th Centuries to end of 20th century. Focus on encounter of Islamic cultures/societies of Maghrib with Africa/Europe.

HIST 3534. Introduction to Jewish History and Cultures. (HIS; 3 cr.; Student Option; Every Fall) Jewish history, society, culture from Second Temple period (5th century BCE) to modern era as illuminated by literature, philosophy, art, film, music, religious law/custom, artifacts of daily life. Emphasizes political, social, cultural contexts that shaped development of Jewish ideas, practices, and institutions.

HIST 3546. Islam and the West. (3 cr.; Student Option; Periodic Fall & Spring) Cultural/intellectual trends that have defined fundamental differences between Islam and the West. Development of historical, philosophical, and intellectual mindset of both spheres. Factors in tension, anxiety, and hatred between Muslim world and Europe and the United States.

HIST 3547. The Ottoman Empire. (GP,HIS; 3 cr.; Student Option; Every Fall & Spring) Survey of Islam's most successful empire, from its founding circa 1300 to its demise in 1923. Lands, institutions, peoples, historical legacy.

HIST 3606. Christians, Muslims, and Jews in the Middle Ages. (GP,HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year) Violent dimensions of these relations: Muslim/Christian expansion, jihad/crusade, anti-Jewish violence/persecution. Peaceful dimensions: trade, intellectual exchange, religious dialogue.

HIST 3609. Military History of Medieval Western Europe. (3 cr.; Student Option; Periodic Fall & Spring) Concept and conduct of war in Western Europe in the Middle Ages and the relation between the military and society.

HIST 3611. Medieval Cities of Europe: 500-1500. (GP,HIS; 3 cr.; Student Option; Every Fall & Spring) Evolution of Western European cities from the late Roman town to the early Renaissance city-state.

HIST 3613. History of the Crusades. (GP,HIS; 3 cr.; Student Option; Every Fall, Spring & Summer) Crusading spirit in Europe. Results of classic medieval crusades ca 1095-1285. States established by crusaders in Near East. Internal European crusades. Chronological prolongation of crusading phenomenon.

HIST 3615W. Women in European History: 1500 to the Present. (GP,WI,HIS; 3 cr.; Student Option; Spring Odd Year) History of women in Western Europe from early modern period to present. Changes crucial to women's lives. Family/kinship structure, control over property, organization of work, religious ideas/practices, education, politics, beliefs/attitudes about female body.

HIST 3616. France in the Middle Ages. (3 cr.; Student Option; Periodic Fall) Politics, society, and culture in medieval France from the end of the Carolingians to the end of the Hundred Years War.

HIST 3617. Pagans, Christians, Barbarians: The World of Late Antiquity. (3 cr.; A-F or Audit; Fall Odd Year) Between classical and medieval, pagan and Christian, Roman and barbarian, the late antique world was a dynamic age. This course will focus on the Mediterranean region from the 2nd to the mid-7th century exploring such topics as the conversion of Constantine, the fall of Rome, barbarian invasions, the spread of Christianity, and the rise of Islam.

HIST 3618. The Dark Ages Illumined: Medieval Europe to 1050. (3 cr.; Student Option;) Origins of medieval Europe, Germanic and Viking invasions, feudalism, manorialism, Islam, the papacy, monarchies, intellectual developments.

HIST 3619. Chivalry, Crisis, and Revival: Medieval History 1050-1500. (3 cr.; Student Option; Periodic Fall) Chivalry and courtly love, crusades, revival of towns and trade, monarchies, religious developments, Black Death, famine, and wars

HIST 3621. Creating the Modern World in Medieval Europe: The Renaissance, 1200-1600. (3 cr.; Student Option; Periodic Fall) Political/cultural history of city-states of northern/central Italy, 1200-1550. Emphasizes Florence/Venice. Readings include Dante, Machiavelli, prequel. Intro course in European history before 1500 recommended

HIST 3626. Early Modern France: From Old Regime to Empire. (3 cr.; Student Option; Every Fall & Spring) The evolution of French political culture and society in thematic context: Louis XIV's Old Regime, the Enlightenment, the French Revolution, the Republic, and Napoleon's Empire. Topics include urban and rural life, public opinion and polite culture, religious conflict, sex and gender, consumerism and material culture, and slavery and colonialism.

HIST 3632. History of Germany; Imperial and Soviet period, and the dissolution of empires. Emphasis will be on modernization, attempts at reforms in the imperial and Soviet period, and the dissolution of empires.

HIST 3652. Early Modern Britain. (3 cr.; Student Option; Periodic Fall & Spring) British society/culture during early modern era, especially 16th and 17th centuries. May include themes related to political developments, economy/social structure, gender, religion, literature, or interaction with other world regions.

HIST 3681. Irish History. (3 cr.; Student Option; Every Fall) History of Ireland, primarily modern, with emphasis on politics and Anglo-Irish relations.

HIST 3691W. The British Empire. (W; 3 cr.; A-F or Audit;) Gain/loss of colonies in Ireland, America, India, Africa. Development of racism, multicultural composition of British society, debates about economic motives for empire, resistance of colonized peoples to conquest/domination.

HIST 3704W. Daily Life in Europe: 1300-1800. (GP,WI,HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year)
Living conditions and daily life in Europe before the Industrial Revolution. Topics include marriage and family, life at court, nobles, peasants, disease, farming, livestock-raising, urban life, the middle classes, manufacturing, trade, piracy, witchcraft, war, crime, and social deviance.

**HIST 3705. From Printing Press to Internet: Media, Communications, and History.** (3 cr.; A-F or Audit; )
Print public sphere in 17th, early 18th century. Political conflicts over freedom of press in 18th, 19th century. Emergence of advertising, public relations industries in 20th century. Significance of broadcast, computer network technologies for democratic political systems.

**HIST 3706. Baroque Rome: Art and Politics in the Papal Capital.** (HIS; 3 cr.; Student Option; Fall Even Year)
Center of baroque culture--Rome--as city of spectacal and pageantry. Urban development, Major works in painting, sculpture, and architecture. Ecclesiastical/private patrons who transformed Rome into one of the world's great capitals.

**HIST 3708. The Age of Curiosity: Art and Knowledge in Europe, 1500-1800.** (AH,TS; 3 cr.; Student Option; Every Fall & Spring)
Diverse ways in which making of art and scientific knowledge intersected in early modern Europe. Connections between scientific curiosity and visual arts in major artists (e.g., da Vinci, Durer, Vermeer, Rembrandt). Artfulness of scientific imagery/diagrams, geographical maps, cabinets of curiosities, and new visual technologies, such as the telescope and microscope.

**HIST 3719. The Making of Contemporary Europe.** (; 3 cr.; Student Option; Every Fall & Spring)

**HIST 3721. Studies in 20th-Century Europe From the Turn of the Century to the End of World War II: 1900-45.** (; 3 cr.; Student Option; Every Fall & Summer)
Social, political, and cultural changes/conflicts. Background to WWI, its impact. Revolution, failure of interwar stability. Fascism. WWII, its consequences.

**HIST 3722. Studies in 20th-Century Europe From the End of World War II to the End of the Cold War: 1945-91.** (; 3 cr.; Student Option; Every Fall, Spring & Summer)
Social, economic, political, and cultural impacts of WWII upon Europe. Division of Europe. Communist regimes in Eastern Europe, cooperation in Western Europe. Impacts of modernization. End of Cold War.

**HIST 3724. Women, Revolution, and War in 20th Century Europe.** (; 3 cr.; Student Option; Periodic Fall)
From WWI through break-up of Yugoslavia, involvement/reactions of European women to situations of war/revolution. Ways in which women contributed, resisted, or submitted. Impact of conflicts on women's lives. Gender, ideological gendering. Lecture, but emphasizes readings, presentations, and discussions.

**HIST 3727. History of the Holocaust.** (; 3 cr.; Student Option; Periodic Fall & Spring)

**HIST 3727W. History of the Holocaust.** (WI; 3 cr.; Student Option; Periodic Fall & Spring)

**HIST 3729. Nazi Germany and Hitler's Europe.** (3 cr.; Student Option; Periodic Fall & Spring)
Comprehensive exploration of Third Reich. Students will examine How the Nazis came to power, transformations of 1930s, imposition of racial politics against Jews/others, nature of total war. Students read historical accounts, memoirs, state documents, view films.

**HIST 3731. Modern France and Its Empire: Identity, Citizenship and the State 1780 to the Present.** (GP,HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year)
History of citizen/state in France from French Revolution to present.

**HIST 3746. Game of Thrones: Emperors, Knights and Witches in Central Europe.** (3 cr.; Student Option; Fall Odd, Spring Even Year)
This course traces the rise and fortunes of the Habsburg family from their emergence in the late 13th century to the end of the Holy Roman Empire in 1806. We use the family to explore key themes of the period including the Black Death, Hussite wars and peasant revolts, the new print culture, developments of the Reformation, European expansion and Enlightenment culture. prereq: None

**HIST 3756. The Peoples of Revolutionary America.** (3 cr.; Student Option; Periodic Fall & Spring)

**HIST 3801. The People of Early America: 16th to 18th Centuries.** (3 cr.; Student Option; Periodic Fall & Spring)
Multicultural approach to early American history focusing on the interactions of Africans, Europeans, and American Indians who came together to create a new world in North America during the 16th, 17th, and 18th centuries.

**HIST 3802. "Sinners, Saints, and Savages": Religion in Early America.** (3 cr.; Student Option; Spring Odd Year)
Native American, Euro-American, and African American cosmologies. Perceptions of religious differences. Notions us/them, civility, and savagery. How religious beliefs shaped responses to colonization, enslavement, and revolution. prereq: Non-fr or instr consent

**HIST 3803. Radicalism in Early America.** (3 cr.; A-F or Audit; Fall Even, Spring Odd Year)
Radicalism to 1850s. Challenge to traditional structures of family/property; relations of gender, race, and class; notions of self/self-governance; and ideas about the divine. Visionary, reformers. Radicalism and violence. prereq: Soph or jr or sr or instr consent

**HIST 3804. Religion and the American Culture Wars.** (HIS; 3 cr.; Student Option; Every Fall)

**HIST 3809. The Peoples of Revolutionary America.** (3 cr.; Student Option; Periodic Fall & Spring)

**HIST 3811. Manifest Destiny, Slavery, and the Politics of Expansion: Jacksonian America.** (3 cr.; Student Option; Spring Even Year)
This course examines the history of the U.S. between the War of 1812 and the outbreak of the Civil War in 1861. We will examine the dramatic expansion in population and territory, onset of transportation, communications, and the industrial revolutions, forced removal of governments and non-Jewish religious/secular authorities.
Native Americans, slavery, reform efforts of the 1830s and 1840s, growth and maturation of political parties, and coming of the Civil War.

HIST 3812. The Civil War and Reconstruction. (3 cr.; Student Option; Every Fall, Spring & Summer) United States from 1848 to 1877. Causes of sectional crisis; Southern secession; Lincoln and emancipation; military history; impact of war North and South; Reconstruction efforts to change the Southern life and transform the status of African Americans.

HIST 3821. United States in the 20th Century to 1945. (HIS; 3 cr.; Student Option; Every Fall, Spring & Summer) American politics and society in the progressive era, the 1920's, the Great Depression and World War II. Economic reform at home, the challenges of world war abroad, and social change affecting the status of women and racial minorities.

HIST 3822. Making America Modern: 1945 to Present. (3 cr.; Student Option; Every Fall, Spring & Summer) American politics and society in the postwar era, the diplomacy of the Cold War, the civil rights movement, the Vietnam War, cultural clashes in the 1960's, Watergate, the conservative resurgence, and the end of the Cold War.

HIST 3834. Law in American Life, Colonial Era to Civil War. (3 cr.; A-F or Audit; ) Understandings of law/property held by colonists, Indians. Conceptions of relationships among family, community, state held in colonial America; conceptions held today. Law of slavery in colonial era. American Revolution/Constitution. Law, industrialization. Legal legitimacy, federalism, Civil War as constitutional crisis.


HIST 3837. Minnesota History. (3 cr.; Student Option; Periodic Fall & Spring) Topics in political/social history of Minnesota and its region in nineteenth/twentieth centuries.

HIST 3838. Family History in America. (3 cr.; A-F only; Every Spring) How historians study families to explore race/ class. Techniques for researching genealogy/ family history. Research/write on history of family.

HIST 3842. The Digital Revolution: Computers in the Making of the Contemporary World. (3 cr.; A-F or Audit; Periodic Fall & Spring) Historical examination of birth of computer. Global transformations after 1945. History of technology/how culture shapes technological change. United States history integrated with global history to show how technology, capitalism, politics, culture, environment conspired to make computer agent of revolutionary change.

HIST 3852. U.S. Labor in the 20th Century. (3 cr.; Student Option; Periodic Fall) The development of a working class from the pre-industrial to an industrial age. Responses of American workers through labor organization, slave resistance, and political reform. The Knights of Labor, the formation of the AFL, and the challenges of Marxism.

HIST 3853. Black Protest in 20th Century America. (3 cr.; Student Option; Periodic Fall, Spring & Summer) Evolution of African American political mobilization.


HIST 3862. American Immigration History. (DSJ,HIS; 3 cr.; Student Option; Spring Odd Year) Global migrations to U.S. from Europe, Asia, Latin America, and Africa, from early 19th century to present. Causes/cultures of migration. Migrant communities, work, and families. Xenophobia, assimilation/integration, citizenship, ethnicity, race relations. Debates over immigration. Place of immigration in America's national identity.

HIST 3864. African American History, 1619-1865. (3-4 cr.; A-F or Audit; Every Fall & Spring) Importance of dynamics of class, gender, region, and political ideology. Changing nature of race/racism.

HIST 3865. African American History, 1865 to Present. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) History of African American men and women from the beginning of the 20th century to the present. Discussion of internal migrations, industrialization and unionization, The Great Depression, world wars, and large scale movements for social and political change.

HIST 3866W. Race, War, and Race Wars in American History. (WI; 3 cr.; A-F or Audit; Fall Odd Year) Role that race has played in American war history. Impact that wars have had on race and race relations in the United States and the world. Literature, film.


HIST 3871. American Indian History: Pre-Contact to 1830. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring) Introduction to American Indian history from ancient native America to the removal era. Focuses on the social, cultural, political, and economic diversity of Native American peoples and Native American experiences with European colonialism.

HIST 3872. American Indian History: 1830 to the Present. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring) Focus on the impact of federal Indian policy on American Indian cultures and societies, and on American Indian culture change.

HIST 3875W. Comparative Race and Ethnicity in US History. (DSJ,WI,HIS; 3 cr. [max 4 cr.; ] A-F or Audit; Periodic Fall & Spring) This writing-intensive course examines the racial history of modern America to learn from and engage with what historians enmeshed in ethnic studies do. These historians examine the systematic and coordinated exercises of power called race in the American past and make legible how racially aggrieved groups responded to this shaping power. Thus, throughout, we ask, "What did racial subjects do with what was done to them by the American system forged out of settler colonialism, slavery, racism, and other forms of injustice, exclusion, and violence?" This question issues an intellectual challenge to do all that needs to be done to capture community life, the politics of difference, and the dynamism of social identities in all their richness, fullness, and complexity. In other words, we study and write about the racial history of modern America, including its ugly past and arc of justice, to consider what it would take to transcend this racial past.

HIST 3877. Asian American History, 1850-Present. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring) Asian American history and contemporary issues, from 1850 to the present. Immigration, labor, anti-Asian movements, women/families, impact of World War Two, new immigrant/ refugee communities, civil rights, Asian American identity/culture.

HIST 3878. American West. (3 cr.; Student Option; Every Fall & Spring) American West from Mexican-American War to present. U.S. expansion, Native-Anglo conflict, migration/immigration. Race, ethnicity, labor, class, and gender in the West. Business/ politics of "settling" the region.

HIST 3882. U.S. and the World. (3 cr.; Student Option; Periodic Fall, Spring & Summer) History of U.S. involvement in world affairs. Political, economic, social, cultural relations by individuals, groups, governmental, non-governmental agencies. Nation building.
imperialism, hemispheric hegemony, cultural expansion, national security, wars.

HIST 3900. Topics in Medieval and Modern European History. (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Selected topics in medieval and modern European history not covered in regular courses. To be taught as staffing and demand exist. prereq: Jr or sr or instr consent

HIST 3959. How to Do History. (3 cr.; A-F or Audit; Every Fall & Spring) Skills/research experience to complete senior paper. How to answer questions such as, "What is history?" How to locate/use historical sources, develop a thesis, and turn rough idea into full research proposal. prereq: History major or dept consent

HIST 3959H. Honors: How to Do History. (3 cr.; A-F only; Every Fall & Spring) Skills/research experience to complete senior paper. How to answer questions such as, "What is history?" How to locate/use historical sources, develop a thesis, and turn rough idea into full research proposal. prereq: History major or dept consent

HIST 3960. Topics in History. (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Selected history topics not covered in regular courses.

HIST 3980W. Supplemental Writing in History. (WI; 1 cr. [max 4 cr.]; Student Option; Every Fall & Spring) May be attached, by agreement of instructor and students, to any 3xx or 5xx course to make a writing-intensive experience. prereq: instr consent; must take a 3-cr 3xxx or 5xxx course taken concurrently

HIST 3990. Historical Internship. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Internship with a historical society, government, or community historical organization. Arranged through and supervised by department. prereq: instr consent

HIST 3993. Directed Study. (1-16 cr.; A-F or Audit; Every Fall, Spring & Summer) Guided individual reading or study. Open to qualified students for one or more semesters. prereq instr consent, dept consent, college consent.

HIST 3994. Directed Research. (1-16 cr.; A-F or Audit; Every Fall, Spring & Summer) Qualified students work on a tutorial basis. prereq instr consent, dept consent, college consent. prereq: instr consent, dept consent, college consent

HIST 4010V. Honors: Research Seminar. (WI; 4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring) Work closely with professors on in-depth investigations of historical topics. Guided instruction in issues, methods, sources. Topics vary. prereq: Jr or Sr history major, honors, or instr consent

HIST 4010W. Research Seminar. (WI; 4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring) Work closely with professors on in-depth investigations of historical topics. Guided instruction in issues, methods, sources. Topics vary. prereq: Jr or Sr history major or instr consent

HIST 4961V. Honors: Major Paper. (WI; 4 cr.; A-F only; Every Fall, Spring & Summer) Research paper on topic of student's choice. Work largely with primary sources. Faculty guidance, prereq: dept consent, instr consent; sign up in Undergraduate Studies Office two sem in advance

HIST 4961W. Major Paper. (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Research paper on topic of student's choice. Work largely with primary sources. Faculty guidance, prereq: dept consent, instr consent; sign up in Undergraduate Studies Office two sem in advance

HIST 4970. Historical Internship. (1-12 cr. [max 24 cr.]; Student Option; Every Fall, Spring & Summer) Internship with a historical society, government, or community historical organization. Arranged through and supervised by department.

HIST 5011. Measuring the Past: Quantitative Methods for Historical Research. (4 cr.; Student Option; Periodic Fall & Spring) Basics of quantitative historical data collection, measurement, analysis. prereq: Primarily for 1st-yr grad students

HIST 5051. Before Herodotus: History and Historiography of Mesopotamia and the Ancient Near East. (3 cr.; A-F or Audit; Periodic Fall & Spring) Historical method/sources for ancient Near Eastern history. Historical traditions. Historiographic texts of Mesopotamia and neighboring regions of the ancient Near East, secondary emphasis on their relationship to works of classical historians such as Herodotus. Use of these sources in modern historiography of ancient Near East. prereq: Prev coursework in ancient Near Eastern history recommended

HIST 5053. Doing Roman History: Sources, Methods, and Trends. (3 cr.; Student Option; Fall Even, Spring Odd Year) Survey of major scholarship in field of Roman history since Mommsen. Political, cultural, social, military, and economic history. Focuses on methodological problems posed by evidence. Ways in which these issues shape research. prereq: Grad student or instr consent

HIST 5111. Proseminar in the History of Medieval Europe. (3 cr.; A-F or Audit; Periodic Fall & Spring) Examination of basic scholarly bibliography for medieval Western European history. Aim is to help students to prepare for M.A. and Ph.D. examinations. prereq: Advanced undergrads of exceptional ability or grads, instr consent

HIST 5115. Medieval Latin Historians. (3 cr.; Student Option; Periodic Fall & Spring) Writing of history in Western Europe during the Middle Ages. Focus on idea of history, philosophy of various historians, techniques of research by medieval historians and chroniclers, history as literature, and value of medieval histories to modern research scholars. Latin texts only. prereq: Reading knowledge of Latin

HIST 5264. Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries. (3 cr. [max 4 cr.]; Student Option; Every Fall & Spring) Interaction with Europe and Asia; attempts at modernization and reform; emancipation of the serfs and rise of revolutionary movements.

HIST 5265. 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime. (3 cr.; Student Option; Every Spring) Analysis of the factors that led to the collapse of the tsarist regime; discussion of the 1917 revolution, the evolution of the Soviet regime and the collapse of Soviet communism. Emphasis on the role of nationalities and the rise of the Commonwealth of independent states.

HIST 5271. The Viking World: Story, History, and Archaeology. (3 cr.; A-F or Audit; Periodic Fall & Spring) Viking society and expansion of Viking influence abroad. Viking impact on Western Europe, interactions with Slavic lands, settlement of North Atlantic islands, Western Europe’s impact on Scandinavian lands. Analyzes archaeological, historical, linguistic, and numismatic evidence.

HIST 5281. European Intellectual History: The Early Modern Period, Antiquity to 1750. (3 cr.; A-F or Audit; Periodic Spring) First of a two-semester course. European thought in its historical/cultural context. Emphasizes development of philosophical/scientific thought, its relation to thinking about the individual and the community. Readings from original sources. prereq: Grad student or instr consent

HIST 5282. European Intellectual History: The Modern Period, 1750-Present. (3 cr.; A-F or Audit; Periodic Spring) Second of a two-semester course. European thought in its historical/cultural context. Emphasizes development of philosophical/scientific thought, its relation to thinking about the individual and the community. Readings from original sources. prereq: Grad student or instr consent

HIST 5283. Marx, Capital and History: An Introduction to Marxist Theory and History. (3 cr.; Student Option; Spring Even Year) Explore Marx’s understanding of capitalism and its history. Marx’s argument regarding historical specificity of capitalism as economic/social condition

HIST 5286. Galileo and the Beginnings of Modern Science. (3 cr.; A-F only; Periodic Fall) The life and work of Galileo Galilei (1564-1642), often called the ‘founder of modern science’. Topics: the Renaissance Italian context for Galileo’s work; the arrangements of authoritative knowledge
that prevailed in 16th-century Tuscany and Venice; the role that universities, the Catholic church, learned academies, and the state played in disciplining knowledge. We consider the episodes of Galileo’s career and read his seminal texts with secondary commentaries upon them. His telescopic observations of 1609–10; his battles with Aristotelian natural philosophy; his experiments and arguments on behalf of experimental and mathematical physics; his defense of Copernican heliocentric cosmology; and his trial and condemnation by the Roman Catholic Church for heresy; and his work in mathematics and mathematical physics that paved the way for Newton and Einstein. The goal will be to understand the achievements of Galileo in their specific historical and cultural context and to use these reflections for thinking about the nature of the modern science that he helped to initiate.

HIST 5295. Social History of Russia and Eastern Europe From the Late 19th Century to the Present. (3 cr.; Student Option; Periodic Fall & Spring) Social movements (revolutionary, nationalist, women’s); communist and post-communist societies.

HIST 5379. Problems in Early American History. (3 cr.; Student Option; Periodic Fall & Spring) Intensive consideration of topics in early American history. Topics may include readings in race, class, and gender; comparative colonialism; slavery; demography; economic history; religion; and regions in the colonial world.

HIST 5381. Minnesota History Workshop. (3-4 cr. [max 8 cr.]; Student Option; Periodic Fall & Spring) A case study and seminar approach to historical research and interpretation. It offers teachers and other scholars a chance to survey a particular topic in Minnesota history and to write their own historical narrative based on primary source research. prereq: 1301, 1302

HIST 5349. Environment and Society in Africa. (3 cr.; Student Option; Periodic Fall & Spring) Major historiographical, theoretical, and methodological debates concerning people-environment relations in Africa, from rise of human societies to present. Environment and the rise of civilizations. Demography, colonial environmental policies, conservation, disease, indigenous knowledge, water management, food. prereq: instr consent

HIST 5468. Social Change in Modern China. (3 cr.; Student Option; Every Fall) Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women’s movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC’s entry into the world trading system.

HIST 5469. Historiographies of China, 1000-1700. (3 cr.; A-F or Audit; Periodic Fall & Spring) Important recent English-language work on Chinese culture during the Song, Yuan, and Ming dynasties. Topics include religion, gender, family structures, ethnic identity, commerce/economics, and political structures/events. prereq: Grad student or instr consent

HIST 5478. Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present. (3 cr.; Student Option; Spring Odd Year) Rise of East Asian Economies, 1930-Present. prereq: Grad student

HIST 5479. History of Chinese Cities and Urban Life. (3 cr.; A-F or Audit, Periodic Fall & Spring) Introduction to traditional Chinese cities, their modern transformation. Ideal city plan in Confucian classics compared with physical layout of some major cities. Models about Chinese cities, influence of the models on our understanding of Chinese history/society.

HIST 5513. North Africa since 1500: Islam, Colonialism, and Independence. (3 cr.; Student Option; Spring Odd Year) History of the Maghrib (Morocco, Algeria, Tunisia, Libya and disputed territories of Western Sahara from time of Ottoman expansion/Sharifian dynasties [Sa’dian/’Alawid] in 16th/17th Centuries to end of 20th century. Focus on encounter of Islamic cultures/societies of Maghrib and Africa/Europe

HIST 5540. Topics in Mediterranean Studies. (1-4 cr. [max 15 cr.]; A-F or Audit, Every Fall & Spring) Mediterranean history, from Middle Ages to present. Taught as staffing permits. prereq: Grad student or advanced undergrad with instr consent

HIST 5547. Empire and Nations in the Middle East. (3 cr.; Student Option; Periodic Fall & Spring) Modernity in non-Western imperial context. Identity, ideology, economy, environment, language. prereq: Grad student or instr consent

HIST 5611. New Directions in the Middle Ages, ca. 300-1100. (3 cr.; A-F or Audit; Periodic Fall & Spring) Basic scholarly bibliography for medieval Western European history during early Middle Ages. Foundation for teaching courses in medieval history, preparing for general doctoral exam. prereq: Grad student or instr consent

HIST 5612. New Directions in the Middle Ages, ca. 1100-1500. (3 cr.; A-F or Audit; Periodic Fall & Spring) Basic scholarly bibliography for medieval Western European history during central/later Middle Ages. Foundation for teaching courses in medieval history, preparing for general doctoral exam. prereq: [5611, grad student] or instr consent

HIST 5614. The Medieval Church. (3 cr.; Student Option; Periodic Fall & Spring) Introduction to history of western church in Middle Ages. Emphasizes church teachings and institutional structures, beliefs/practices of lay people, medieval Christian encounter with non-Christian world. prereq: Grad student or instr consent

HIST 5633. Socio-Economic History of China. (3 cr.; A-F or Audit; Periodic Fall) Nature of Chinese socio-political formations and economic development in Qing and Republican eras. 1644-1937. Establishment/methods of state rule, merchants, agrarian social structure, domestic industry, demographic regimes, capitalism, and imperialism. Comparisons using theoretical and case studies of economic development. prereq: Grad student or [adv undergrad, instr consent]

HIST 5640. Topics in Legal History. (3 cr.; A-F or Audit; Periodic Fall & Spring) Comparative approaches to, methodologies of, and theoretical debates in legal history. Topics from ancient world to present, such as citizenship/statebuilding, religion and the law, women’s legal history.

HIST 5642. U.S. Legal History. (3 cr.; A-F or Audit; Periodic Fall & Spring) Topics in history of American law, legal thought, legal institutions, and legal profession. Proceeds thematically. Primary/secondary sources.

HIST 5648. Development of the Western European Legal Tradition. (3 cr.; A-F or Audit; Periodic Fall & Spring) Evolution of and interaction among Roman and civil law, customary/feudal law, canon law, and English common law. Primary/secondary sources in English.

HIST 5715. Readings in European Women’s History: 1450-1750. (3 cr.; A-F or Audit; Periodic Fall & Spring) Introduction to current historical research on European women’s history. 1450-1750. Topics include gender roles and form of family structure, women’s participation in religious movements, legal status of women.

HIST 5720. Society/Politics: Modern Europe. (3 cr.; A-F or Audit; Every Fall & Spring) Introduction to literature in English on problems of modern European social, cultural, political history. THEMATIC/geographic focus varies year to year. Topics include historical approaches to class/gender relations, state formation as social/political process, family history, evolution of public life, popular culture. prereq: Grad or instr consent


HIST 5777. Prosseminar in Habsburg Central Europe. (3 cr.; A-F or Audit; Periodic Fall & Spring) Central Europe under Habsburg rule from the reforms of Maria Theresa to imperial collapse. Continuity and change in society; economic and political modernization; the rise of national
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

Consciousness and anti-Semitism; politics and culture in the Fin de Siecle; the Empire and World War I. Prereq: instr consent

**HIST 5797. Methods of Population History.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Standard methods of population analysis. Focuses on methods widely used for historical population research.

**HIST 5801. Seminar in Early American History.** (3 cr.; A-F or Audit; Periodic Fall & Spring) Introduction to literature of early American history. Readings selected from some of best scholarship in field. Questions of colonial historians. Theories, methods, sources used in pursuit of those questions.

**HIST 5802. Readings in American History, 1848-Present.** (3 cr.; A-F or Audit; Every Fall & Spring) Readings-intensive course. U.S. history from Mexican-American War to present.


**HIST 5871. Readings in U.S. Intellectual History: 19th-20th Centuries.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Definitions of American national identity from 1789 to the present as expressed in politics, religion, literature, painting, music, architecture, and history. Prereq: instr consent

**HIST 5881. American Foreign Relations to 1895.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Intensive readings in the historiography of American foreign relations with emphasis on American imperialism, domestic courses of foreign policy, and international political, economic, and cultural relations. Prereq: instr consent

**HIST 5890. Problems in American Indian History.** (3 cr.; A-F or Audit; Periodic Fall & Spring) Intensive consideration of topics in American Indian history. Topics may include social history, history of particular regions, political systems, education, American Indian policy. Prereq: Advanced undergrad with instr consent or grad student

**HIST 5900. Topics in European/Medieval History.** (; 1-4 cr. [max 16 cr.]; A-F only; Every Fall & Spring) Selected topics in European or medieval history not covered in regular courses; taught as staffing permits. Prereq: Grad or [advanced undergrad with instr consent]

**HIST 5901. Latin America Proseminar: Colonial.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes. Prereq: instr consent

**HIST 5902. Latin America Proseminar: Modern.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes. Prereq: instr consent

**HIST 5905. Topics in European Medieval History.** (; 1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Selected topics in Medieval European history, up to 1500ce. Prereq: Grad or [advanced undergrad with instr consent]

**HIST 5910. Topics in U.S. History.** (; 1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Selected topics in U.S. history not covered in regular courses. Taught as staffing permits. Prereq: Grad or advanced undergrad student with instr consent

**HIST 5920. Topics in African History.** (; 3 cr. [max 15 cr.]; Student Option; Periodic Fall & Spring) Topics not covered in regular courses.

**HIST 5930. Topics in Ancient History.** (; 1-4 cr. [max 16 cr.]; A-F or Audit; Periodic Fall & Spring) Selected topics in ancient history not covered in regular courses. To be taught as staffing permits and as enrollment warrants. Prereq: Grad or instr consent

**HIST 5932. The Production of Knowledge, Negotiating the Past, and the Writing of African Histories.** (3 cr.; A-F or Audit; Periodic Fall & Spring) Recent scholarship on social history of Africa. Focuses on new literature on daily lives of ordinary people in their workplaces, communities, households.

**HIST 5940. Topics in Asian History.** (; 1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Topics not covered in regular courses. Prereq: Grad student or [advanced undergrad, instr consent]

**HIST 5941. Readings in Chinese Documents.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Readings in Chinese on a topic to be selected by the instructor. Depending on the topic and the time period, readings may involve a mixture of modern and classical Chinese or may be entirely in modern Chinese. Consult instructor for more information. Prereq: Reading knowledge of Chinese

**HIST 5950. Topics in Latin American History.** (; 1-4 cr. [max 15 cr.]; A-F or Audit; Every Fall & Spring) Selected topics in Latin American history not covered in regular courses. Taught as staffing permits. Prereq: Grad or advanced undergrad with instr consent

**HIST 5960. Topics in History.** (; 1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Selected topics in history not covered in regular courses. Taught as staffing permits. Prereq: [advanced undergrad with instr consent]

**HIST 5962. Bell Library Research Seminar in Comparative World History, ca. 1000-1800 CE.** (3 cr.; A-F or Audit; Periodic Fall & Spring) Research proseminar on actions of Europeans in wider world, 1000-1800. Based on documents in James Ford Bell Library. Prereq: Grad student, instr consent

**HIST 5964. Comparative Economic History.** (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Theoretical approaches guide cross-cultural examinations of major issues in the economic history of East Asia, Europe, and the New World. Agrarian structures in economic development, markets, the state and economic development, and the industrial revolution. Prereq: instr consent

**HIST 5970. Advanced Research in Quantitative History.** (; 4 cr. [max 16 cr.]; A-F or Audit; Periodic Fall & Spring) Students will carry out publishable-quality research on a quantitative historical topic.


**HIST 5990. Readings in Comparative History.** (; 3 cr. [max 9 cr.]; A-F only; Spring Odd Year) Students read/discuss historical works that focus on common theme or employ similar methods in different geographic areas. Issues of cross-area comparison. Topics vary (e.g., peasant societies, race/ethnicity, states/nationalism). Prereq: instr consent

**HIST 5993. Directed Study.** (1-16 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq [Grad student or sr], instr consent, dept consent, college consent.

**HIST 5994. Directed Research.** (1-16 cr.; Student Option; Every Fall, Spring & Summer) Work on a tutorial basis. Prereq [Grad student or sr], instr consent, dept consent, college consent.

**HIST 8015. Scope and Methods of Historical Studies.** (3 cr.; A-F or Audit; Every Fall) Development of historical studies over time (especially in 19th and 20th centuries). Methodologies currently shaping historical research. Theoretical developments within the discipline during 19th and 20th centuries.

**HIST 8016. Practicum in Historical Writing.** (3 cr.; A-F only; Periodic Fall & Spring) Facilitate transition from writing seminar papers to writing individual research projects part of dissertation. Practice of making
HIST 8021. Seminar: Advanced Historical Writing. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Formal writing group. Writing practices for historians. Readings/discussions about historical analysis. Practical application of writing historical narratives. Students complete a major writing project based on their program needs and progress. prereq: Grad student, instr consent

HIST 8025. Politics of Historical Memory. (3 cr.; max 6 cr.; A-F or Audit; Every Spring)

HIST 8110. Medieval History: Research Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Research in medieval European history, using primary source material. prereq: instr consent, good reading knowledge of Latin, French, one other European language

HIST 8232. Cultural Fallout: The Cold War and its Legacy: Research. (3 cr.; A-F or Audit; Every Fall & Spring)
Student produces research paper on history/culture of Cold War era as it developed in United States after World War II. Research project builds upon readings from 8231.

HIST 8239. Readings in Gender, Race, Class, and/or Ethnicity in the United States. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Dynamics of gender, racial, class, and ethnic relations in U.S. history; intersections of these forces. prereq: instr consent

HIST 8240. Topics in Research in Gender, Race, Class, or Ethnicity in the United States. (3 cr.; max 6 cr.; A-F or Audit; Periodic Fall & Spring)
Dynamics of gender, racial, class, and ethnic relations in U.S. history. Intersections of these forces. Topics vary by instructor. prereq: instr consent

HIST 8245. Human Rights and Crimes Against Humanity: A Global History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Theoretical literature on genocides and human rights and on race/nation. Readings/discussions on meaning of "genocide" and its codification in international law. Historical cases. Students choose case to research.

HIST 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

HIST 8390. Research in American Indian History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Research/writing skills in American Indian history. Identify research questions, locate sources, conduct original research, produce substantial research paper.

HIST 8434. Health and Healing in African History. (3 cr.; Student Option; Periodic Fall & Spring)

HIST 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HIST 8464. Research in Yuan, Ming, and Qing History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Basic skills and resources for doing research in history of late imperial China. Bibliographic exercises; reading and translating primary documents. prereq: Good working knowledge of classical Chinese, background in history of late imperial China

HIST 8465. Research in Yuan, Ming, and Qing History. (3 cr.; Student Option; Periodic Fall & Spring)
Basic skills and resources for doing research in history of late imperial China. Students select, translate, and annotate texts appropriate to their research interests and write a research paper centering on these texts. prereq: Good working knowledge of classical Chinese, background in history of late imperial China

HIST 8540. Topics in Mediterranean Studies. (1-4 cr.; max 15 cr.; A-F or Audit; Every Fall & Spring)
Medieval history from Middle Ages to present. Taught as staffing permits, prereq: Grad student or advanced undergrad with instr consent

HIST 8630. Seminar in World History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Critical examination of historical literature dealing with theoretical approaches to world history and teaching of world history. prereq: instr consent

HIST 8640. Topics in Legal History Research. (3 cr.; max 9 cr.; A-F or Audit; Periodic Fall & Spring)
Comparative, methodological, theoretical, and topical courses in legal historical research, from ancient world to present. Offerings rotate.

HIST 8644. Legal History Workshop. (3 cr.; A-F or Audit; Every Fall & Spring)
Introduction to legal history and professional socialization. Work-in-progress of leading scholars working in field of legal history. Students can undertake original research. prereq: instr consent

HIST 8645. American Legal History. (3 cr.; A-F only; Periodic Fall & Spring)
This course explores the interaction between law, politics, and culture in American society, concentrating on the period from the Revolution through the New Deal. Topics include: democracy and the rule of law; slavery; the public-private distinction; Civil War and Reconstruction; industrialization; expansion of the federal administrative state; law and the human sciences; crime and punishment; legal education and the role of the lawyer in the American polity. Readings will include primary legal sources, such as treatises, statutes, constitutions, and landmark cases, as well as contemporary religious, scientific, and literary works, which will help to situate the legal materials in broader cultural context. Several secondary sources will also be considered, both for insights into the topics covered, and to illustrate various approaches to legal-historical analysis. The course will encourage critical examination of these sources with the aim of clarifying how law has figured in the history and historiography of the United States. No previous background in American history is assumed.

HIST 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HIST 8709. Seminar: History of Sexuality. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Theories of sexuality (by, e.g., Foucault, Butler, deLauretis), their application in history. Topics may include: feminist critique of Foucault and the classics, psychoanalytic approaches to religious transformations such as the Reformation, varying forms of gender transgression, sexuality in colonial encounters, operation of sexual metaphors in political conflict, and AIDS and the writing of history.

HIST 8715. Research on European Women's History, 1450-1750. (3 cr.; Student Option; Periodic Fall & Spring)
Research techniques for completing a major research paper based on primary sources. prereq: 5715

HIST 8720. Research Seminar on Central European History. (1-4 cr.; max 16 cr.; A-F or Audit; Every Fall, Spring & Summer)
Broad research theme/problem: in most cases preparation for dissertation. Students identify primary/secondary sources, conduct research, write paper, and read/comment upon each other's drafts. Geographic focus varies with instructor, may include Germany or lands of former Habsburg Austrian empire.

HIST 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HIST 8801. Seminar in Early American History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Introduction to literature of early American history. Readings selected from some of best scholarship in field. Questions of colonial
Historians. Theories, methods, sources used in pursuit of those questions.

HIST 8802. Readings in American History, 1848-Present. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Readings-intensive course. U.S. history from Mexican-American War to present.

HIST 8832. Cultural Fallout: The Cold War and Its Legacy: Research. (3 cr.; A-F or Audit; Every Fall & Spring)
Student produces research paper on history/culture of Cold War era in the United States after World War II. Research projects build upon readings from 5831. prereq: 5831

HIST 8857. Seminar: Research in the History of American Women. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Students define a historical problem or area of research on a topic in American women's history they would like to pursue in depth, identify appropriate sources and accomplish research in primary and secondary sources, write a 25 to 35-page scholarly article, and read and comment upon each other's drafts. prereq: 5857, instr consent

HIST 8858. Research in Early American History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Research and writing skills. With instructor and other participants, students identify their research questions, locate the sources with which to answer these questions, conduct original research, and produce a substantial research paper. prereq: 5801 or instr consent

HIST 8886. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
No description. prereq: Max 14 cr per semester or summer, 24 cr required

HIST 8900. Topics in European/Medieval History. (1-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Topics not covered in regular courses.

HIST 8905. Topics in European Medieval History. (1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Selected topics in Medieval European history, up to 1500ce.

HIST 8910. Topics in U.S. History. (1-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Topics not covered in regular courses.

HIST 8920. Topics in African History. (1-4 cr. [max 16 cr.]; A-F or Audit; Periodic Fall)
Topics not covered in regular courses.

HIST 8930. Topics in Ancient History. (1-4 cr. [max 16 cr.]; A-F or Audit; Periodic Fall & Spring)
Topics not covered in regular courses.

HIST 8940. Topics in Asian History. (1-4 cr. [max 16 cr.]; A-F or Audit; Periodic Fall)
Topics not covered in regular courses.

HIST 8944. Research Seminar: New Directions in African Social History I. (3 cr.; A-F or Audit; Periodic Fall & Spring)
First of two-part course. Radical transformation in field of African social history during past two decades. Students select major research topic and begin preliminary investigation. prereq: instr consent

HIST 8945. Research Seminar: New Directions in African Social History II. (3 cr.; S-N or Audit; Periodic Fall & Spring)
Second of two-part course. Students conceptualize and write major research paper. prereq: 8944, instr consent

HIST 8950. Topics in Latin American History. (1-4 cr. [max 16 cr.]; A-F or Audit; Every Spring)
Topics not covered in regular courses.

HIST 8960. Topics in History. (1-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Topics not covered in regular courses.

HIST 8961. Research Seminar: Intellectual History. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Approaches/methods. Readings on or exemplifying intellectual history. Intellectual history as something broader than history of philosophical thought: a set of approaches of broad cross-disciplinary applicability. Each student prepares a research paper on a topic of intellectual history and present it to class for critique.

HIST 8970. Advanced Research in Quantitative History. (4 cr. [max 16 cr.]; A-F or Audit; Periodic Fall & Spring)
Students carry out publishable-quality research on quantitative history topic. prereq: Grad student

HIST 8990. Topics in Comparative History-Research. (3 cr. [max 15 cr.]; Student Option; Every Fall & Spring)
Topics vary. Students read/discuss historical works from different geographic areas, develop proposals for comparative research, or pursue comparative research projects. prereq: instr consent

HIST 8993. Directed Study. (1-16 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Students work on tutorial basis. Guided individual reading or study. prerq: Grad student, instr consent

HIST 8994. Directed Research. (1-16 cr.; A-F or Audit; Every Fall, Spring & Summer)
Work on a tutorial basis. prereq: instr consent

History of Medicine (HMED)

HMED 3001W. Health, Disease, and Healing I. (HIS,WI; 4 cr.; Student Option; Every Fall)
Introduction to intellectual/social history of European/American medicine, health care from classical antiquity through 18th century.

HMED 3002W. Health Care in History II. (HIS,WI; 3 cr.; Student Option; Every Spring)
Introduction to intellectual/social history of European/American medicine, health care in 19th/20th centuries.

HMED 3040. Human Health, Disease, and the Environment in History. (HIS; 3 cr.; Student Option; Every Spring & Summer)
Introduction to historical relationship of human health and the environment. How natural/human-induced environmental changes have, over time, altered our experiences with disease and our prospects for health.

HMED 3055. Women, Health, and History. (HIS; 3 cr.; A-F only; Periodic Fall & Spring)
Women's historical roles as healers, patients, research subjects, health activists. Biological determinism, reproduction, mental health, nursing, women physicians, public health reformers, alternative practitioners. Gender disparities in diagnosis, treatment, research, careers. Assignments allow students to explore individual interests.

HMED 3065. Body, Soul, and Spirit in Medieval and Renaissance European Medicine. (3 cr.; A-F or Audit; Every Spring)

HMED 3075. Technology and Medicine in Modern America. (HIS,TS; 3 cr.; Student Option; Every Fall & Spring)
How technology came to medicine's center-stage. Impact on production of medical knowledge, professionalization, development of institutions/industry, health policy, and gender/race disparities in health care.

HMED 3600. Directed Study. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
TBD prereq: instr consent

HMED 4960. Senior Research Topics in Medical History. (3-4 cr.; A-F only; Every Spring)
Seminar. Reading/discussion, individual directed research project with oral presentation. Students meet in peer groups and with instructor. prereq: Sr, instr consent

HMED 5075. Technology and Medicine in Modern America. (3 cr.; A-F or Audit; Fall Odd, Spring Even Yrs)
How technology came to medicine's center-stage. Impact on production of medical knowledge, professionalization, health policy, gender/race disparities in health care. prereq: instr consent

HMED 5940. Topics in the History of Medicine. (3-4 cr. [max 16 cr.]; Student Option; Periodic Fall & Spring)
Seminar on the historical relations between medicine and the State from the 18th to 20th centuries.

HMED 7500. Historical Research for Health Professional Students. (2-6 cr.; H-N or Audit; Every Fall & Spring)
Introduction to research methods. Directed research on historical topic of student's choice. Arranged period of study. prereq: [3rd or 4th yr health professional student], instr consent
HMED 8001. Foundations in the History of Early Medicine. (3 cr.; A-F only; Every Fall) History of Western medicine, from professionalization of healing in Greco-Egyptian antiquity to association of postmortem pathology with disease and clinical movement of early 19th-century Paris.

HMED 8002. Foundations in the History of Modern Medicine, 1800-present. (3 cr.; A-F only; Every Spring) History of Western medicine in Europe and America, from the Paris School and pathological anatomy in early 19c France through germ theories of disease, bacteriological revolution, reform of medical education, pharmaceutical revolution, growth of biomed research establishment, and comparative health care delivery systems.

HMED 8112. Historiography of Science, Technology, and Medicine. (3 cr.; A-F only; Every Fall) Models of practice, different schools. Work of representative historians of science, technology, and medicine. prereq: instr consent

HMED 8113. Research Methods in the History of Science, Technology, and Medicine. (3 cr.; A-F only; Every Spring) Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision. prereq: instr consent

HMED 8220. Seminar: Current Topics in the History of Medicine. (3 cr.; [max 9 cr.]; A-F or Audit; Every Fall & Spring) Topics vary. prereq: instr consent

HMED 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

HMED 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

HMED 8631. Directed Study. (1-6 cr. [max 12 cr.]; A-F or Audit; Every Fall) tbl prereq: instr consent

HMED 8632. Directed Study. (1-6 cr. [max 12 cr.]; A-F or Audit; Every Spring) tbl prereq: instr consent

HMED 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbl prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HMED 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HMED 8830. Topics in the History of Science, Technology, and Medicine. (3 cr. [max 9 cr.]; A-F or Audit; Periodic Fall & Spring) Historical literature of topics common to history of science, technology, and medicine. prereq: instr consent

HMED 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

HSCI 1011. Digital World. (HIS,T; 3 cr.; Student Option; Spring Odd Year) Essential knowledge and critical perspective to understand today's Digital World. The history and social impact of the digital revolution, including security, surveillance, gaming, "reality," and global internet governance.

HSCI 1212. Life on Earth: Perspectives on Biology. (ENV,HIS; 4 cr.; Student Option; Every Fall & Spring) How humans have developed theories/observations over 400 years about life on earth. Applying historical methods to Holocene extinction, ENSO and famines, human population growth, the Dust Bowl and soil conservation, DDT and falcon repopulation, and disease and responses to pandemics. Environmental debates across national boundaries. Origins of life on earth. Evolution, natural theology. Ecosystems.

HSCI 1214W. Life on Earth: Perspectives on Biology. (ENV,WI,HIS; 4 cr.; Student Option; Every Fall & Spring) How humans have developed theories/observations over 400 years about life on earth. Applying historical methods to Holocene extinction, ENSO and famines, human population growth, the Dust Bowl and soil conservation, DDT and falcon repopulation, and disease and responses to pandemics. Environmental debates across national boundaries. Origins of life on earth. Evolution, natural theology. Ecosystems.

HSCI 1714. Technology and Civilization: Stone Tools to Steam Engines. (HIS,T; 3-4 cr.; Student Option; Every Fall & Spring) History of technology in its cultural context from earliest times to the Industrial Revolution. Neolithic Revolution, Bronze and Iron Ages, ancient civilizations, Greece, Rome, Middle Ages, and Renaissance.

HSCI 1715. Technology and Civilization: Waterwheels to the Web. (HIS,T; 3-4 cr.; Student Option; Every Fall & Spring) Relations of technology to culture since Industrial Revolution. Diffusion of Industrial Revolution, modes of adaptation by different cultures, social impact.

HSCI 1814. Revolutions in Science: The Babylonian to Newton. (GP,HIS; 3-4 cr.; Student Option; Every Fall & Spring) Development and changing nature of sciences in their cultural context. Babylonian/Greek science. Decline/transmission of Greek science. Scientific Revolution (1500-1700) from Copernicus to Newton.


HSCI 2333V. Honors Course: Science and Technology in the American Century. (CIV,WI,HIS; 3 cr.; A-F only; Every Fall & Spring) In the twentieth century, the United States became a leader in science and technology. Course examines reasons for this success and also the ways in which those activities raised ethical and social concerns.

HSCI 3211. Biology and Culture in the 19th and 20th Centuries. (CIV,HIS; 3 cr.; Student Option; Every Fall & Spring) Changing conceptions of life and aims and methods of biology; changing relationships between biology and the physical and social sciences; broader intellectual and cultural dimensions of developments in biology.

HSCI 3242. The Darwinian Revolution. (HIS; 3 cr.; Student Option; Every Fall & Spring) Development of evolutionary thought in 19th/20th centuries. Emphasizes Darwin's theory of evolution by natural selection. Scientific, economic, political, religious, philosophical dimensions of Darwinism. Comparative reception of Darwinism in different countries/cultures.

HSCI 3244. History of Ecology and Environmentalism. (ENV,HIS; 3 cr.; Student Option; Every Fall & Spring) Histories of ecological ideas; ecology as a scientific discipline; environmental ideas and movements in the United States and the western world. Modern period (post-1650). European roots of ideas about relationships between plants, animals, humans, and their environments. United States and establishment of ecology as a scientific discipline, as well as its connection with efforts to protect and conserve natural resources. Efforts to place humans under the lens of ecology, critiques of the impact of humans on nature, and growth of the environmental movement in response to those critiques.

HSCI 3331. Technology and American Culture. (HIS,T; 3 cr.; Student Option; Every Fall & Spring) American culture(s) and technology, pre-Columbian times to present. Artisanal, biological, chemical, communications, energy, environment, electronic, industrial, military, space and transportation technologies explained in terms of economic, social, political and scientific causes/effectss.

HSCI 3332. Science and American Culture. (DSJ,HIS; 3 cr.; Student Option; Every Fall & Spring) American science since 1600, including transfer of science to America; development...
of indigenous traditions for pursuit of science; infrastructure for education and research; public response to scientific development.

HSCI 3401. Ethics in Science and Technology. (CIV,HIS; 3 cr.; Student Option; Every Fall & Spring) Historical issues involve research ethics including utilitarian, social Darwinian, and other ethical systems developed in science. Ethical problems posed by modern science and technology, including nuclear energy, chemical industry, and information technologies.

HSCI 3421. Engineering Ethics. (CIV,HIS; 3 cr.; Student Option; Every Fall & Spring) Ethical issues in engineering research and engineers' public responsibility/practice, using historical cases; historical development of engineering as a vocation/profession; ethical implications of advanced engineering systems such as nuclear weaponry and networked communications.


HSCI 3714. Technology and Civilization: Stone Tools to Steam Engines. (HIS,TS; 3-4 cr.; Student Option; Every Fall & Spring) History of technology in its cultural context from earliest times to the Industrial Revolution. Neolithic Revolution, Bronze/Iron Ages, ancient civilizations, Greece, Rome, Middle Ages, Renaissance.

HSCI 3715. Technology and Civilization: Waterwheels to the Web. (HIS,TS; 3-4 cr.; Student Option; Every Fall & Spring) Relations of technology to culture since Industrial Revolution. Diffusion of Industrial Revolution, modes of adaptation by different cultures, social impact.

HSCI 3814. Revolutions in Science: The Babylonians to Newton. (GP,HIS; 3-4 cr.; Student Option; Every Fall & Spring) Development and changing nature of sciences in their cultural context. Babylonian/Greek science. Decline/transmission of Greek science. Scientific Revolution (1500-1700) from Copernicus to Newton.


HSCI 4121W. History of 20th-Century Physics. (WI; 3 cr.; Student Option; Every Fall & Spring) Experimental and theoretical discoveries in 20th-century physics (modern physics, theory of relativity, quantum theories, nuclear physics to World War II) within the context of educational, institutional, and political developments in Europe and the United States. prereq: general physics or instr consent

HSCI 4321. History of Computing. (HIS,TS; 3 cr.; Student Option; Fall Even, Spring Odd Year) Developments in the last 150 years; evolution of hardware and software; growth of computer and semiconductor industries and their relation to other business areas; changing relationships resulting from new data-gathering and analysis techniques; automation; social and ethical issues.

HSCI 4455. Women, Gender, and Science. (DSU,HIS; 3 cr.; Student Option; Every Fall & Spring) Three intersecting themes analyzed from 1700s to the present: women in science, sexual and gendered concepts in modern sciences, and impact of science on conceptions of sexuality and gender in society.

HSCI 5211. Biology and Culture in the 19th and 20th Centuries. (CIV; 3 cr.; Student Option; Every Fall & Spring) Changing conceptions of life and aims and methods of biology; changing relationships between biology and the physical and social sciences; broader intellectual and cultural dimensions of developments in biology.


HSCI 5244. History of Ecology and Environmentalism. (3 cr.; Student Option;) Development of ecological thought from 18th century natural theology to contemporary ecology and conservation biology; changing views of “balance” and the “economy” of nature; conceptual and methodological developments in ecosystems ecology; connections between ecology and conservation, population and environmental politics.

HSCI 5331. Technology and American Culture. (3 cr.; Student Option; Periodic Fall & Spring) Development of American technology in its cultural/intellectual context from 1790 to present. Transfer of technology to America. Establishment of an infrastructure promoting economic growth. Social response to technological developments.


HSCI 5401. Ethics in Science and Technology. (3 cr.; Student Option; Periodic Fall & Spring) Historical issues involving ethics in science. Ethical problems posed by modern science/technology, including nuclear energy, chemical industry, and information technologies.

HSCI 5421. Engineering Ethics. (3 cr.; Student Option; Every Fall & Spring) Engineering ethics in historical context, including the rise of professional engineering societies; ethical problems in engineering research and engineers’ public responsibility; ethical implications of advanced engineering systems such as the production of nuclear weapons; development of codes of ethics in engineering.


HSCI 5993. Directed Studies. (1-15 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent

HSCI 5994. Directed Research. (3 cr.; Student Option; Every Fall & Spring) TBD prereq: instr consent

HSCI 6112. Historiography of Science, Technology, and Medicine. (3 cr.; A-F only; Every Fall) Models of practice, different schools. Work of representative historians of science, technology, and medicine.

HSCI 6113. Research Methods in the History of Science, Technology, and Medicine. (3 cr.; A-F only; Every Spring) Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision.

HSCI 8124. Foundations for Research in Ancient Science. (3 cr.; A-F or Audit; Periodic Fall) Development of natural/mathematical science in ancient Near East and Classical Greece. prereq: Grad HSci major or minor or instr consent

HSCI 8125. Foundations for Research in the Scientific Revolution. (3 cr.; A-F or Audit; Fall Even, Spring Odd Year) Development of sciences/natural philosophy, 1500-1725. prereq: Grad HSci major or minor or instr consent

HSCI 8131. Industrial Revolutions. (3 cr.; A-F only; Spring Even Year) Development of industrial society, from 1700 through 1850. Emphasizes developments in mechanical/engineering sciences. Scientific, economic, political, and social dimensions of industrialization.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
HSCI 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

HSCI 8421. Social and Cultural Studies of Science. (3 cr.; Student Option; Periodic Fall & Spring) Review of recent work; theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

HSCI 8441. Women in Science: Historical Perspectives. (3 cr.; Student Option; Periodic Fall & Spring) Key literature dealing with patterns of participation in science and medicine since the 18th century. The ways in which modern science is perceived to be gendered, particularly in its practice and in ways that seem to influence theory and applications. prereq: instr consent

HSCI 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

HSCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HSCI 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

HSCI 8830. Topics in the History of Science, Technology, and Medicine. (3 cr. [max 9 cr.]; A-F or Audit; Periodic Fall & Spring) Historical literature of topics common to history of science, technology, and medicine. prereq: instr consent

HSCI 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

HSCI 8900. Seminar: History of Early Physical Science. (3 cr.; Student Option; Periodic Fall & Spring) For advanced graduate students; topics in development of natural and mathematical science before 1800. prereq: instr consent

HSCI 8910. Seminar: History of Modern Physical Sciences. (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) For advanced graduate students; topics in development of physical sciences since 1800. prereq: instr consent

HSCI 8920. Seminar: History of Biological Sciences. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) For advanced graduate students; topics in development of natural, biological, and medical sciences from Aristotle to the present. prereq: instr consent

HSCI 8930. Seminar: History of Technology. (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) For advanced graduate students; topics in development of technology from ancient times to the present. prereq: instr consent

HSCI 8940. Seminar: History of Science and Technology in the Americas. (3 cr.; Student Option; Every Fall & Spring) For advanced graduate students; topics in development of science and technology, emphasizing the United States and Canada. prereq: instr consent

HSCI 8950. Seminar: Science and Technology in Cultural Settings. (3 cr.; Student Option; Every Fall) For advanced graduate students; topics in development of science and technology in or across specific geographic regions or particular cultures. prereq: instr consent

HSCI 8993. Directed Studies. (1-5 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer) TBD prereq: instr consent

HSCI 8994. Directed Research. (1-5 cr. [max 15 cr.]; Student Option; Every Fall & Spring) TBD

Hmong (HMNG)


HMNG 1002. Introduction to Hmong Language II. (5 cr.; Student Option; Every Summer) Continuation of 1001. Foundations of learning Hmong. Speaking, reading, writing, listening. Communication/interaction, supplemented with grammatical details. Hmong community/culture. prereq: 1001 or 1011

HMNG 1011. Beginning Hmong I. (5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing. Emphasizes development of communicative competence.

HMNG 1012. Beginning Hmong II. (5 cr.; Student Option; Every Spring) Continuation of 1011. Listening, speaking, reading, writing. Skills. Development of communicative competence. prereq: 1001 or 1011 or instr consent

HMNG 1015. Accelerated Beginning Hmong. (5 cr.; Student Option; Every Fall & Summer) Review of grammar/usage, practice in reading/writing. Introduction to Hmong literature and formal writing. Topics in Hmong culture. prereq: Ability in basic spoken Hmong

HMNG 1016. Accelerated Intermediate Hmong. (5 cr.; Student Option; Every Spring) Review of grammar/usage, continued practice in reading/writing. Expanded introduction to Hmong literature/formal writing. Selected topics in Hmong culture. prereq: [1011 and 1012] or 1015 or instr consent

HMNG 3021. Intermediate Hmong I. (5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing. Grammar review/elaboration. Authentic texts, cultural readings, basic compositions, oral presentations. prereq: 1002 or 1012 or 1015 or instr consent

HMNG 3022. Intermediate Hmong II. (5 cr.; Student Option; Every Spring) Continuation of 3021. Listening, speaking, reading, writing. Grammar review/elaboration. Authentic texts, cultural readings, basic compositions, oral presentations. prereq: 3021 or instr consent

HMNG 3031. Advanced Hmong I. (4 cr.; Student Option; Every Fall) Speaking, listening, reading, writing. Complex vocabularies, sentence structures from Hmong newspapers, magazine, folktales, folk songs, novels, poetry, proverbs, riddles. Concepts/terms from social/ritual settings. Idioms, slang, classifiers. prereq: 3032 or equiv or instr consent

HMNG 3032. Advanced Hmong II. (4 cr.; Student Option; Every Spring) Speaking, listening, reading, writing. Complex vocabularies, sentence structures from Hmong newspapers, magazine, folktales, folk songs, novels, poetry, proverbs, riddles. Concepts/terms from social/ritual settings. Idioms, slang, classifiers. prereq: 3031 or equiv or instr consent

HMNG 3290. Hmong Language Teaching Tutorial. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring) Students tutor beginning students of Hmong and are part of department's Hmong language team. prereq: Grade of A in 3022

HMNG 3993. Directed Studies. (1-5 cr. [max 15 cr.]; Student Option No Audit; Periodic Fall & Spring) Guided individual study of Hmong language or linguistics. prereq: instr consent, dept consent, college consent

HMNG 4001. Beginning Hmong I for Graduate Student Research. (5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing. Emphasizes development of communicative competence. Meets with 1011.

HMNG 4002. Beginning Hmong II for Graduate Student Research. (5 cr.; Student Option; Every Spring) Continuation of 4001. Listening, speaking, reading, writing. Skills. Development of communicative competence. Meets with 1012. prereq: 4001

HMNG 4003. Intermediate Hmong I for Graduate Student Research. (5 cr.; Student Option; Every Fall)
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HSEM 3037V. Honors Seminar. (WI; 3 cr.; A-F only; Periodic Fall)

HSEM 3038H. Honors Seminar. (DSJ; 3 cr.; A-F only; Periodic Fall & Spring)
Topics course. Frequently interdisciplinary. Taught by department of history faculty. Prereq: [Jr or Sr], honors

HSEM 3039V. Honors Seminar. (DSJ, WI; 3 cr.; A-F only; Periodic Spring)
Active learning/writing. Frequently interdisciplinary.

HSEM 3039H. Honors Seminar. (ENV; 3 cr. [max 6 cr.]; A-F only; Periodic Fall)
Special topics discussion course; active learning; frequently interdisciplinary. Taught by political Science faculty. Prereq: [Jr or Sr] honors student

HSEM 3054H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics discussion; active learning; frequently interdisciplinary. Prereq: [Jr or Sr] honors student

HSEM 3059H. Honors seminar. (2-3 cr.; A-F only; Periodic Fall)
Special topics discussion course; active learning; frequently interdisciplinary.

HSEM 3067V. Honors Seminar. (WI; 3 cr.; A-F only; Every Fall & Spring)
Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors

HSEM 3106H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics course. Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3201H. Honors Seminar. (3 cr.; A-F only; Periodic Fall)
Honors seminar. Emphasis on active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3201V. Honors Seminar. (WI; 3 cr.; A-F only; Periodic Spring)
Special topics course. Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3202H. Honors Seminar. (3 cr.; A-F only; Periodic Spring)
Honors seminar. Emphasis on active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3308H. Honors Seminar. (3 cr.; A-F only; Periodic Spring)
Special topics course. Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3308V. Honors Seminar. (WI; 3 cr.; A-F only; Spring Even Year)
Special topics course; emphasis on active learning; frequently interdisciplinary. Writing enhanced. Prereq: [Jr or Sr] honors student

HSEM 3323H. Honors Seminar. (2-3 cr.; [max 6 cr.]; A-F only; Periodic Fall)
Special topics course. Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3404H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics discussion; active learning; frequently interdisciplinary. Prereq: [Jr or Sr] honors student

HSEM 3410H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics course. Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3608H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics course. Active learning. Prereq: Jr or Sr honors student

HSEM 3614H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics discussion course. Active learning, frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3635H. Honors Seminar. (3 cr.; A-F only; Periodic Fall)
Special topics, interdisciplinary course; taught by Veterinary medicine faculty prerequisite: [Jr or Sr] honors student

HSEM 3701H. Honors Seminar. (2 cr.; A-F only; Periodic Fall)
Honors seminar. Emphasis on active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3702H. Honors Seminar. (CIV; 3 cr.; A-F only; Every Spring)
Special topics Course; emphasis on active learning; frequently interdisciplinary. Prereq: [Jr or Sr] honors student

HSEM 3705H. Honors Seminar. (3 cr.; A-F only; Periodic Fall)
Special topics, interdisciplinary course; taught by Occupational Therapy faculty.

HSEM 3715H. Honors Seminar. (3 cr.; A-F only; Periodic Fall)
Topics course. Emphasizes active learning. Frequently interdisciplinary. Taught by Bioethics faculty. Prereq: [Jr or Sr] honors student

HSEM 3716H. Honors Seminar. (2-3 cr.; [max 6 cr.]; A-F only; Periodic Spring)
Emphasizes active learning. Frequently interdisciplinary. Prereq: [Jr or Sr] honors student

HSEM 3719H. Honors Seminar. (2-3 cr.; A-F only; Periodic Fall)
Special topics course. Active learning. Frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3720H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Special topics discussion course. Active learning, frequently interdisciplinary. Prereq: Jr or Sr honors student

HSEM 3724H. Honors Seminar. (2-3 cr.; A-F only; Periodic Spring)
Topics Course. Emphasizes active learning. Interdisciplinary. Prereq: [Jr or Sr] honors student

HSEM 3801H. Honors Seminar. (3 cr.; A-F only; Periodic Fall)
Emphasizes active learning. Frequently interdisciplinary. Associated with law faculty. Prereq: [Jr or Sr], honors

Horticultural Science (HORT)

HORT 1001. Plant Propagation. (BIOL; 4 cr.; Student Option; Every Fall & Spring)
Principles and techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures on principles; labs on practice of various propagating techniques.

HORT 1003. Horticulture for the Home Gardener. (3 cr.; Student Option; Every Spring)

HORT 1013. Floral Design. (3 cr.; Student Option; Periodic Fall)

HORT 1014. Edible Landscape. (TS; 3 cr.; Student Option; Every Spring)
Tracing our relationship with edible landscapes traces to our hunting-gathering origins. Technological/social changes that have distanced us from our food. Integrating food plants into pleasing, sustainable, and edible landscapes in yards, neighborhoods, and cities.

HORT 1015. Woody and Herbaceous Plants. (4 cr.; A-F only; Every Fall)
How to identify plants around the world. A few hundred of the most important cultivated plants for northern climates, their distinguishing features, common uses, cultural specificities, and notable cultivars.

HORT 1031. Vines and Wines: Introduction to Viticulture and Enology. (3 cr.; Student Option No Audit; Every Fall & Spring)
History of wine, principles of biology, culture of grapevine, fermentation, sensory evaluation of wine. prereq: 21 yrs of age by date of 1st class meeting

HORT 1061. The Sustainable Lawn. (3 cr.; Student Option; Every Fall)
Common turfgrasses. How to manage home lawn in sustainable way. Maintaining quality turf areas with reduced inputs.

HORT 1090. Directed Studies. (1-3 cr.; Student Option; Every Fall, Spring & Summer)
Approved field, lab, or greenhouse experiences in application of horticultural information/
practices. prerq: instr consent or department permission

HORT 1901. Topics: Freshman Seminar. (ENV; 3 cr.; Student Option; Every Fall) Topics vary.

HORT 1905. Freshman Seminar. (; 1-3 cr.; Student Option; Every Fall & Spring) Topics vary. prerq: Fr

HORT 1942. Topics: Freshman Seminar. (TS; 3 cr.; A-F or Audit; Every Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule.

HORT 2100. Agricultural Biochemistry. (3 cr.; A-F only; Every Fall) Chemical/biological foundation for agricultural disciplines. Concepts in organic, analytical and biological chemistry. Chemistry, metabolism, and development of plants. prerq: CHEM 1015 or CHEM 1061 instr consent

HORT 3005W. Environmental Effects on Horticultural Crops. (WI; 4 cr.; Student Option; Every Spring) Introduction to physiological basis for effects of environment on plant growth/development. How to produce optimal plant growth. Experimental technique, data analysis, scientific writing. Lecture, readings, lab.

HORT 3090. Directed Studies. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Approved field, lab, or greenhouse experiences in application of horticultural information/practices. prerq: Nonfr, instr consent

HORT 3131. Student Organic Farm Planning, Growing, and Marketing. (3 cr.; Student Option; Every Fall) Students plan/implement cropping/marketing strategies for organic produce/flowers from Student Organic Farm on St. Paul campus. prerq: 1001 or AGRO 1101 or AGRO 1103 or BIOL 1001 or BIOL 1009 or instr consent

HORT 3480. Topics in Sustainable Horticulture. (; 1-3 cr.; Student Option; Every Fall, Spring & Summer) Various topics

HORT 4000. International Experiences in Horticultural Science. (; 3 cr. [max 6 cr.]; Student Option; Every Spring) Perspectives in horticultural science/cultural diversity through various international settings. Preparation for international study tour of one to three weeks.

HORT 4015. Advanced Woody and Herbaceous Plant Topics. (; 1 cr. [max 7 cr.]; A-F only; Every Fall, Spring & Summer) Species, cultivars, identification, and use for each genus of one group of plants. prerq: 1015

HORT 4061W. Turfgrass Management. (WI; 3 cr.; A-F only; Every Fall) Biology of turfgrasses, ecology of landscape systems. Installation, management, and culture of turfgrass communities and landscape plant systems. Sod production, industrial grounds, lawn care, park/recreation areas, athletic field/ business management. Case studies. prerq: 1001 or instr consent

HORT 4062. Turfgrass Weed and Disease Science. (; 3 cr.; A-F only; Fall Odd Year) Turfgrass weed/disease problems. How to deal with these problems using an integrated approach. Biology, identifying features, and management strategies for several turfgrass diseases/weeds. How to apply IPM principles to turfgrass weed/disease problems.

HORT 4063. Turfgrass Science. (; 3 cr.; A-F only; Every Spring) Ecology, physiology, and theory of turf population dynamics. Specialized management situations such as golf course, commercial sod production, and fine turf athletic settings. prerq: 4061

HORT 4071W. Applications of Biotechnology to Plant Improvement. (WI; 4 cr.; Student Option; Every Fall) Fundamentals of plant genetics, molecular biology, and plant biotechnology. Emphasizes their applications to plant propagation and crop improvement. Hands-on experience with crossing plants, analysis of phenotypes and segregation data, plant tissue culture/ transformation, gel electrophoresis, molecular cloning, use of genetically modified crops. Principles of ethics/citizenship to decision making in plant genetics and biotechnology. Debate, discussion, writing exercises. prerq: [Biol 1009 or equiv or grad student], instr consent

HORT 4096. Professional Experience Program: Internship. (; 1 cr. [max 2 cr.]; S-N only; Every Fall, Spring & Summer) Professional experience in horticulture firms or government agencies attained through supervised practical experience. Students evaluate reports and consult with faculty advisers and employers. prerq: CFANS undergrad, completed internship contract prior to employment

HORT 4096W. Professional Experience Program: Internship. (WI; 2 cr.; A-F only; Every Fall) Professional experience in horticultural businesses, government agencies, arboreta, and botanical gardens achieved through a supervised practical experience. Students produce a final publication focusing on writing for lay audiences. Project starts before the internship begins and ends approximately two months after the internship is complete. prerq: CFANS undergrad

HORT 4114W. Scheduling Crops for Protected Environments. (WI; 4 cr.; A-F only; Every Fall) The purpose of this course is to acquaint students with the identification, scheduling and cultural requirements of commercially produced potted plants, gain experience in growing them, and conduct experiments to understand current problems. The course builds on knowledge obtained in Hort 1001 or Hort 1015, by adding in additional factors of plant growth coupled with scheduling and growing a of crops which commercial growers

would experience. The role of ornamental plants in the human environment will be discussed, with special emphasis on future issues. Writing is an integral component of this course; one major paper is revised and expanded multiple times plus other course writing fulfill the writing intensive requirement. Through the use of interactive learning, field trips, written assignments, and in-class discussions students learn crop requirements and the interactions between the marketing distribution system of breeders, producers, distributors, growers, retailers, and consumers.

HORT 4401. Plant Genetics and Breeding. (; 4 cr.; Student Option; Every Spring) Principles of plant genetics and environmental variation. Applications of genetics to crop evolution and breeding of self-pollinated, cross-pollinated, and asexually propagated crops. Investigation of hybridization, variation, and selection. prerq: Biol 1009 or equiv or grad, instr consent

HORT 4461. Horticultural Marketing. (; 3 cr.; A-F only; Every Fall) Major areas in horticultural marketing. Difference between horticultural products and commercial commodities. Core marketing components that should be used by every small horticultural business. Approaches to consumer research.

HORT 4601. Aquaponics: Integrated fish and plant food systems. (4 cr.; A-F only; Every Spring) Advanced training/experience at intersection of biology, engineering, economics, policy, culture, environment. Emphasis on experiential learning, i.e., system design/maintenance, community engagement. prerq: Biol 1001 or Biol 1009

HORT 4850. Pollinator Protection in Managed Landscapes. (3 cr.; A-F or Audit; Fall Even Year) Importance of pollinators in agricultural/other natural landscapes. Risks to pollinators. Ways risks can be reduced, minimized, or overcome. Ways public policy has impacted pollinators/ how future policy decisions will affect pollinator protection efforts. prerq: [1001 or AGRO 1101 or BIOL 1009 or BIOL 1001 or ENT 1001 or PLPA 1005]; 30 credits completed (non-freshman status)


HORT 5011. Common Chinese Medicinal Plants: Classification, Identification, and Application. (; 3 cr.; Student Option; Fall Odd Year) More than 200 common Chinese medicinal plants from 80 plant families. Medicinal plant identification/classification. Methods/ philosophy of applying herbs for health and disease prevention. Practice with about 90 herb
samples. prereq: 1001 or BIOL 1009 or instr consent

HORT 5012. Common Chinese Medicinal Plants: Growing and Processing. (3 cr.; Student Option; Fall Even Year)
How to grow, process, store 40 common Chinese herbs/herbal products. prereq: 1001 or BIOL 1009 or CHEM 1015 or instr consent

HORT 5023. Public Garden Management. (2 cr.; Student Option; Every Spring)

HORT 5031. Fruit Production and Viticulture for Local and Organic Markets. (3 cr.; A-F or Audit; Fall Odd Year)
Principles of fruit production. Temperature. Fruit crops. Integrated management of fruit cropping systems. Site selection, cultural management practices, taxonomic classification, physiological/environmental control of plant development. Writing. prereq: [1001, 3005] or instr consent

HORT 5032. Organic Vegetable Production. (3 cr.; A-F or Audit; Spring Odd Year)
Integrated management of vegetable cropping. Site selection/environment, seed/stand establishment, cultural management, commodity use, handling. Types of vegetable cultivars. Breeding, physiological/environmental control. prereq: [3005, SOIL 2125] or instr consent

HORT 5051. Plant Production II. (; 4 cr.; A-F or Audit; Every Spring)

HORT 5058. Plant Cytogenetics. (2 cr.; Student Option; Spring Odd Year)

HORT 5059. Plant Cytogenetics Lab. (1 cr. [max 2 cr.]; Student Option; Spring Odd Year)
Consolidate knowledge of plant cytotgenetics by practicing series of microscopy/computational technologies. Examine number, movement, structure/structure modification of chromosomes. Application in plant improvement. prereq: [HORT/AGRO 4401, BIOL 4004] or instr consent

HORT 5061. Advanced Turfgrass Science. (2 cr.; Student Option; Every Spring)
For advanced students in turf with career objectives in professional turf management. Emphasis on ecology, physiology, theory of turf population dynamics and specialized management situations such as golf course, commercial sod production, and fine turf athletic settings. prereq: 4061

HORT 5071. Ecological Restoration. (4 cr.; Student Option; Every Fall)
Ecological/physiological concepts for revegetation of grasslands, wetlands, forests, and landscapes. Plant selection, stand establishment, evaluation. State/federal programs that administer restoration/ reclamation. Field trips. prereq: [One college course in ecology, one college course in [plant science or botany]] or instr consent

HORT 5090. Directed Studies. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
In-depth exploration of concepts, technology, materials, or programs in specific area to expand professional competency/self-confidence. Planning, organizing, implementing, and evaluating knowledge obtained from formal education and from experience. prereq: 8 cr upper div Hort courses, instr consent

HORT 5131. Student Organic Farm Planning, Growing, and Marketing. (; 3 cr.; Student Option; Every Spring)
Students plan/implement cropping/marketing strategies for organic produce/flowers from Student Organic Farm on St. Paul campus. prereq: 1001 or AGRO 1101 or AGRO 1103 or BIOL 1001 or BIOL 1009 or instr consent

HORT 6002. Problem Solving in Horticulture. (; 2-4 cr.; S-N only; Every Fall) Collaborative problem-solving experience designed/completed by students with guidance from faculty instructor. prereq: Completion of 18 cr in master of agriculture in horticulture program or instr consent

HORT 6003. Masters of Professional Studies in Horticulture Professional Experience Program: Internship. (; 1-3 cr. [max 6 cr.]; S-N only; Every Fall, Spring & Summer)
Professional experience in horticulture firms or government agencies attained through supervised practical experience. Students evaluate reports, consult with faculty advisers and with employers. prereq: Masters of professional studies in horticulture student, completed internship contract, instr consent

HORT 6011. Plant Propagation. (; 4 cr.; A-F only; Every Fall)
Principles/techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures on principles, labs on practice of various propagating techniques. Reading/discussion of related primary literature. prereq: Master of Professional Studies or instr consent

HORT 8005. Supervised Classroom or Extension Teaching Experience. (; 2 cr.; S-N or Audit; Fall Even Year)
Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticultural Science; Plant Pathology; or Soil, Water, and Climate.

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HSG 2196. Work Experience in Housing Studies. (1-4 cr. (max 8 cr.; S-N only; Every Fall, Spring & Summer) Supervised work experience in business, industry, or government, related to student's area of study. Integrative paper or project. prereq: Plan submitted/approved by [adviser, internship supervisor], written approval of supervisor, instr consent

HSG 2463. Housing and Community Development. (3 cr.; A-F or Audit; Every Fall) Meaning/significance of neighborhood/community, residential neighborhood change, impact of housing on neighborhood conditions. Gentrification, displacement, racial segregation, suburbanization, community-based revitalization.


HSG 4160H. Honors Capstone Project. (2 cr. [max 4 cr.; A-F only; Every Fall & Spring) Individualizes honors experience by connecting aspects of major program with special academic interests. prereq: Housing studies honors

HSG 4193. Directed Study in Housing Studies. (1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent study in Housing Studies under tutorial guidance. prereq: Undergrad, instr consent

HSG 4196. Internship in Housing Studies. (1-1 cr. [S-N or Audit; Every Fall, Spring & Summer) Supervised work experience relating activity in business, industry, or government to the student's area of study. Integrative paper or project may be required. prereq: Completion of at least one-half of professional sequence, plan submitted/approved in advance by [adviser, internship supervisor], written consent of faculty supervisor, instr consent

HSG 4413. A Systems Approach to Residential Construction. (4 cr.; A-F or Audit; Every Spring) Dynamic/interrelated issues of energy, moisture control, indoor air quality in residential buildings. Emphasizes design, construction, and operational aspects to provide an energy efficient, durable structure, and healthy living environment. Interaction between moisture and wood products within building system. prereq: Upper div or instr consent

HSG 4461. Housing Development and Management. (4 cr.; A-F or Audit; Every Spring) Housing development process/financing. Management of multifamily housing. Emphasizes housing for low-income families/specific populations (e.g., older residents).

HSG 4465. Housing in a Global Perspective. (3 cr.; A-F or Audit; Spring Odd Year) Demographic changes, economic connections, and public policies for housing around the world. Sustainable development, rural-to-urban migration, land distribution, economic globalization, and civil conflict and war.

HSG 4467W. Housing and the Social Environment. (WF; 4 cr.; A-F or Audit; Every Fall) Housing choices in context of social environment. Emphasizes special needs of elderly, disabled, minorities, large families, female-headed households, and low-income households. Students conduct a post-occupancy evaluation of housing.

HSG 5170. Topics in Housing Studies. (1-4 cr. [max 32 cr.]; A-F or Audit; Every Fall, Spring & Summer) In-depth investigation of a single specific topic, announced in advance. prereq: Jr or sr or grad student

HSG 5193. Directed Study in Housing Studies. (1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent study in Housing Studies under tutorial guidance. prereq: Jr or sr or grad student

HSG 5463. Housing Policy. (3 cr.; A-F or Audit; Every Spring) Institutional/environmental settings that make up housing policy in the United States. Competing ideas about solving housing problems through public intervention in the market. Federal/local public sector responses to housing problems. prereq: [2401 or DHA 2401], [2463 or DHA 2463] or instr consent

HSG 5464. Understanding Housing: Assessment and Analysis. (3 cr.; A-F or Audit; Every Spring) Analytical design applied to analysis/presentation of housing/housing-related data. Use of Geographical Information Systems (GIS) to display, analyze, and communicate spatial data related to housing.

HSG 5467. Housing and the Social Environment. (4 cr.; A-F or Audit; Every Fall) Housing choices in context of social environment. Emphasizes special needs of elderly, disabled, minorities, large families, female-headed households, and low-income households. Students conduct a post-occupancy evaluation of housing.

HSG 5471. Housing Studies Certificate Seminar. (2 cr.; A-F or Audit; Spring Odd Year) Integrative seminar and "capstone" to Certificate program. Students prepare an individual career plan that focuses on application of housing studies to community/workplace. prereq: Admitted to Housing Studies Certificate Program

HSG 5481. Promoting Independence in Housing and Community. (3 cr.; A-F or Audit; Fall Odd Year) Housing, work, and community environments as they relate to aging and managing disabilities. Principles of home modification, universal design, livable communities, and assistive technology to support individuals/families.

HSG 5484. Rural Housing Issues. (3 cr.; A-F or Audit; Spring Even Year) Housing issues for non-metropolitan places, small towns, and rural areas. Housing needs and policy implications for rural residents. Economic development strategies for housing availability, adequacy, and affordability.

HSG 8170. Topics in Housing Studies. (1-3 cr. [max 6 cr.; A-F or Audit; Every Fall & Spring) In-depth investigation of topic announced in advance.

HSG 8180. Professional Seminar. (1-2 cr. [max 4 cr.; A-F or Audit; Every Fall & Spring) Professional development issues/trends.

HSG 8192. Readings in Housing Studies. (1-3 cr. [max 8 cr.; A-F or Audit; Every Fall, Spring & Summer) Independent study, review of books, and periodicals under tutorial guidance. prereq: instr consent

HSG 8193. Directed Study. (1-3 cr. [max 8 cr.; A-F or Audit; Every Fall, Spring & Summer) Directed study in housing studies. prereq: instr consent

HSG 8222. Plan B Master's Project. (3 cr.; S-N or Audit; Every Fall & Spring) Plan B master's project. prereq: [DHA or design master's] student, instr consent

HSG 8463. Housing: Race and Class. (3 cr.; A-F or Audit; Fall Even Year) Intersections between housing, race, and class. How housing reflects and helps to constitute racial/class difference. Housing as spatial expression of race/class. Case studies.

HSG 8467. Theoretical Perspectives in Housing Studies. (3 cr.; A-F or Audit; Every Spring) Investigation/evaluation of theories applied to housing. Levels of analysis. Links between theory, research questions, and methodological approaches. prereq: 5467 or DHA 5467 or instr consent

Human Factors (HUMF)

HUMF 5001. Foundations of Human Factors/Ergonomics. (3 cr.; A-F or Audit; Periodic Fall) Variability in human performance influenced by interaction with designs of machines/tools, computers/software, complex technological systems, jobs/working conditions.
organizations, sociotechnical institutions. Conceptual, empirical, practical aspects of human factors/ergonomics. prereq: Grad HumF major or minor or instr consent

HUMF 5193. Directed Study in Human Factors and Ergonomics. (1-4 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer) Independent study in human factors/ergonomics under tutorial guidance. prereq: instr consent


HUMF 5874. Service Design: Designing complex systems to improve service delivery. (4 cr.; A-F only; Every Spring) Real world service delivery problems. Perceptual/cognitive strengths/weaknesses addressed when designing systems. prereq: Grad student or instr consent

HUMF 8001. Special Topics: Human Factors/Ergonomics. (2-3 cr.; A-F only; Every Fall & Spring) Survey course in human factors/ergonomics. Interaction of performancebehavior with design factors in performance environment. Concepts, methods, empirical findings, different systems applications, current research. Topics vary. prereq: Grad HumF major or minor or instr consent

HUMF 8002. Proseminar in Human Factors/Ergonomics. (1 cr. [max 2 cr.]; A-F or Audit; Every Fall & Spring) Issues/concerns tailored to interests of faculty/students regarding human factors/ergonomics. Interdisciplinary science concerned with interaction of performancebehavior with design factors in performance environment. prereq: Grad HumF major or minor or instr consent

HUMF 8333. FTE: Master's. (1 cr.; A-F only; Every Fall, Spring & Summer) FTE: master’s. prereq: Master’s student, adviser consent, DGS consent

HUMF 8444. FTE: Doctoral. (1 cr.; A-F only; Every Fall, Spring & Summer) FTE: doctoral. prereq: Doctoral student, adviser consent, DGS consent

HUMF 8541. Decision Support Systems. (4 cr.; A-F or Audit; Every Fall & Spring) Students build a decision support system for a problem of their choice. How to identify appropriate problems. Styles of DSSs, evaluating their effectiveness. prereq: Undergrad-level computer programming course or instr consent; programming skills recommended

HUMF 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; A-F or Audit; Every Fall, Spring & Summer) Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr

HUMF 8777. Thesis Credits: Master’s. (1-18 cr.; A-F only; Every Fall, Spring & Summer) Thesis credits: master’s. prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HUMF 8794. Human Factors Research. (1 cr.; S-N only; Every Fall, Spring & Summer) Human factors research.

HUMF 8888. Thesis Credit: Doctoral. (1-24 cr.; A-F only; Every Fall, Spring & Summer) Thesis credit: doctoral, prereq: Max 18 cr per semester or summer; 24 cr required

Human Resources/Indus Rel (HRIR)


HRIR 3031. Staffing and Selection: Strategic and Operational Concerns. (2 cr.; A-F only; Every Fall, Spring & Summer) Introduction to theory/practice of staffing decisions. Recruitment, selection, promotion, demotion, transfer, dismissal, layoff, retirement. Staffing analyzed from strategic/operational perspectives. Legal issues.

HRIR 3032. Training and Development. (2 cr.; A-F only; Every Fall, Spring & Summer) Introduction to theory/research/practice of design/implementation/evaluation of employee training/development programs. Training as process for influencing individual/organizational outcomes.

HRIR 3041. The Individual in the Organization. (2 cr.; A-F only; Every Fall, Spring & Summer) Factors influencing individual work performance. Includes motivation, perceptual differences, career choice, psychological contracts, assumptions about workers/work, leadership/management, learning/skill development, openness to change. Examines evidence on current trends.

HRIR 3042. The Individual and Organizational Performance. (2 cr.; A-F only; Every Fall, Spring & Summer) Factors influencing group, team, and organizational performance. Systems that drive organizational success. Job design/organization structure, organization effectiveness measures, culture, group dynamics, teamwork, Power/influence.

HRIR 3051. Compensation: Theory and Practice. (2 cr.; A-F only; Every Fall, Spring & Summer) Introduction to compensation/reward programs in employing organizations. Theories of organizational/employee behavior used in design/implementation of pay programs. Design, implementation, job evaluation, salary surveys, skill-based pay, merit-based pay, other compensation programs.

HRIR 3071. Union Organizing and Labor Relations. (2 cr.; A-F only; Every Fall, Spring & Summer) Analysis of labor unions, employee associations, collective bargaining within framework of contemporary American legislation/policy. Forming/organizing labor unions. Management strategies/responsibilities, historical influences on policy/practice in private/public sectors.

HRIR 4100W. HRIR Capstone: Personal and Organizational Leadership. (WI; 4 cr.; A-F only; Every Fall, Spring & Summer) Leadership as important competency for HR professionals. Reflection/growth of personal leadership skills. Techniques, strategies, philosophies to develop leadership acumen of individuals within organizations. Leadership research, prereq: 3021, 6 HRIR credits. [CSOM or HRD junior or senior or dept consent]

HRIR 5000. Topics in Human Resources and Industrial Relations. (2 cr.; A-F only; Every Fall, Spring & Summer) Topics in human resources/industrial relations. prereq: HRIR MA student must register A-F, [3021, CSOM or HRD junior or senior or dept consent]

HRIR 5222. Managing Diversity. (2 cr.; A-F only; Every Fall, Spring & Summer) How to manage diverse workforce. Human resource practices examined with respect to diversity. How to incorporate diversity into decision making to enhance organizational performance. prereq: HRIR MA student must register A-F, [3021, CSOM or HRD junior or senior or dept consent]

HRIR 5252. Employment and Labor Law for the HRIR Professional. (2 cr.; A-F only; Every Fall, Spring & Summer)
HRIR 5642. Employee Performance Management: Strategies, Systems, and Skills. (2 cr.; Student Option; Every Fall)
Performance management strategies. Components of effective performance management systems. Alignment with HR strategy. Integration with HR practices. Measurement/appraisal. Feedback, coaching. Legal issues. prereq: HRIR MA student must register A-F, 3021, [CSOM or HRD junior or senior or dept consent]

HRIR 5442. Employee Performance Management: Strategies, Systems, and Skills. (2 cr.; Student Option; Every Fall)
Performance management strategies. Components of effective performance management systems. Alignment with HR strategy. Integration with HR practices. Measurement/appraisal. Feedback, coaching. Legal issues. prereq: HRIR MA student must register A-F, 3021, [CSOM or HRD junior or senior or dept consent]

HRIR 5654. Public Policies on Employee Benefits: Social Safety Nets. (2 cr.; Student Option; Every Fall)
Analysis of social safety nets through government-mandated employee benefits. Workers’ compensation, unemployment insurance, social security, health insurance. Rational for social safety nets. Administration/evaluation of existing programs. Effects on worker well-being/behavior of employers/workers. Need for reform. prereq: HRIR MA student must register A-F, ECON 1101, [CSOM or HRD junior or senior or dept consent]

HRIR 5655. Public Policies on Work and Pay. (3 cr.; Student Option; Every Spring)
Analysis of public policies regarding employment, unions, labor markets. Public programs affecting wages, unemployment, training, worker mobility, security, quality of work life. Policy implications of changing nature of work. prereq: HRIR MA student must register A-F, ECON 1101, [CSOM or HRD junior or senior or dept consent]

HRIR 5662. Personnel Economics. (2 cr.; Student Option; Every Fall & Spring)
Application of economic tools to issues in human resources/industrial relations. Incentives/imperfect information. Incentive-based pay. Promotions/tournaments. Human capital/training. Screening/signaling. Applications/limitations. prereq: Prereq: HRIR MA student must register A-F, ECON 1101, [CSOM or HRD junior or senior or dept consent]

HRIR 5992. Independent Study in Human Resources and Industrial Relations. (1-8 cr.; Student Option; Every Fall, Spring & Summer)
Individual readings or research topics. prereq: dept consent or instr consent

HRIR 6000. Graduate Topics in Human Resources and Industrial Relations. (3 cr.; A-F only; Every Fall & Spring)
Selected graduate topics of current relevance to human resource management/industrial relations. prereq: HRIR MA student or dept consent

HRIR 6001. Business Principles for the HRIR Professional. (4 cr.; A-F only; Every Fall)

HRIR 6009. Introduction to Human Resources and Industrial Relations. (3 cr.; A-F only; Every Fall)

HRIR 6111. Using Data and Metrics in Human Resources and Industrial Relations. (4 cr.; A-F only; Every Fall & Spring)
Theory/applications of methods of data analysis for using data in HRIR decision-making. Descriptive/inferential statistics. especially hypothesis tests/confidence intervals. Regression analysis. Identification of appropriate techniques. Avoiding unreliable inferences. Introduction to HRIR metrics. prereq: HRIR MA student or dept consent

HRIR 6114. Human Resource Information Systems. (2 cr.; A-F only; Every Fall & Spring)
Economic aspects of individual and group behavior in organizations. Individual and collective rationality, information, incentives, coordination problems, and contracts. Impacts on HRIR decisions and outcomes. Solutions and approaches to problems in organizations at micro and macro levels. prereq: dept consent

HRIR 6401. Organizational Theory Foundations of High-Impact HRIR. (2 cr.; A-F only; Every Fall & Spring)
Incentives and human capital in organizations. Social and psychological organization behavior/performance. Implications for designing HR practices in multinational organizations/international contexts. prereq: HRIR MA student or dept consent

HRIR 6301. Staffing, Training, and Development. (4 cr.; A-F only; Every Fall)
Developing plans for hiring to facilitate strategic goals, attracting talent, selecting best candidates, helping new employees onboard, developing knowledge/skills over time, keeping talented people. Evaluation of staffing, training, development effectiveness. prereq: HRIR MA student or dept consent

HRIR 6302. Staffing and Selection: Strategic and Operational Concerns. (2 cr.; A-F only; Every Fall & Spring)
Theory/practice related to staffing decisions. Recruitment, selection, promotion, transfer, dismissal, layoff, retirement in organizations. Legal environment in which staffing decisions are made. Staffing from strategic/organizational perspectives. prereq: 6301 or dept consent

HRIR 6303. Employee Training: Creating a Learning Organization. (2 cr.; A-F only; Every Fall)
Theory, research, practice related to design/implementation of employee training programs. Needs analysis. Training outcomes. Instructional design/training techniques. Role of employees, firm policies/practices in training. prereq: 6301 or dept consent

HRIR 6304. Employee Development: Creating a Competitive Advantage. (2 cr.; A-F only; Every Fall)
Career development/planning. Employee/mangement development techniques. Organizational/employee concerns related to socialization, cross-cultural assignments, change, engagement, performance management. prereq: 6301 or dept consent

HRIR 6402. HR Practices, HRM Strategy, and Organizational Performance. (2 cr.; A-F only; Every Fall)
Analysis of how different organizational practices/combinations thereof affect organizations in competitiveness, profitability, workplace safety, employment stability, wages. Coherence/consistency of system of organizational practices in relation to various contingencies. prereq: 6401 or dept consent

HRIR 6403. Comparative Organizations and HRM Systems. (2 cr.; A-F only; Every Spring)
Variations in organizational practices related to variations in ownership. Profit, nonprofit, government, cooperatives, economic systems, culture, technology, market structure. Organizational practices.
**HRIR 6441. Organizational Behavior Foundations of High-Impact HRIR.** (2 cr.; Every Fall & Spring)
Psychological aspects of individual/group behavior in organizations. Individual motivation, attitudes/job satisfaction. Leadership Organization design/culture. Impacts on HRIR decisions/outcomes. Solutions/approaches to problems in organizations at micro/macro levels. prereq: HRIR MA student or dept consent

**HRIR 6444. Employee Motivation, Engagement, and Well-being.** (2 cr.; A-F only; Every Spring)
Employee motivation, behavior, job attitudes. How they can be channeled into productive/unproductive behaviors/employee well-being. How work behavior is influenced by individuals, groups, features of organizations. prereq: 6441 or MBA 6110 or dept consent

**HRIR 6465. Leadership and Personal Development.** (2 cr.; A-F only; Every Fall, Spring & Summer)
Understanding effective leadership. Identifying personal leadership strengths/vulnerabilities through feedback. Developing leadership skills through practice as informed by theory/evidence. Exercises, role play. Creating customized leadership development plan. prereq: MBA or HRIR MA student or dept consent

**HRIR 6484. Management of Groups.** (2 cr.; A-F only; Every Fall, Spring & Summer)
Factors that influence performance, well-being of groups in organizations. Group dynamics, norms, culture, structure, leadership, decision-making, problem-solving. Managing dynamics, learning, performance, creativity of groups. Intergroup relations, incentives, effect of environment. Prereq: HRIR grad student

**HRIR 6501. Compensation and Benefits.** (4 cr.; A-F only; Every Spring)
Pay/benefit determination by labor markets, internal structures, individual performance. Alignment of business strategies with complementary compensation practices. Performance evaluation, technical skills, compensation analytics, pay negotiations. Illustrates concepts from labor economics, behavioral economics, psychology with routine interactive case studies. prereq: HRIR MA student or dept consent

**HRIR 6502. Compensation Theory and Applications.** (2 cr.; A-F only; Every Fall)
Relationship between economic/psychological theories, design/operation of compensation programs. Demographic influences on compensation program outcomes. Statistical analysis applied to pay program design/administration. Global pay variations. Current pay issues/controversies. prereq: 6501 or dept consent

**HRIR 6503. Employer-Sponsored Employee Benefit Programs.** (2 cr.; A-F only; Every Spring)
Design, administration, management of non-mandatory compensation benefit programs, including health/dental care plans/insurance, retirement plans, disability benefits. paid time off, accommodation benefits. Effects of providing benefits on workers’ incentives for performance. Psychological foundations of employee benefits. Role of benefits in employee recruitment/retention. prereq: 6501 or dept consent

**HRIR 6504. Executive Compensation.** (2 cr.; A-F only; Every Spring)
Course emphasizes understanding and appreciation of the complexities of executive compensation. Course will develop your knowledge of analysis and design of executive compensation, teach you to read and understand executive compensation disclosures, develop an awareness of trends, issues and challenges and give you an idea of how accounting, tax regulations, and other regulations shape executive compensation. Through the use of cases, class discussions and interactive experiential activities this course will develop your intellectual ability to critically examine, analyze, and deal with the complexity and ambiguity of executive compensation. prereq: A-F only; prereq MBA or HRIR MA student

**HRIR 6644. Topics in Labor Market Analysis.** (2-4 cr.; A-F only; Periodic Fall & Spring)
May include micro aspects of unemployment, implicit contracts/efficiency wages, investment in human capital, occupational choice, job search, job matching/turnover, migration, labor force participation, government program evaluation. prereq: 6001, 6111, [Business Admin PhD student or dept consent]

**HRIR 6701. Labor Relations and Collective Bargaining.** (4 cr.; A-F only; Every Spring)
Evolution of U.S. labor unions/public policy, bargaining environment/structure, goals/negotiations, contract administration/results, international comparisons, labor-management cooperation, newly emerging issues. prereq: HRIR MA student or dept consent

**HRIR 6702. Contemporary Issues in Labor Relations.** (2 cr.; A-F only; Every Fall)
Focused issues of particular concern to various actors in contemporary labor relations. Topics vary. prereq: 6701 or dept consent

**HRIR 6703. Dispute Resolution: Labor Arbitration.** (2 cr.; A-F only; Every Fall)
Arbitration to resolve grievances/impasses arising out of collective bargaining agreement’s administration/negotiation. Arbitration law/legal issues, procedures/practices, case presentation, management rights, discipline/discharge, evidence, contract language interpretation, remedies. Newly emerging approaches. prereq: 6701 or dept consent

**HRIR 6801. HRIR in Practice: Strategy, Execution, and Ethics.** (2 cr.; A-F only; Every Spring)
Types of strategies. Developing/executing HRIR strategies. Project management. Ethical frameworks, issues, considerations in HRIR. prereq: [6001, 6111, 6301, 6401, 6441, 6501, 6701] or dept consent

**HRIR 6802. Capstone Project.** (2 cr.; A-F only; Every Spring)
Application of related knowledge, concepts, methods to practical problem in human resources/industrial relations. Benchmarking of related best practices in research/practice. Full development, analysis, proposed recommendations for implementation or improvement of selected problem. prereq: [6001, 6111, 6301, 6401, 6441, 6501, 6701] or dept consent

**HRIR 6822. Field Project.** (4 cr.; Student Option; Every Fall & Spring)
Teams formulate/execute study of actual business problem faced by business, non-profit, or governmental organization, generally in Twin Cities. prereq: [6001, 6111, 6301, 6401, 6441, 6501, 6701] or dept consent

**HRIR 6992. Independent Study in Applied Human Resources and Industrial Relations.** (1-8 cr.; S-N only; Every Fall, Spring & Summer)
Individual readings, research topics, projects in applied settings. prereq: dept consent

**HRIR 8041. Design and Management of Organizations.** (4 cr.; Student Option; Every Fall)
Introduction to micro through macro organizational issues at individual, dyadic, group, organizational, and environmental levels; their implications for organizational design, control, coordination, and development. prereq: Econ 1101, Econ 1102, Psy 1001 or instr consent, grad HRIR major or dept consent; grad majors must enroll A-F only

**HRIR 8063. Human Resources and Organizational Performance.** (2 cr.; Every Fall)
Impact of human resource policies and practices on organizational productivity and effectiveness. Role of government, unions, and private sector institutions on organizational effectiveness. prereq: 8061 or instr consent, grad HRIR major or dept consent; grad majors must enroll A-F only

**HRIR 8333. FTE: Master’s.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: HRIR MA student, dept consent

**HRIR 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

**HRIR 8666. Doctoral Pre-Thesis Credits.** (1-5 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**HRIR 8801. Core Seminar: Fundamentals of Economic Analysis for Work and**
Organizations. (4 cr.; Student Option; Periodic Fall & Spring) Theoretical/empirical approaches in labor/organizational economics. Labor supply/demand. Monoply/institutional features of labor markets. Compensation, incentives sorting, training. Approaching topics/questions in work/organizations from economic perspective. prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8802. Core Seminar: Organizational Behavior. (4 cr.; Student Option; Periodic Fall) Major theories/current research on individuals in organizations. Job attitudes/motivation. Personality/individual differences. Team effectiveness. Antisocial/pro-social behavior. Emotions, Justice, prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8803. Core Seminar: Fundamentals of HR Research. (4 cr.; Student Option; Periodic Fall & Spring) Major theories/current research on human resources/industrial relations practices/institutions. Recruitment, selection, job performance. Training/development. Compensation. Other practices/institutions. prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8812. Core Seminar: Research Methods in Work and Organizations. (4 cr.; Student Option; Periodic Spring) Application in research projects. prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8820. Seminar: Special Topics in Work and Organizations Research. (2 cr. [max 12 cr.]; Student Option; Every Spring) Contemporary theoreies/research on specific topics in work/organizations. Topics vary. prereq: [Business Admin student or dept consent], grad majors must enroll A-F

HRIR 8825. Research Practicum/Workshop. (1 cr. [max 4 cr.]; S-N only; Every Fall & Spring) Experience in conducting research/other doctoral student activities.

HRIR 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

HRIR 8991. Independent Study in Human Resources and Industrial Relations. (1-8 cr.; A-F or Audit; Every Fall, Spring & Summer) Individual readings and/or research projects. prereq: instr consent

India (INDA)

INDA 1001. Beginning Hindi. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

INDA 1201. Beginning Kannada. (4 cr.; Student Option; Every Fall & Summer) Study abroad course.

INDA 3005. Intermediate Hindi. (4 cr.; Student Option; Every Fall, Spring & Summer) Course abroad course.

INDA 3008. Advanced Hindi. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

Industrial Engineering (IE)

IE 1101. Foundations of Industrial and Systems Engineering. (4 cr.; A-F only; Every Fall) History/development of industrial/systems engineering, operations planning, quality control, human factors, resource management, financial engineering, facility location/layout, optimization, probabilistic/stochastic models, simulation, project management. prereq: [MATH 1372 or equiv], CSE student

IE 2021. Engineering Economics. (4 cr.; A-F only; Every Fall) Cost/design process, cost estimation models, cash flow analysis, interest rate models, time value of money, evaluation of projects, internal rate of return, depreciation/income taxes, price changes/inflation, capital budgeting, decision making under uncertainty. prereq: [MATH 1372 or equiv], CSE student

IE 3011. Optimization I. (4 cr.; A-F only; Every Fall) Optimization models, data/solutions, linear programming, simplex method, duality theory, sensitivity analysis, network optimization models, integer programming. prereq: 1101, MATH 2374, MATH 2373, Upper Division CSE

IE 3012. Optimization II. (4 cr.; A-F only; Every Fall) Nonlinear programming, convexity, gradient method, constrained optimization, Lagrangian function, KKT condition, duality theory, dynamic optimization. prereq: 3011, ISyE major

IE 3041. Industrial Assignment I. (2 cr.; A-F or Audit; Every Spring) Industrial work assignment in engineering intern program. Evaluation based on student's formal written report covering semester's work assignment. prereq: ISyE upper division, registration in ME co-op program

IE 3521. Statistics, Quality, and Reliability. (4 cr.; Student Option; Every Fall, Spring & Summer) Random variables/probability distributions, statistical sampling/measurement, statistical inferencing, confidence intervals, hypothesis testing, single/multivariate regression, design of experiments, statistical quality control, quality management, reliability. prereq: MATH 1372 or equiv

IE 3522. Quality Engineering and Reliability. (4 cr.; A-F only; Every Spring) Quality engineering/management, economics of quality, Statistical process control, reliability, maintain ability, availability. prereq: 3521, MATH 2373, MATH 2374, ISyE major

IE 3553. Simulation. (4 cr.; A-F only; Every Spring) Introduction to techniques/tools of stochastic simulation. Applications from finance/insurance risk. Problems in inventory/queueing. prereq: CSCI 1113, 3521, ISyE major


IE 4041W. Senior Design. (WI; 4 cr.; A-F only; Every Spring) Work in small teams to address open-ended problem in industrial/systems engineering. Teams work with faculty or industry advisers. Project, midterm/final presentation, final report. prereq: 1101, 2021, 3012, 3522, 3553, 4011, 4511, 4541W, 3521, 4551, ISyE senior

IE 4043. Industrial Assignment II. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Solution of system design problems that require developing criteria, evaluating alternatives, and generating a preliminary design. Final report emphasizes design communication and describes design decision process, analysis, and final recommendations. prereq: 3041

IE 4044. Industrial Assignment III. (2 cr.; A-F only; Every Fall, Spring & Summer) Industrial work assignment in engineering co-op program. Evaluation based on student's formal written report covering semester work assignment. prereq: IE 4043, registration in ME co-op program

IE 4091. Independent Study. (1-4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Independent study of topic(s) involving industrial and systems engineering and operations research.

IE 4094. Directed Research. (1-4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Research with faculty adviser on a topic in industrial and systems engineering or...
IE 4096. Curricular Practical Training. (1 cr. [max 3 cr.]; A-F only; Every Fall, Spring & Summer) Industrial work assignment in engineering intern program. Evaluation based on student’s formal written report covering semester’s work assignment.


IE 4541W. Project Management. (WI; 4 cr.; A-F only; Every Fall) Introduction to engineering project management. Analytical methods of selecting, organizing, budgeting, scheduling, and controlling projects. Risk management, team leadership, program management. prereq: ISYE senior

IE 4551. Production and Inventory Control. (4 cr.; A-F only; Every Spring) Methods for managing production, inventory, supply chain operations. Demand forecasting, inventory control, production planning/scheduling, supply chain coordination, manufacturing flow analysis. Implications of emerging technologies, business practices, government regulations. prereq: 3011, 3521, ISYE major

IE 4894H. Senior Honors Thesis. (2 cr.; A-F only; Every Fall, Spring & Summer) Writing thesis under direction of ISYE faculty member.

IE 5080. Topics in Industrial Engineering. (1-4 cr.; Student Option; Periodic Fall & Spring) Topics vary each semester.

IE 5111. Systems Engineering I. (2 cr.; A-F or Audit; Every Fall) Overview of systems-level thinking/techniques in context of an integrated, design-oriented framework. Elements of systems engineering process, including lifecycle, concurrent, and global engineering. Framework for engineering large-scale, complex systems. How specific techniques fit into framework. prereq: CSE upper div or grad student

IE 5112. Introduction to Operations Research. (3 cr.; A-F or Audit; Every Fall & Spring) Survey of Operations Research models/methods in deterministic/stochastic settings. Linear programming, integer programming, networks, forecasting, Markov chains, and queuing systems. Examples from various application areas, such as systems engineering, logistics, design, and project management. prereq: [Math 2243 or Math 2373 or equiv], [one semester of probability or statistics], [CSE upper div or grad student]

IE 5113. Systems Engineering II. (4 cr.; A-F or Audit; Every Spring) Systems engineering thinking/techniques presented in 5111. Hands-on techniques applied to specific problems. Topics pertinent to effectiveness of design process. Practices and organizational/reward structure to support collaborative, globally distributed design team. prereq: 5111, a course on basic probability, [CSE upper div or grad student]

IE 5441. Financial Decision Making. (4 cr.; A-F only; Every Fall, Spring & Summer) Cash flow streams, interest rates, fixed income securities. Evaluating investment alternatives, capital budgeting, dynamic cash flow process. Mean-variance portfolio selection, Capital Asset Pricing Model, utility maximization, risk aversion. Derivative securities, asset dynamics, basic option pricing theory. prereq: CSE upper div or grad student

IE 5511. Human Factors and Work Analysis. (4 cr.; A-F or Audit; Every Fall) Human factors engineering (ergonomics), methods engineering, and work measurement. Human-machine interface: displays, controls, instrument layout, and supervisory control. Anthropometry, work physiology and biomechanics. Work environmental factors: noise, illumination, toxicology. Methods engineering, including operations analysis, motion study, and time standards. prereq: Upper div CSE or grad student

IE 5513. Engineering Safety. (4 cr.; A-F or Audit; Every Fall & Spring) Occupational, health, and product safety. Standards, laws, and regulations. Hazards and their engineering control, including general principles, tools and machines, mechanics and structures, electrical safety, materials handling, fire safety, and chemicals. Human behavior and safety, procedures and training, warnings and instructions. prereq: Upper div CSE or grad student

IE 5522. Quality Engineering and Reliability. (4 cr.; Student Option; Periodic Fall & Spring) Quality engineering/management, economics of quality, statistical process control design of experiments, reliability, maintainability, availability, prereq: [4521 or equiv], [upper div or grad student or CNR]

IE 5531. Engineering Optimization I. (4 cr.; Student Option; Every Fall) Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch/bound/linear programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning. prereq: Upper div or grad student or CNR

IE 5532. Stochastic Models. (4 cr.; Student Option; Every Fall) Introduction to stochastic modeling and stochastic processes. Probability review, random variables, discrete- and continuous-time Markov chains, queuing systems, simulation. Applications to industrial and systems engineering including production and inventory control. prereq: Undergraduate probability and statistics. Familiarity with computer programming in a high level language.

IE 5541. Project Management. (4 cr.; A-F only; Every Fall & Spring) Introduction to engineering project management. Analytical methods of selecting, organizing, budgeting, scheduling, and controlling projects, including risk management, team leadership, and program management. prereq: Upper div or grad student

IE 5545. Decision Analysis. (4 cr.; Student Option; Periodic Fall) Normative theories of decision making. Emphasizes structuring of hard decision problems arising in business and public policy contexts. Decision trees, expected utility theory, screening prospects by dominance, assessment of subjective probability, multiple attribute utility, analytic hierarchy process, benchmarking with data envelopment analysis, basics of game theory. prereq: 3521 or equiv

IE 5551. Production Planning and Inventory Control. (4 cr.; Student Option; Every Fall & Spring) Inventory control, supply chain management, demand forecasting, capacity planning, aggregate production and material requirement planning, operations scheduling, and shop floor control. Quantitative models used to support decisions. Implications of emerging information technologies and of electronic commerce for supply chain management and factory operation. prereq: CNR or upper div or grad student

IE 5553. Simulation. (4 cr.; Student Option; Periodic Fall & Spring) Discrete event simulation. Using integrated simulation/animation environment to create, analyze, and evaluate realistic models for various industry settings, including manufacturing/service operations and systems engineering. Experimental design for simulation. Selecting input distributions, evaluating simulation output. prereq: Upper div or grad student; familiarity with probability/statistics recommended

IE 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

IE 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

Students learn about the accounting system used by firms to measure and report their economic performance and financial position to external parties. Students analyze corporate financial reports to discover the impact of significant economic events. Discussions and cases focus on the role of financial reporting standards in informing financial intermediaries and contributing to the efficient allocation of capital in a modern economy.

IMBA 6110. Leading Others. (2 cr.; A-F only; Every Spring)
Achieving organizational goals by leading in ways that create motivation, engagement, commitment, positive social interactions, and job performance. Understanding and managing the characteristics of organizations, work groups, and individuals. The role of group dynamics, decision making, cooperation, conflict, and power in leading others.

IMBA 6120. Data Analysis & Statistics. (3 cr.; A-F only; Every Summer)
Concepts and principles of business statistics, data analysis and presentation of results. Topics: exploratory data analysis, basic inferential procedures, statistical process control, time series and regression analysis, and analysis of variance. These methods are selected for their relevance to managerial decision making and problem solving.

IMBA 6140. Managerial Economics. (3 cr.; A-F only; Every Summer)
How markets work, how positive economic rents (profits) are made, and how strategic behavior affects profits. Four major topical areas include market micro-structure, industrial structure, uncertainty, and incentives and firm governance.

IMBA 6210. Marketing Management. (3 cr.; A-F only; Every Summer)
Management of the marketing function; understanding the basic foundational marketing concepts and skills in strategy development and planning of operational and strategic levels pertaining to product offering decisions, distribution channels, pricing and communication.

IMBA 6220. Supply Chain Management. (3 cr.; A-F only; Every Fall)
An orientation to a supply chain paradigm. Domestic and global perspectives will be examined. Tools used in operations and optimization will be discussed in the context of linking consumers to technology providers and manufacturers on rapid and distributed global platform.

IMBA 6230. Financial Management. (3 cr.; A-F only; Every Summer)
Tools and concepts of financial management. Emphasizes use by financial and non-financial managers to measure creation of value within an organization. Evaluating businesses and business opportunities, identifying financial requirements and sources. Prereq: 6030

IMBA 6240. Data Analytics. (3 cr.; A-F only; Every Fall)
It is critical for contemporary managers to understand how the convergence of mobility, analytics, social media, cloud computing, and
Information Networking (INET)

INET 1001. Survey of Information Technology. (1 cr.; A-F or Audit; Every Fall & Spring)
Major classifications of information technology (IT). Business uses with focus on data, systems, networks. IT as career, including degrees, certifications, trends, opportunities, lifelong learning.

INET 3065. Computer Security for the Business Professional. (3 cr.; Student Option; Every Fall)
Computer security without technical jargon. Real-world examples and issues. Practices for safe, secure, and ethical computer use: virus, worm, and malware detection and elimination; antivirus and firewall selection; secure Internet purchasing; social networking sites; web page setup. prereq: Basic computer/Internet navigation skills; laptop with browser and MS Word or equivalent.

INET 3101. C Programming: Language and Applications. (2 cr.; A-F or Audit; Every Fall)
Syntax of C language. How other languages use C to interact with operating system. Debugging. Assignments build upon real-world programming examples to demonstrate how/where to use C. Scripting using languages such as UNIX shell and Perl. prereq: Programming experience or completed coursework in [Java or C+ or similar programming language]

INET 3102. Web Infrastructure. (2 cr.; A-F or Audit; Every Fall)
Infrastructure of the web, from its fundamental protocol (HTTP) to the organization and use of large-scale components and services. Cloud offerings (compute, storage, queuing) and platforms (AWS, Google Apps, Heroku). prereq: [3101, CSCI 2021] or equivalent IT experience

INET 3350. Special Topics in IT Infrastructure. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall)
Topics in information technology infrastructure.

INET 4007. Security II: Cloud Security. (4 cr.; A-F only; Every Fall)
An exploration of information security, how it applies to current networking technologies, and ways these technologies are used and consumed. New authentication methods for securing user data, such as telemetry, biometrics, and N factor authentication, will be surveyed. The course will also look at recent instances of information breaches that have put a spotlight on security, especially as they relate to cloud services, virtual environments, and Internet standards. No prerequisites. Basic knowledge of security issues and processes (detection, risk assessment, technology, secure design, business continuity, forensics, and legal aspects) is recommended. If you have taken INet 4165, you will be well prepared. If you are unsure about whether your knowledge is sufficient for success in this class, contact the instructor.

INET 4011. Networking I: Network Administration. (4 cr.; A-F or Audit; Every Fall)
A combination of networking theory (lecture and expert guest speakers) and application (lab work). Topics include network architecture, switching, routing, algorithms, protocols, infrastructure hardware, cable plant, security, and network management. prereq: CSCI 4211-Introduction to Computer Networks or equivalent networking knowledge and understanding.

INET 4021. Network Programming. (4 cr.; A-F or Audit; Every Fall)
Network/distributed programming concepts. Design using C, Java, and other higher level programming languages. Sockets, TCP, IP, RPC, streaming, CORBA, .NET, SOAP. Labs use UNIX/Linux and MS Windows operating systems. prereq: [CSCI 4211 or equiv professional experience or instr consent], 45 cr

INET 4031. System Administration. (4 cr.; A-F or Audit; Every Spring)
Integration of hardware, software and operational practice. Recap of machine architecture/organization. Complex technology issues, e.g., designing for scalability, configuring systems, archiving storage systems, monitoring/testing performance, executing recovery processes, managing software licenses. Lab based, Microsoft Server, and Linux OS. prereq: [CSCI 4061 or instr consent], 45 cr

INET 4032. Systems I: Storage. (4 cr.; A-F or Audit; Every Fall)
Information is one of the most valuable commodities of the 21st century. This course deals with the proper care and handling of enterprise data, whether the ?enterprise? is a large multinational corporation, a family home, or something in between. Topics include storage network architecture and storage system design. We will examine data storage technology; local, network, and distributed storage; storage history; data protection policy and implementation (including redundancy, replication, backup, and archive storage); security; compression and encryption; and emerging technologies like Big Data, Cloud storage, AWS, Google, and vCloud Air. prereq: Fundamental understanding of an operating system such as Microsoft Windows, Linux, or Apple OSX, in the areas of file systems, I/O, computer architecture, and basic administration.

INET 4041. Networking II: Emerging Technologies. (4 cr.; A-F or Audit; Every Fall)
Emerging networking concepts, technologies, and applications. Topics will evolve to reflect
current trends and expertise of the faculty, such as high speed networking, ATM, network security, wireless networks, multimedia, and electronic commerce. Each technology is considered for the underlying theory: the driving technological and business needs; the applications; the competing alternative technologies; and the design, implementation, and configuration of such systems. Case studies may be used to identify and analyze strategic issues and problems. Concepts and tools from this and previous ITI courses are applied to solve these problems and design realistic programs of action. Hands-on labs are included in industry speakers, tours, and demonstrations show practical applications. prereq: CSCI 4211 or equivalent, or professional experience, to comprise a basic understanding and knowledge of operating systems, computer architecture, and probability theory. Senior status preferred.

INET 4051. IT Infrastructure Operations. (WI; 3 cr.; A-F or Audit; Every Spring) Network, server, and database operations. Infrastructure architecture, organizational structure, security, metrics, vendor relations, outsourcing, capacity planning, strategic planning, budgeting. Online case study. prereq: [CSCI 4211 or instr consent], sr or instr consent.

INET 4061. Data Science I: Fundamentals. (3 cr.; A-F or Audit; Every Spring) Introduction to data science. Design strategies for business analytics: statistics basics, core data mining models, dimensional model, data pipeline, visualization. Hands-on labs with immemory analytics, relational database, and statistics software. prereq: [4707 or CSCI 4707 or instr consent], laptop.

INET 4082W. IT Infrastructure Projects and Processes. (WI; 3 cr.; A-F or Audit; Every Fall) This course presents an IT management perspective on business partnerships, project management and lifecycles, methodologies, processes, and organizational structures. It covers scope definition, resource estimating of time and cost, quality considerations, and metrics and risk analysis. Project management best practices are emphasized. All the concepts will be tied together with project simulation assignments. As a writing intensive designated course, it will spend significant time focusing on the writing process. Writing is crucial to this discipline because clear, accurate, and professional communication is essential to each element in the process of project management. The inability to write well, clearly, and in terms of specified audiences can, in the professional world, lead to not only misinformation between team members but also, and more largely, to a failure of projects and the companies and employees they represent. prereq: 45 cr recommended


INET 4121. DevOps II: Development Strategies. (4 cr.; A-F or Audit; Every Fall) DevOps (Development and Operations) is the term used to describe the collaboration of software engineers with the quality assurance and operations teams who test, deploy, and operate new systems. Its goal is to generate better and more continuous feedback regarding what is being developed, consumed, and operated, in order to increase delivery and deployment speed while maintaining system stability. Topics include configuration management, application deployment, monitoring of application and infrastructure performance, version control, and testing and building systems. Professional software engineering tools for the continuous integration tool chain are surveyed, and the Python language, combined with operating system and web functions, is used to develop tools for automating DevOps practices. (Though assignments are in Python, students with only Java or C++ should be able to learn Python quickly.) prereq: CSCI 4061 or operating system knowledge, basic knowledge of Python.

INET 4153. Introduction to Security: Policy and Regulation. (3 cr.; A-F or Audit; Every Fall) Explores the significant domestic and international regulatory demands faced by information technology management (IT) in business and industry, with attention to the effects of those regulations on IT infrastructure policy, technology management, and decision making. Several major U.S. and international regulatory documents will be studied. IT governance, risk and compliance management frameworks, best practices, and common approaches used to meet today’s regulatory challenges and support common business functions will be examined, as well as IT policies, procedures, and processes in highly regulated business sectors; experience with Windows/Internet; 45 semester credits


INET 4193. Directed Study. (1-4 cr.; max 12 cr.) A-F or Audit; Every Fall, Spring & Summer) Independent project. Topic arranged with and supervised by ITI faculty. prereq: ITI student, dept consent.

INET 4596. Internship. (1-3 cr.; max 6 cr.) A-F only; Every Fall, Spring & Summer) Hands-on work experiences in a professional IT setting. Students apply coursework, contribute to knowledge of best practices, and participate in career development. prereq: [ITI major or certificate student], [jr or sr], dept consent.

INET 4707. Introduction to Databases. (4 cr.; A-F or Audit; Every Fall) Concepts, data models. Case studies, data manipulation languages, logical data models, database design, facilities for database security/integrity, applications. prereq: CSCI 4061, at least 45 cr completed; CSCI majors contact CSci Dept before registering.

INET 4709. Data Management I: Fundamentals. (3 cr.; A-F or Audit; Every Spring) This course provides insight into concepts and techniques for installing and managing highly scalable relational databases: storage, protection, structure, tuning, and access. Students will learn how to integrate business requirements into specific database policies and procedures. Topics include selection of hardware and software components, backup and disaster recovery, performance metrics, high availability, and monitoring techniques. Hands-on lab exercises will utilize core concepts covered in lecture: installation of MySQL, backup and recovery, import and export, security, transaction management, data partitioning, and database replication. prereq: INET/CSCI 4707 and CSCI 4061, or professional experience with SQL and basic operating systems.

INET 4710. Big Data Architecture. (3 cr.; A-F or Audit; Every Fall) Factors that ensure success in Big Data initiative. Big Data definitions/architecture concepts, strategies, model development, prereq: [4031, 4709, familiarity with operating systems/databases] or instr consent.

INET 4711. Big Data Implementation. (3 cr.; A-F or Audit; Every Spring) Assess challenges involved in fully implementing big data system using open source technologies. Includes hands-on lab exercises to design and construct cloud-based data platform with appropriate capabilities, components, interfaces. Tool/technology evaluation, data services, cloud provisioning, hardware sizing, auditing, monitoring, security, data content. prereq: 4031, 4709, 4710, familiarity with operating systems, databases, and basic programming (UNIX, Java or equivalent). Knowledge of Ruby on Rails highly recommended.

Information and Decision Science (IDSC)


IDSC 3101. Introduction to Programming. (2 cr.; A-F only; Every Fall & Spring) Computer programingms used by companies to build sophisticated information systems. Variables, control structures. Data structures such as arrays/collections. Programming style, graphical user interfaces (GUIs).

IDSC 3102. Intermediate Programming. (2 cr.; A-F only; Every Fall & Spring) Programming concepts to develop large, full-featured applications. Object-oriented programming, database applications, Web applications. Style, performance, UI design. prereq: 3101 or [equiv experience, instr consent]


IDSC 3202. Analysis and Modeling for Business Systems Development. (2 cr.; A-F or Audit; Every Fall & Spring) Improving/automating key business processes in manufacturing and service industries. Roles of business management and MIS. Selecting business process opportunities, business process analysis, process modeling of work/data flow, decomposition, software tools. Traditional/object analysis methods. prereq: 3001

IDSC 4401. Information Security. (2 cr.; A-F only; Every Spring) Concepts/issues of security and data integrity threats that undermine utility, robustness, and confidence in electronic technologies in facilitating business transactions. prereq: 3001

IDSC 4411. Accounting Information Systems and IT Governance. (2 cr.; A-F only; Every Spring) Information technology audit function, internal control, audit process, smart operations, network security, systems development life cycle, enterprise resource planning risk, compliance issues. IT governance, business continuity, frameworks/methodologies. Lectures, case studies, real-world examples. prereq: 3001

IDSC 4421. Financial Information Systems and Technologies. (2 cr.; A-F or Audit; Every Fall, Spring & Summer) IS in financial services, corporate financial operations, and investment management. Traditional vs electronic financial markets, computerized trading, digital sources of financial data, electronic money, decision technologies in financial services. Software development skills for personal investments. prereq: 3001

IDSC 4431. Advanced Database Design. (2 cr.; A-F only; Every Spring) Reviews ER/relational modeling and normalization, then focuses on fact modeling (ORM) to produce advanced richer business data models. "Flipped" class, fully online, including all lectures & final exam. Weekly in-class review session is recorded and online for questions, discussion, and results of assignments & quizzes. prereq: 3103 or CSCI 4707 or CSCI 5707 or instr consent

IDSC 4440. Electronic Commerce. (2 cr.; A-F or Audit; Periodic Fall, Spring & Summer) Issues/trends in applying e-commerce initiatives. Technological infrastructure, revenue models, marketing, business-to-business strategies, online auctions, legal and ethical aspects, hardware/software, payment systems, security. Conceiving, planning, building, and managing e-commerce initiatives. prereq: 3001

IDSC 4455. Web 2.0: The Business of Social Media. (2 cr.; A-F only; Every Spring) Business use of social media technologies. Blogs, wikis, online social networks. Readings, forum discussion, case analyses. How technologies engage consumers, market products or services, benefit from open innovation, foster collaboration among employees. prereq: 3001


IDSC 6040. Information Technology Management. (2 cr.; A-F only; Every Fall, Spring & Summer) Management of information systems, information technology (IT) in global organization. Strategic uses of IT. Alignment of IT, organizational strategy, internet/Web technologies, e-commerce customer services. Integration of e-business applications, interorganizational systems, systems implementation. Management of information as resource. Lecture, case analysis, classroom discussion. Prereq MBA student.

IDSC 6050. Information Technologies and Solutions. (2 cr.; A-F only; Every Spring) Current/emerging technologies in modern Net-enhanced organizations. Internet/Web technologies, including Internet fundamentals, Web communications, Web 2.0/social media, information security, cloud computing, IT-driven innovation, emerging IT trends.

IDSC 6401. Decision Technologies. (2 cr.; A-F only; Every Fall & Spring) Traditional vs. Web-based decision support. Focuses on business-to-consumer (B2C) applications. Expert systems, neural networks,
IDSC 421. Financial Information Systems and Technology. (2 cr.; A-F only; Every Spring)

IDSC 6421. Financial Information Systems and Technology. (2 cr.; A-F only; Every Fall & Spring)

IDSC 6435. Business Process Excellence. (2 cr.; A-F only; Every Fall)
Practical data-analytic thinking/decision making. Apply techniques in different settings, Web data, best practices in data visualization. Hands-on experience with software. prereq: MBA student

IDSC 6465. Global Sourcing of IT and IT Enabled Services. (4 cr.; A-F only; Every Spring)
Outsourcing IT and IT enabled services. Source business/knowledge processes: finance/accounting, human resources, engineering services, data analytics. Strategic global sourcing planning/implementation. Management of offshore service relationships. prereq: [6040 or 6050 or MBA 6240], MBA student

IDSC 6471. Knowledge Management. (2 cr.; A-F only; Every Fall)

IDSC 6481. Managerial Decision Making. (2 cr.; A-F only; Every Fall)
Frameworks for making decisions as a manager, knowledge worker, or individual. How policies area adopted. Poor decision making. Learning from mistakes. Bounded rationality, system thinking, concepts of learning. prereq: MBA student

IDSC 6480. Advanced Topics in MIS. (3 cr.; A-F only; Periodic Fall & Spring)
Discussion and analysis of topics and developments in managing information systems. prereq: [15 cr.], MBA student

IDSC 6491. Independent Study in Information Systems. (1-4 cr.; A-F only; Periodic Fall & Spring)
Independent study in Information Systems. prereq: instr consent

IDSC 8003. Accounting and Information Systems. (4 cr.; A-F only; Every Fall)
IS/IT infrastructure assessment methods, technology solutions, management issues. Digital data sources. Systems design in accounting and financial reporting information systems. Internal control requirements of Sarbanes-Oxley Act of 2002. Experiential learning, hands-on use of accounting enterprise software other packages. prereq: IDSC 3001 or equivalent

IDSC 8511. Conceptual Topics and Research Methods in Information and Decision Sciences. (3 cr.; Student Option; Every Fall)
Relationships to underlying disciplines; major research streams; seminal articles, survey literature, and major researchers. Provides framework for organizing knowledge about information and decision sciences. prereq: instr consent

IDSC 8521. System Development. (3 cr.; Student Option; Spring Even Year)
Why it is hard to develop efficient/effective information systems, what can be done to improve situations. Defining efficiency/effectiveness in development process and in systems. Producing/evaluating artifacts (constructs, models, methods, tools) that enable more efficient/effective information systems to be developed. prereq: Business admin PhD student or instr consent

IDSC 8531. Organizational Theory and Research in Information Systems. (3 cr.; A-F only; Spring Even Year)
Introduction, adoption, use/exploitation of information systems in organizations. Critically examine empirical work. Formulate research questions. Conduct research. prereq: PhD student in Business Administration

IDSC 8541. Introduction to Economics of Information Systems. (3 cr.; A-F only; Spring Odd Year)
Classical research questions. Methods/findings that form backbone of economics of IS. Online auctions, electronic markets, outsourcing, human capital issues, prereq: PhD student in Business Administration or instr consent

IDSC 8721. Behavioral Decision Theory. (3 cr.; Student Option; Periodic Fall & Spring)
Traditional/current research. Major models/methodologies. Issues of preference, judgment, and choice under conditions of certainty/uncertainty. Seminar format. prereq: Business admin PhD student or instr consent; offered alt yrs

IDSC 8722. Heuristic Decision Making. (2 cr.; Student Option; Periodic Fall)
How decisions are made, how knowledge is stored/used, how knowledge of variability/feedback influence decisions. Decisions at strategic, operational, individual level. Exceptional performance, pathologies of decision making. Basis for "best practice." How knowledge is managed in decisions, decision failure. Folly, normal accidents, decision problems in which individuals manipulate information to influence/deceive others. prereq: Business Admin PhD student or instr consent; offered alt yrs

IDSC 8800. Research Seminar in Information and Decision Sciences. (4 cr.; A-F only; Periodic Fall & Spring)
Topics, which vary by semester, are selected from new areas of research, research methods, and significant issues. prereq: Business admin PhD student or instr consent

IDSC 8801. Research Seminar in Information and Decision Sciences. (2 cr.; A-F only; Periodic Fall & Spring)
New areas of research, research methods, issues. prereq: Business Admin PhD student or instr consent

IDSC 8892. Readings in Information and Decision Sciences. (1-8 cr.; A-F only; Periodic Fall & Spring)
Readings useful to a student's individual program and objectives that are not available
through regular courses. prereq: Business admin PhD student or instr consent

IDSC 8894. Graduate Research in Information and Decision Sciences. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer)
Individual research on an approved topic appropriate to student's program and objectives. prereq: Business admin PhD student or instr consent

Infrastructure Sys Mgmt Eng (ISME)

ISME 5101. Project Management. (3 cr.; A-F or Audit; Every Fall)
Broad areas in project management/leadership. Emphasizes practical understanding of business/engineering project management. Project planning, scheduling, controlling. Budgeting, staffing, task/cost control. Communicating with, motivating, leading, managing conflict. prereq: Open to general grad students but with instr consent

ISME 5104. Construction Estimating. (2 cr.; A-F or Audit; Periodic Fall)
Methods for quantity take-offs. Identification of resources for price/availability information. prereq: ISE grad student

ISME 5105. Computer Applications II. (1 cr.; A-F or Audit; Periodic Fall)
Application features in Excel, Visual Basic, and Web Authoring. Data reduction, data presentation, interactive Web calculations. Student projects. prereq: ISE grad student

ISME 5112. Infrastructure Systems Engineering Management. (2 cr.; A-F or Audit; Every Spring)
Managing public works infrastructure. Case studies of decision making in environment of conflicting interests. prereq: Open to advanced master's students

ISME 5113. Computer Applications in Infrastructure Systems Engineering. (2 cr.; A-F or Audit; Every Fall & Spring)
Advanced application of computer tools/methods in infrastructure engineering problems. Spreadsheets Visual Basic programming, HTML, JAVA script. prereq: ISE grad student

ISME 5114. Pavement Management, Maintenance, and Rehabilitation. (3 cr.; A-F or Audit; Periodic Fall)

ISME 5201. Pavement Management, Maintenance and Rehabilitation. (2 cr.; A-F or Audit; Periodic Fall & Spring)

ISME 5202. Traffic Engineering Management. (2 cr.; A-F or Audit; Periodic Spring)
Identification and effective use of traffic control devices. Automated method of characterizing/assessing traffic flow. Evaluation/improvement of geometric features. prereq: ISE student

ISME 5301. Bridge Management Maintenance and Rehabilitation. (2 cr.; A-F or Audit; Periodic Fall)

ISME 5302. Critical Infrastructure Security and Protection. (2 cr.; A-F only; Every Spring)
Security challenges of protecting critical infrastructure, facilities, and built environment. Security, agility, and robustness/survivability of large-scale critical infrastructure that face new threats and unanticipated conditions.

ISME 5401. Water Distribution Systems. (1 cr.; A-F or Audit; Periodic Fall)
Components/design of water distribution systems. Methods of evaluation/management. Maintenance/rehabilitation techniques. prereq: ISE grad student

ISME 5402. Storm Water Management. (2 cr.; A-F or Audit; Periodic Spring)
Components/design of storm water collection systems. Methods of evaluation/management. Maintenance/rehabilitation techniques. prereq: ISE grad student

ISME 5403. Water Treatment Systems. (2 cr.; A-F or Audit; Periodic Fall)
Components/design of water treatment systems. Evaluation/management methods. Maintenance/rehabilitation techniques. prereq: ISE grad student

ISME 5500. Public Interactions. (1 cr.; A-F or Audit; Every Fall)
Techniques for effective public communication. How to run public hearing. Resources for publishing public notices. Sequence course in three parts. prereq: Advanced grad student or open to general grad students with instr consent

ISME 5503. Financial Management in Public Organizations. (2 cr.; A-F or Audit; Every Fall & Spring)
Design, installation, and use of accounting/control systems in public organizations. Public accounting standards/practices, financial administration, financial reporting, debt management, budgeting, and contract/procurement management systems. Lecture, discussion, case analysis. prereq: ISE student

ISME 5504. Construction Law and Ethics. (2 cr.; A-F or Audit; Every Fall)
Ethical framework for responsible management of public works projects. Moral leadership, trust in public/private organizations, quality control. prereq: ISE student

ISME 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall & Spring)
FTE: Master's Prerequisite Master's student, adviser approval, DGS approval.

Innovation Studies (IS)

IS 5001. Introduction to Innovation Studies. (1-4 cr.; A-F or Audit; Periodic Fall)
Key concepts/models from sociology, futures study, and business. Innovative, team leadership strategies. Definition/application of just-in-time concept. Life-long self-improvement skills.

IS 5002. Final Project for Innovation Studies. (1-4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Either an internship in an organization or a hands-on study project on a contemporary issue or problem. Students apply expertise/ideas to a real-world situation. prereq: Completion of IS requirements, dept consent

IS 5100. Innovation Studies Seminar. (1-4 cr.; max 24 cr.; A-F or Audit; Every Fall, Spring & Summer)
Innovation studies topics.

IS 5950. Special Topics. (1-4 cr.; max 12 cr.; A-F or Audit; Every Fall, Spring & Summer)
Special interdisciplinary topics. prereq: dept consent

IS 5993. Directed Studies. (1-4 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: dept consent

Insurance and Risk Management (INS)

INS 4100. Corporate Risk Management. (2 cr.; Student Option; Every Fall & Spring)
Theory applied to corporate risk management and insurance practices. Identification,
Incorporate various sources of knowledge/content to provide deepening perspective on multiple layers of diversity/counseling individuals with substance use/co-occurring mental health disorders. Aspects of various cultural experiences (i.e., race/ethnicity, class status, sexual/affectional orientation, gender, religion) as they impinge upon client, counselor, counseling relationship, prereq: ADDS 5081 or equivalent

IBH 6041. Prolonged Exposure Therapy for PTSD. (2 cr.; A-F only; Every Spring) Advanced practice methods and interventions for working with trauma and co-occurring disorders. Emerging and evidence-based practices presented, practiced, and applied.

IBH 6051. Advanced Group Practice. (2 cr.; A-F only; Every Fall & Spring) Trends/developments in group counseling. Evidence-based group processes/techniques for individuals with chronic/persistent mental illness, substance use disorders, co-occurring disorders. Field placement component.

IBH 6061. Applied Advanced Diagnostics I. (2 cr. [max 3 cr.]; A-F only; Every Fall & Spring) Diagnosing individuals with chronic/persistent mental health disorders, personality disorders, associated substance use disorders. Case studies, field placement with multidisciplinary team prereq: IBH student, ADDS 5091 and IBH 6011

IBH 6062. Applied Advanced Diagnostics II. (2 cr.; A-F only; Every Fall, Spring & Summer) Applied Advanced Diagnostics II prereq: 6061. must be admitted IBH student

IBH 6071. Advanced Professional Issues. (3 cr.; A-F only; Every Fall & Spring) Develop ethical decision model that incorporates five moral principles. ACA/NAADAC codes of ethics/statutes/regularations that apply to mental health/substance abuse counseling. Case studies.


IBH 6091. Intersection of Career and Mental Health. (2 cr.; A-F only; Every Fall & Spring) Vocational choice theory, lifestyle choices, occupational/educational information, career exploration, assessment tools. Diverse populations/ethical standards. Employment/career concerns for persons with mental health, substance use, previously incarcerated.

IBH 6101. Family Dynamics and Therapy. (3 cr.; A-F only; Every Fall & Spring) Family dynamics/life cycle, communication patterns, multi-generational patterns. Systems theory/interventions for appropriate use of family resources to enhance intervention, treatment, family/individual functioning/maintenance processes.

IBH 6111. Research and Evaluation Methods. (3 cr.; A-F only; Every Fall & Spring) Models of program evaluation. Use of research findings for program modification. Elements of research process, types of designs, program evaluation. Ethical considerations of research. Measurement concepts.

IBH 6112. Mental Health and Addiction Management and Administration. (2 cr.; A-F only; Every Fall, Spring & Summer) State/regulatory standards/rules/statutes. Health care financing/reimbursement. prereq: ADDS 5091 or ADDS 4001

IBH 6121. Professional Seminar 2. (1 cr.; S-N only: Every Fall, Spring & Summer) Scope/importance of portfolio/presentation as professional. Discussion/practice will focus on clinical competencies to be included on students professional portfolio. Professional ethics, clinical care, theoretical framework, diversity. Prepares students for IBH Internship experience by reviewing requirements, processes, interview/some skills. State licensing requirements, prereq: Must have completed minimum of 40 credits in IBH program


IBH 6226. Introduction to Vital Involvement Practice (VIP). (1 cr.; A-F only; Every Summer) Students will understand how to utilize VIP principles to help empower clients in living their everyday lives in ways that achieve personal goals, promote health, exercise strengths, prevent problems, and contribute to the community.

IBH 6227. Supervision Models and Methods in Integrated Behavioral Health. (3 cr.; A-F only; Every Fall, Spring & Summer) Supervision Models/Methods in Integrated Behavioral Health. prereq: Must be admitted IBH student

IBH 6228. Mental Health and Addiction Program Administration. (2 cr.; A-F only; Every Fall, Spring & Summer) Most often, good employees or strong counselors are promoted into leadership positions with an assumption that a good clinician is a good leader. This course will review strategies to develop strong leaders along with understanding of the importance of regulations and accreditation standards in creating consistent practice and consistency across all treatment programs. Students will obtain an introductory understanding of leadership skills and begin using evidence-based leadership. Students will review and apply Department of Human Service Statutes
IBH 6229. Crisis Assessment and Management. (2 cr.; A-F only; Every Fall, Spring & Summer) Observe/participate with five different levels of crisis intervention settings. Chemical dependency evaluation, hospital emergency department, mental health urgent care, mental health clinic, community mobile crisis intervention. prereq: [AddS 5091 or AddS 4001], dept consent, background check

IBH 6230. Clinical Application in Prolonged Exposure Therapy. (3 cr.; A-F only; Every Fall, Spring & Summer) Clinical Application in Prolonged Exposure Therapy. prereq: 6031, 6041, must be admitted IBH student, dept consent

IBH 6231. Management of Eating Disorders. (3 cr.; Student Option; Every Fall & Spring) Etiology, occurrence, course, treatment, prevention of eating disorders from multidisciplinary perspective. Roles/responsibilities of eating disorder treatment team members of varying types across various treatment milieus.

IBH 6910. Topics in Integrated Behavioral Health. (1-4 cr. [max 32 cr.]; A-F only; Every Fall, Spring & Summer) Topics in Integrated Behavioral Health.

IBH 6950. Topics in Multicultural Practice. (1-3 cr. [max 18 cr.]; A-F only; Periodic Fall, Spring & Summer) Topics in multicultural practice.

IBH 6993. Directed Study in Integrated Behavioral Health. (1-3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Directed study. prereq: Must be admitted IBH student, dept consent

IBH 6994. Directed Research in Integrated Behavioral Health. (1-3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Directed research. prereq: Must be admitted IBH student, dept consent

IBH 6996. Internship for Integrated Behavioral Health. (1-4 cr. [max 16 cr.]; S-N only; Every Fall, Spring & Summer) Culuminating field experience of MPS-IBH. On-site placement in public or private mental health, addictions/integrated treatment setting. Bridge between training/professionalism. prereq: dept consent

IBH 8002. Portfolio Seminar. (1 cr.; S-N only; Every Fall, Spring & Summer) Structured environment that ensures completion of well written/on-time IBH Portfolio. prereq: 6121

ICP 3093. Directed Study. (1-15 cr.; A-F only; Every Fall, Spring & Summer) Independent, directed study. prereq: instr consent

ICP 3101W. Inter-College Program Proposal Development. (WI; 2 cr.; A-F only; Every Fall & Spring) Write proposal of study/formulate plan of courses through which to complete degree. prereq: ICP student or instr consent

ICP 3201. Career and Internship Preparation. (1 cr.; A-F only; Every Fall & Spring) Self exploration, networking, industry research, job/internship search, resumes, cover letters, interviewing, salary negotiation, goal setting. prereq: Soph orjr orsr or grad student

Interdepartmental Study (ID)

ID 1201. Major and Career Exploration. (2 cr.; Student Option; Every Fall & Spring) Students learn about their unique interests, skills, personality, values. Using this information in choosing major/career. Importance of internships, community service, other practical experiences. prereq: Fr or soph

ID 3201. Career Planning. (2 cr.; Student Option; Every Fall, Spring & Summer) For juniors and seniors. A practical introduction to integrating individual talents, values, interests, and experience with critical career search strategies. Emphasis on understanding the marketplace, internet research, strategic resume writing, networking, and interviewing.

ID 3205. Law School Exploration. (2 cr.; Student Option) Assessment of fit between individual, law school, and career field of law. Off-campus informational interviews, site visits.

ID 3208. Internship Reflection: Making Meaning of Your Experience. (1 cr.; Student Option; Every Fall & Spring) Allows students to examine, reflect on, and construct meaning from their internship experience through self assessment of personal and career needs and goals, examination of what it means to be a professional? and operate within professional environments, evaluation of performance and accomplishments, articulation of knowledge and skills via effective resume writing. prereq: dept consent

ID 3574. HECUA Off-Campus Study Programs: Civil Rights Movement: History and Consequences. (DSJ, HIS; 6 cr.; A-F only; Every Summer) May-session course. History/practice of civil rights movement in the United States. Philosophy, practice, and historical implications of the movement.

ID 3581. HECUA: Arts for Social Change - Art and Culture in Political, Social, Historical Context. (AH; 4 cr.; Student Option; Every Spring) Arts, popular culture, social change. Interdisciplinary field study, seminar work, internship. prereq: concurrent registration is required (or allowed) in 3582, 3583, dept consent

ID 3582. HECUA: Arts Practice - Social Justice Theory and Practice in the Field. (DSJ; 4 cr.; Student Option; Every Spring) Arts, popular culture, social change. Interdisciplinary field study, seminar work, internship. prereq: concurrent registration is required (or allowed) in 3581, 3583, dept consent

ID 3583. HECUA: Arts for Social Change Internship Seminar. (CIV; 8 cr.; Student Option; Every Spring) Arts, popular culture, social change. Interdisciplinary field study, seminar work, internship. Offered spring semester. prereq: concurrent registration is required (or allowed) in 3581, concurrent registration is required (or allowed) in 3582

ID 3595W. HECUA Off-Campus Study Program: Agriculture and Justice Agroecosystems in Context. (CIV,WI; 4 cr.; Student Option; Every Spring) Through interdisciplinary/field-based methods, including farm stay/subsequent creation of “whole farm plan,” students learn theory/practice of fundamental agroecological principles. Define, assess, interpret factors that contribute to greater sustainability of agroecosystems. prereq: instr consent

ID 3596. HECUA Off-Campus Study Program: Agriculture and Justice - Justice and the U.S. Food System. (4 cr.; Student Option; Every Spring) Complexities of food system. Roots of land ownership/labor practices in U.S., unpacking economics/policies. Considering one’s own role in creating sustainable future. Participatory Action Research projects place students at organizations working for food justice in Twin Cities. prereq: concurrent registration is required (or allowed) in 3595, dept consent

ID 3597. HECUA Off-Campus Study Program: Agriculture and Justice Food Systems Internship (4 cr.; Student Option; Every Spring & Summer) Minimum of 160 hours on substantive, mission-related projects at community-based organizations dedicated to food justice/food sovereignty in Twin Cities/greater Minnesota. Through written assignments/critical reflection, HECUA faculty link internship back to theoretical frames. prereq: 3555, 3556, instr consent

ID 3598. HECUA Off-Campus Study Program: Agriculture and Justice - Food Systems Internship (6 cr.; Student Option; Every Spring & Summer) Minimum of 300 hours on substantive, mission-related projects at community-based organizations dedicated to food justice/food sovereignty in Twin Cities/greater Minnesota. Through written assignments/critical reflection, HECUA faculty link internship back to theoretical frames. prereq: dept consent

ID 3960. Interdepartmental Study Topics. (3 cr.; A-F only; Periodic Summer)
Selected interdepartmental topics not covered in regular courses.

ID 3993. Directed Study. (1-4 cr. [max 32 cr.]; Student Option; Every Fall & Spring) Guided individual reading or study. prereq: instr consent, dept consent, college consent.

**Interdisciplinary Archaeologic (INAR)**

INAR 8200. Directed Readings. (1-7 cr.; Student Option; Every Fall & Spring) tbd prereq: InAR grad major or instr consent

INAR 8300. Directed Research. (1-7 cr.; Student Option; Every Fall, Spring & Summer) tbd prereq: InAR grad major or instr consent

INAR 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

INAR 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

INAR 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

INAR 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

INAR 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

**Interdisciplinary Medicine (INMD)**

INMD 6001. Directed Study I. (0-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Directed study.

INMD 6002. Directed Study II. (0-6 cr.; P-N or Audit; Every Fall, Spring & Summer) tbd

INMD 6003. Independent Study. (0-6 cr.; P-N or Audit; Every Fall, Spring & Summer) Independent study/remediation course.

INMD 6120. Foundations of Preventive Medicine. (2 cr.; P-N or Audit; Every Summer) An introduction to the determinants and distribution of disease, the prevention of disease and promotion of health, medical research design and statistical analysis of data, and important aspects of health care delivery and public health. prereq: enroll med


INMD 6555. The Healer's Art: Awakening the Heart of Medicine. (0-1 cr.; P-N only; Every Spring) Developing a sense of personal/professional satisfaction from and ongoing commitment to the profession. prereq: Registered medical student

INMD 6755. Volunteer Community Outreach Experience. (0 cr.; No Grade Associated; Every Fall, Spring & Summer) The purpose of volunteer community outreach experiences are to provide medical trainees an opportunity to observe and/or assist in the provision of health care services to populations that are diverse in age, ethnicity, social environment, and need, as well as to experience unique clinical settings outside of the Medical School.

INMD 6802. Science of Medical Practice. (7 cr.; P-N only; Every Fall) Genetic and biochemistry workings of the human body as they relate to normal daily function, including nutritional aspects.

INMD 6803. Essentials of Clinical Medicine Part 1. (5 cr.; P-N only; Every Fall) Introduction to clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of “doctoring.” Students’ first clinical experiences.

INMD 6804. Essentials of Clinical Medicine Part 2. (3 cr.; P-N only; Every Spring) Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of “doctoring.” Students’ first clinical experiences.

INMD 6805. Essentials of Clinical Medicine Part 3A. (5 cr.; P-N only; Every Summer) Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of “doctoring.” Students’ first clinical experiences.

INMD 6806. Essentials of Clinical Medicine Part 3B. (5 cr.; P-N only; Every Fall) Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of “doctoring.” Students’ first clinical experiences.

INMD 6807. Essentials of Clinical Medicine Part 3C. (5 cr.; P-N only; Every Spring) Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of “doctoring.” Students’ first clinical experiences.

INMD 6808. Human Health & Disease - Cardio & Resp. (4 cr.; P-N only; Every Fall) Pathophysiology of cardio-respiratory system, including infectious disease, pathologic pharmacologic principles.

INMD 6809. Human Health & Disease - Rheum, Derm & Ophth, Orto & Otol. (4 cr.; P-N only; Every Spring) Pathophysiology of rheumatology, dermatology, ophthalmology, orthopaedics/ otolaryngology disciplines, including infectious disease. Pathologic/pharmacologic principles.

INMD 6810. Human Health & Disease - Renal & Endo/Repro. (5 cr.; P-N only; Every Spring) Pathophysiology of endocrine/reproductive systems, including laboratory medicine/ infectious disease. Pathologic/pharmacologic principles.

INMD 6811. Human Health & Disease - GI & Heme. (4 cr.; P-N only; Every Fall) Pathophysiology of circulatory/gastrointestinal systems, including laboratory medicine/ infectious disease. Pathologic/pharmacologic principles.

INMD 6812. Micro Biology and Immunology. (5 cr.; P-N only; Every Spring) Major bacterial, viral, fungal, and parasite diseases, including their life cycles and transmission, virulence factors, types of associated illnesses and diagnosis, general principles of treatment, and methods of prevention. Innate and acquired immunity, including cellular interactions, mechanisms, derangements, and serological use in diagnosis.

INMD 6813. Neuroscience. (3 cr.; P-N only; Every Spring) Human neuroscience. Survey of molecular cellular systems neuroscience as related to medicine.

INMD 6814. Physiology. (3 cr.; P-N only; Every Spring) Systems physiology. General physiology, endocrine, circulatory, respiratory, digestive, energy metabolism, and renal physiology examined at molecular, cellular, and organ level. Homeostasis and basic regulatory aspects of physiological processes of organ systems.

INMD 6815. Human Behavior. (1 cr.; P-N only; Every Summer) Human activities, including those hidden from view such as cognition, feelings, and decision making. Focus on being a patient or a physician.

INMD 6816. Human Sexuality. (1 cr.; P-N only; Every Summer) Basic and clinical skills. Teaching students the process of how to help provide patients with information and helpful suggestions concerning sexuality and referring patients who require more specialized forms of health care.

INMD 6817. Principles of Pathology. (1 cr.; P-N only; Every Summer) General principles of human pathology.

INMD 6818. Principles of Pharmacology. (1 cr.; P-N only; Every Summer)
General principles of pharmacology.

INMD 6819. Human Health & Disease - Neuro & Psych. (3 cr.; P-N only; Every Fall) Pathophysiology of neurology/psychiatry disciplines, including infectious disease, along with pathologic/pharmacologic principles.

INMD 6820. Medical Gross Anatomy & Embryology. (3 cr.; H-N only; Every Fall) This course is a study of human gross anatomy with emphasis upon the anatomical structure (and a bit of function) of the components of the human body. It relies heavily on laboratory dissection in the approach to learning anatomy.

INMD 6821. Human Histology. (3 cr.; H-N only; Every Fall) Histology puts biochemistry, molecular biology and physiology in the context of cell structure and function. This lecture and laboratory course covers the microscopic structure of the body, using light and electron microscopic techniques, with an emphasis on the relationship of structure to function.

INMD 7000. Interdisciplinary Research. (1-12 cr.; H-N or Audit; Every Fall, Spring & Summer) Clinical or basic science research, prereq; [3rd or 4th yr] medical student; MD/Ph.D. program preferred

INMD 7001. Interdisciplinary Research II. (2-12 cr.; H-N or Audit; Every Fall, Spring & Summer) Clinical or basic science research, prereq: 3rd or 4th yr medical student

INMD 7002. Interdisciplinary Research-3. (2-6 cr.; H-N only; Every Fall, Spring & Summer) Clinical or basic science research, prereq: 3rd or 4th year medical student

INMD 7050. Research in Health Care Management I. (4 cr.; P-N or Audit; Periodic Fall) Students select a topic of importance in health care management, formulate a problem, and carry out research, prereq: Registered in MD/ MBA dual degree program

INMD 7051. Research in Health Care Management II. (2-4 cr. [max 2 cr.]; P-N or Audit; Periodic Fall) Students select a topic of importance in health care management, formulate a problem, and carry out research, prereq: Registered in MD/ MBA dual degree program

INMD 7100. Development of Clinical Skills. (0-6 cr. [max 12 cr.]; H-N only; Every Fall, Spring & Summer) History, physical exam, assessment, and management skills related to patient care.

INMD 7200. Rural Physician Associate Program (RPAP). (2-6 cr. [max 36 cr.]; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive primary care experience in a rural setting. Intended for the student with an interest in rural Minnesota primary care. Each student works with family physicians and local and/or visiting specialists. Problem-based learning, hands-on clinical experience, and one-to-one teaching. Scholarships available.

INMD 7201. Rural Physician Associate Program II (RPAP). (2-6 cr.; P-N only; Every Fall) Community-based elective with extensive primary care experience in a rural setting. Intended for the student with an interest in rural Minnesota primary care. Each student works with family physicians and local and/or visiting specialists. Problem-based learning, hands-on clinical experience, and one-to-one teaching. Scholarships available.

INMD 7202. Rural Physician Associate Program III (RPAP). (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive primary care experience in a rural setting. Intended for the student with an interest in rural Minnesota primary care. Each student works with family physicians and local and/or visiting specialists. Problem-based learning, hands-on clinical experience, and one-to-one teaching. Scholarships available.

INMD 7203. Rural Physician Associate Program (RPAP): Orthopaedic Surgery. (2-4 cr.; P-N only; Every Fall, Spring & Summer) Community-based elective with extensive orthopaedic surgery experience in a rural setting.

INMD 7204. Rural Physician Associate Program (RPAP): Surgery. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) Community-based elective with extensive primary care (surgery) experience in a rural setting. Student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching.

INMD 7205. Rural Physician Associate Program (RPAP): Obstetrics and Gynecology. (6 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive obstetrics/gynecology experience in a rural setting. Student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching.

INMD 7206. Rural Physician Associate Program (RPAP): Pediatrics. (6 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive pediatrics experience in a rural setting.

INMD 7207. Rural Physician Associate Program (RPAP): Urology. (2-4 cr.; P-N only; Every Fall, Spring & Summer) Community-based elective with extensive urology experience in a rural setting.

INMD 7280. RPAP: Emergency Medicine. (4 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive emergency medicine experience in a rural setting.

INMD 7282. RPAP Family Medicine Clerkship. (4 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive family medicine experience in a rural setting.

INMD 7210. RPAP Primary Care Selective Clerkship. (4 cr.; P-N only; Every Fall, Spring & Summer) Four-week ambulatory experience in rural setting.

INMD 7211. Metropolitan Physician Associate Program I. (2-6 cr. [max 18 cr.]; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive primary care experience in a metropolitan setting.

INMD 7212. MetroPap II. (0-6 cr. [max 12 cr.]; H-N only; Every Fall, Spring & Summer) MetroPap II.

INMD 7213. MetroPAP: Surgery. (6 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive surgery experience in a metropolitan setting.

INMD 7214. MetroPAP: OB/Gyn. (6 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive obstetrics and gynecology experience in a metropolitan setting.

INMD 7215. MetroPAP: Family Medicine Clerkship. (4 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive family medicine experience in a metropolitan setting.

INMD 7216. MetroPAP: Primary Care Selective. (4 cr.; P-N only; Every Fall, Spring & Summer) Community-based elective with extensive primary care experience in a metropolitan setting.

INMD 7217. MetroPAP: Emergency Medicine. (4 cr.; H-N only; Every Fall, Spring & Summer) Community-based elective with extensive emergency medicine experience in a metropolitan setting.


INMD 7301. Medical Anthropology I: The Normal and the Pathological. (1 cr.; P-N or Audit;) Beliefs/practices concerning human affliction, health, and healing in cross cultural perspective. Body as biologically given and culturally/historically located. Meanings that individuals and social groups attach to health, sickness, suffering, and healing. The normal and the pathological in comparative perspective.

INMD 7302. Medical Anthropology II: International Health, Colonialism, and Emerging Diseases. (2 cr.; P-N or Audit;)
Beliefs/practices concerning human affliction, health, and healing in cross cultural perspective. Body as biologically given and culturally/historically located. Meanings that individuals and social groups attach to health, sickness, suffering, and healing.

INMD 7303. Medical Anthropology III: Comprehending Human Affliction and Healing Cross Culturally. (3 cr.; P-N only; Every Fall) Beliefs/practices concerning human affliction, health, and healing in cross cultural perspective. Body as biologically given and culturally/historically located. Meanings that individuals and social groups attach to health, sickness, suffering, and healing. Ways in which diverse social groups cope with human affliction and seek to achieve health.

INMD 7310. VAMC LIC - Medicine I (VALUE). (8 cr.; H-N only; Every Fall) VA based Internal Medicine clerkship with experiences in both inpatient and outpatient Internal Medicine. The course will emphasize diagnostic approaches to patient problems and acquisition of knowledge and skills while working with internal medicine hospitalists in the inpatient setting and attending physicians in the primary care clinics.

INMD 7311. VAMC LIC - Surgery (VALUE). (6 cr.; H-N only; Every Fall) VA based General Surgery Clerkship in which students will work directly with attending physicians while learning various responsibilities of surgical care and achieve competency in core surgical areas.

INMD 7312. VAMC LIC - Psychiatry (VALUE). (6 cr.; H-N only; Every Spring) VA based Psychiatry clerkship that will prepare medical students to recognize, diagnose and care for patients with psychiatric disorders encountered in most medical practices. Students will be working one-on-one with a psychiatrist in the outpatient setting and will follow patients to the inpatient setting.

INMD 7313. VAMC LIC - Neurology (VALUE). (4 cr.; H-N only; Every Spring) VA based Neurology clerkship that will increase clinical skills in diagnosing and treating neurologic illnesses. This will occur in the clinic and on the inpatient neurology consult service.

INMD 7314. VAMC LIC - Primary Care Selective - Internal Medicine (VALUE). (4 cr.; H-N only; Every Fall, Spring & Summer) Internal Medicine ambulatory setting based in VA Patient Aligned Care Teams (PACTs) with students taking primary responsibility for care of a panel of patients. Students will learn chronic disease management, population-based management of medical problems as well as routine preventative medicine.

INMD 7315. VAMC LIC - Surgical Specialty Otolaryngology (VALUE). (2-4 cr.; H-N only; Every Spring) VA based surgical selective that emphasizes evaluation of primary care problems related to Otolaryngology. Students will participate in major head, neck and ear surgeries during the clerkship.

INMD 7316. VAMC LIC - Surgical Specialty Urology (VALUE). (2-4 cr.; H-N only; Every Fall, Spring & Summer) VA based surgical selective that will provide basic principles of Urologic surgery that will be encountered in a general medicine practice.

INMD 7317. VAMC LIC - Ophth/Interprofessional Patient Care (VALUE). (4 cr.; H-N only; Every Summer) VA elective that will train medical students in patient-centered and inter-professional care that will lead to improved patient care and satisfaction. The experience will prepare students to meet the contemporary requirements of residency programs and future practice in a rapidly changing health care environment.

INMD 7318. VAMC LIC - Surgical Specialty Orthopedics (VALUE). (2-4 cr.; H-N only; Every Spring) VA based surgical selective that will provide basic principles of orthopedic surgery that will be encountered in a general medicine practice.

INMD 7320. VAMC LIC Plus - Elective (VALUE). (2-3 cr.; H-N only; Every Summer) The VAMC LIC Plus elective is a two-week focused experience that is meant to enhance one aspect of the curriculum. Value elective longitudinal integrated clerkship at the V.A. Medical Center. The area chosen by the student is built upon a specific interest encountered within the previous VALUE LIC. Student is responsible for finding the supervising preceptor (clinician) who will determine both the depth and breadth of the experience along with the student's assessment throughout the two weeks. Both the student and the preceptor must sign an agreement prior to the start of the experience as to final elective expectations.

INMD 7401. Hospitalist Rotation. (0-6 cr. [max 12 cr.]; P-N only; Every Fall, Spring & Summer) One on one educational experience with an internal medicine or medicine/pediatric hospitalist.

INMD 7410. Education in Pediatrics Across the Continuum LIC - Medicine 1. (8 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal Internal Medicine clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in general pediatric surgery while working with a continuity preceptor in outpatient surgery and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7411. Education in Pediatrics Across the Continuum LIC ? Surgery. (6 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal surgery clerkship based at the University of Minnesota Masonic Children's Hospital and University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in general pediatric surgery while working with a continuity preceptor in outpatient surgery and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7412. Education in Pediatrics Across the Continuum LIC: Psychiatry. (6 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal psychiatry clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in general pediatric psychiatry while working with a continuity preceptor in outpatient psychiatry; and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7413. Education in Pediatrics Across the Continuum LIC ? Neurology. (4 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal neurology clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in general pediatric neurology while working with a continuum preceptor in outpatient neurology and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7414. Education in Pediatrics Across the Continuum LIC ? Primary Care Selective. (4 cr.; P-N only; Every Fall, Spring & Summer) Through continuity clinics as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC) at the University of Minnesota Masonic Medical Center, as well as online curriculum and weekly EPAC team meetings, the learner will get clinical exposure to primary care and acquire knowledge, skills and attitudes in the process of care and how to improve it.

INMD 7415. Education in Pediatrics Across the Continuum LIC ? Family Medicine. (4 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal Family Medicine clerkship based at Smiley's Family Medicine Clinic/University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Family Medicine while working with a continuity preceptor in Family Medicine, tracking them for both inpatient and outpatient experience, and by tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7416. Education in Pediatrics Across the Continuum LIC: Obstetrics/Gynecology. (6 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal Obstetrics and Gynecology clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in general pediatric surgery while working with a continuity preceptor in obstetrics and gynecology; and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.
Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Obstetrics and Gynecology while working with a continuity preceptor in Obstetrics and Gynecology in both the inpatient and outpatient setting and tracking continuity patients across their experiences at the University of Minnesota Medical Center.

INMD 7417. Education in Pediatrics Across the Continuum LIC: Pediatrics. (6 cr.; P-N only; Every Fall, Spring & Summer) A longitudinal pediatrics clerkship based at the University of Minnesota Masonic Children's Hospital and Fairview Children's Clinic as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in pediatrics while working with a continuity preceptor in outpatient pediatrics; and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7418. Education in Pediatrics Across the Continuum LIC ? Emergency Medicine. (4 cr. [max 8 cr.]; P-N only; Every Fall, Spring & Summer) A longitudinal Emergency Medicine clerkship based at the University of Minnesota Masonic Children's Hospital as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Emergency Medicine while working with a continuity preceptor in Emergency Medicine; tracking patients to inpatient, surgical or outpatient arenas as able; and through simulation experiences.

INMD 7419. Education in Pediatrics Across the Continuum LIC - Surgery Subspecialties. (4 cr.; P-N only; Every Fall, Spring & Summer) Through a longitudinal surgery clerkship based at the University of Minnesota Masonic Children's Hospital and University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC) learners will rotate with surgical subspecialists to facilitate acquisition of knowledge, skills and attitudes in surgical subspecialties while working with preceptors in outpatient surgery and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7420. Education in Pediatrics Across the Continuum LIC ? Pediatric Hospitalist Medicine Elective. (2-8 cr.; P-N only; Every Fall, Spring & Summer) The EPAC Pediatric Hospitalist Medicine elective is a 4-week elective in which the student functions as sub-intern on a pediatric inpatient service. This elective will provide the student with clinical experiences emphasizing clinical problems and medical conditions in Pediatric medicine. The goal is to prepare medical students for internship, through a clinically-focused experienced, emphasizing the tasks necessary for internship. Students will use knowledge of pathophysiology and clinical epidemiology in order to develop a reasoned differential diagnosis. The students will plan a logical and practical diagnostic evaluation, using principles of evidence-based medicine.

INMD 7421. Education in Pediatrics Across the Continuum LIC - Enrichment Elective. (2-8 cr. [max 24 cr.]; P-N only; Every Fall, Spring & Summer) The EPAC enrichment elective is a focused experience with the goal of furthering a student's developmental progress towards entrustment without direct supervision in one or more areas of professional development. In general the assessment framework are the Core Entrustable Professional Activities for Entering Residency (CEPAER). The student will work with the Course Director and EPAC leadership team to identify and assign an experience that is likely to facilitate the developmental goals. This could include direct patient care or not. The student and course director must sign an agreement prior to the start of the experience as to the final elective expectations.

INMD 7422. Education in Pediatrics Across the Continuum - Independent Study. (2-8 cr. [max 24 cr.]; P-N only; Every Fall, Spring & Summer) The EPAC independent study elective is a semester long experience meant to complement patient care in pediatric medicine by developing a student's non-direct patient care knowledge, skills and attitudes. The student will work with the course director to plan an independent study project: examine include a quality improvement project, drafting/submitting for presentation a case report, etc. They will identify a supervising preceptor. The student, course director and the supervising preceptor will sign an agreement prior to the start of the experience as to the final elective expectations. This elective may be repeated up to a total of three times, to move on to the next phase in a project in progress or to do a new project.

INMD 7423. Education in Pediatrics Across the Continuum - Medical Education Independent Study. (12 cr.; P-N only; Every Fall, Spring & Summer) As a part of participation in the EPAC undergraduate medical education curricular experience, EPAC students will, in the EPAC Medical Education Independent Study: Actively participate in educational quality improvement of the local EPAC program? Contribute to the national data used to evaluate the national EPAC project and test feasibility? Actively participate in formal, documented self-assessment and feedback beyond that explicitly required for traditionally tracked medical students at the University of Minnesota Medical School To this end, EPAC students will, at a minimum, attend weekly meetings during the EPAC LIC curriculum, complete all required local and national assessments, and keep their diagnosis and procedure tracker up to date.

INMD 7450. Hospice and Palliative Care. (; 3 cr.; H-N only; Every Fall, Spring & Summer) Interdisciplinary course. Hospice, palliative medicine.

INMD 7500. ICU Translational Science. (; 4 cr.; H-N only; Every Fall, Spring & Summer) Year 4 students who want to experience how basic science concepts can be translated to quality care of patients requiring intensive care.

INMD 7508. Clerkship: Primary Care Medicine. (; 4 cr.; H-N or Audit; Every Fall, Spring & Summer) Participation in patient care in outpatient primary care settings located at internal medicine, family practice, pediatric, and geriatric clinics. prereq: 6104

INMD 7509. Clerkship II: Primary Care Medicine. (; 4 cr.; H-N or Audit; Every Fall, Spring & Summer) N/A prereq: 6508

INMD 7520. Interdisciplinary Health Education in a Community Setting. (; 4 cr.; P-N or Audit; Periodic Fall) Students work with instructor and coordinator at one of three community sites. prereq: Health science student

INMD 7521. Health Activism Elective. (; 2-4 cr.; P-N or Audit; Every Fall, Spring & Summer) Joint Medical School-School of Public Health course. Series of skill-building workshops. Hands-on community project completed by small group of public health and medical students in cooperation with a community organization and a faculty mentor. Projects focus on issues of health disparities, environmental justice, and access to care. prereq: 3rd or 4th yr medical student

INMD 7522. Migrant Health Elective. (4 cr.; H-N only; Every Summer) This rotation is an interprofessional, community-engaged medical rotation that focuses on the social determinants of health of the most marginalized population in the state, rural Latino hired agricultural workers. The clinical experience will be caring for patients on mobile medical units that travel to farms in rural, southern Minnesota. Learners will follow a curriculum that includes readings, documentaries, films, medical literature, discussions/workshops, tours of workplaces, and lectures by leading experts around the nation in the health of agricultural workers. We also have meetings with the local Mexican Consulate, community health centers, legal experts, occupational health physicians, and labor organizers. This rotation includes the opportunity to work with residents in internal medicine, pediatrics, emergency medicine, and pharmacy and professionals from other disciplines including pharmacy, dentistry, and vet medicine. We also work directly with Centro Campesino, an organization that pairs AHC students with promising Latino youth from rural farmworker families.

INMD 7523. Occupational and Environmental Medicine Elective. (2-4 cr.; H-N only; Every Fall, Spring & Summer) By the end of this rotation, students will be able to: 1) identify unique problems associated with occupationally and environmentally-related illness and injury; 2) obtain and organize
a thorough occupational or environmental history; 3) formulate appropriate work/activity restrictions based on a specific illness or injury; 4) describe the role of preventive medicine, both patient-focused & programmatic, in individual wellness and overall population health.

INMD 7540. Ambulatory Clinic for the Physician-Scientist. (3 cr. [max 6 cr.]; H-N or Audit; Every Fall, Spring & Summer) Students develop/revise ambulatory patient evaluation and management skills. prereq: Med student

INMD 7542. Clinical Continuity Experience for Physician Scientists I. (3 cr. [max 6 cr.]; H-N only; Every Fall) Students paired with active physician scientist who serves as MSTP Clinical Mentor. One-on-one meetings between student/MSTP clinical mentor averaging one-half day per month. Mentors provide ongoing clinical opportunities/teach clinical care skills.

INMD 7545. Clinical Continuity Experience for Physician Scientist II. (3 cr. [max 6 cr.]; H-N only; Every Fall) Students paired with active physician scientist who will serve as MSTP Clinical Mentor. One-on-one meetings between student/MSTP clinical mentor in clinic averaging one day per week for 9 weeks. Hands-on clinical experience.

INMD 7548. Clinical Foundations for the Physician Scientist. (4 cr. [max 8 cr.]; H-N only; Every Fall, Spring & Summer) Students paired with active physician scientist who serves as MSTP Clinical Mentor. One-on-one meetings between student/MSTP clinical mentor in clinic averaging one day per week for 9 weeks. Hands-on clinical experience.

INMD 7549. MSTP Directed Study. (3-6 cr.; P-N only; Every Fall, Spring & Summer) This course is for MD/PhD students to pursue independent research under the directed supervision of a research faculty mentor. The student must have a research mentor prearranged and approved by the MD/PhD program prior to taking the course.

INMD 7552. Traditional Indian Medicine Clerkship. (2-6 cr. [max 2 cr.]; H-N or Audit; Every Fall, Spring & Summer) Clinical experience in major hospital/center in approved (through Medical School Curriculum Affairs) Indian Health Service area. prereq: Med student, dept consent

INMD 7553. Elective Away at Centers for Disease Control (CDC). (2-8 cr.; H-N or Audit; Every Fall, Spring & Summer) Full-time experience in section of CDC. prereq: Med student, dept consent

INMD 7555. Elective Away for Credit. (2-8 cr. [max 16 cr.]; H-N or Audit; Every Fall, Spring & Summer) N/A prereq: Med student, dept consent

INMD 7556. Elective Away for Credit 2. (2-6 cr. [max 2 cr.]; H-N or Audit; Every Fall, Spring & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

**Interior Design (IDES)**

**IDES 1601. Interior Design Studio I.** (4 cr.; A-F or Audit; Every Fall)

Theories used to solve interior design problems related to human behavior. Design process. Communication skills that are required for interior design profession. prereq: Interior design pre-major or interior environments minor

**IDES 1602. Interior Design Studio II.** (4 cr.; A-F only; Every Spring)

Introduction to interior design programming as method for understanding behaviors/requirements of humans in spaces. Use of color in three-dimensional environments. Developing communication skills. Problem-solving. prereq: [1601 or DHA 1601] with grade of at least C-. interior design pre-major

**IDES 2196. Work Experience in Interior Design.** (; 1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer)

Supervised work experience in business, industry, or government related to student's area of study. prereq: Plan submitted/approved by advisor, internship supervisor. written approval of supervisor, inst consent

**IDES 2603. Interior Design Studio III.** (; 4 cr.; A-F only; Every Fall)

Expanding presentation skills, visual communication of design process. Design of interior environment as influenced by neighborhood, adjacent structures, regional context, diverse cultures. prereq: [1602 or DHA 1602] with grade of at least C-. pass portfolio review, interior design major

**IDES 2604. Interior Design Studio IV.** (4 cr.; A-F or Audit; Every Spring)

Relationship between exterior/interior design as it pertains to building construction. Methods/materials, principles of structure, building systems, construction details. Interface of electrical, HVAC, plumbing systems in buildings. prereq: [2603 or DHA 2603], 2613

**IDES 2612. Materials and Specifications.** (ENV; 4 cr.; A-F or Audit; Every Spring)

Environmental issues, from global to interior spaces. Effect of building codes/legislation, social awareness. Functional/aesthetic relationship of materials/resources to interior design. prereq: [Pass portfolio review, interior design major] or interior environments minor or design minor or inst consent

**IDES 2613. Interior Structures, Systems, and Life Safety.** (4 cr.; A-F only; Every Fall & Spring)

Codes, standards, regulations, and guidelines that govern design of interior space and support life safety. Integration of building systems. Structures for non-residential/residential occupancy. Building/energy codes. Lectures, guest speakers, field trips.

**IDES 2622. Computer Applications I.** (; 2 cr.; A-F only; Every Spring)

Computer-aided design, its role in interior design. Use of software applications for construction drawings, two/three-dimensional representation. Modeling for interior design problem-solving/presentation. prereq: Interior design major

**IDES 3161. History of Interiors and Furnishings: Ancient to 1750.** (GP; 4 cr.; A-F or Audit; Every Fall)

Study of European and American interiors and furnishings, including furniture, textiles, and decorative objects.

**IDES 3162. History of Interiors and Furnishings: 1750 to Present.** (HIS; 4 cr.; A-F or Audit; Every Spring)

European/American interiors/furnishings, including furniture, textiles, and decorative objects.

**IDES 3196. Field Study: National or International.** (; 1-4 cr. [max 10 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Faculty-directed field study in national or international setting. prereq: inst consent

**IDES 3605. Interior Design Studio V.** (; 4 cr.; A-F only; Every Spring)

Advanced interior design problems dealing with small to medium scale spaces. Emphasizes special-needs populations.

**IDES 3606. Interior Design Studio VI.** (; 4 cr.; A-F only; Every Fall)

Interior design problems dealing with medium-scale spaces. Focuses on medium office design. prereq: [2604 or DHA 2604], 2612

**IDES 3612. Lighting Design.** (3 cr.; A-F only; Every Fall)


**IDES 3614. Interior Design Ethics and Professional Practice.** (CIV; 4 cr.; A-F only; Every Fall)

Business of interior design, professional ethics, and responsible design. Ethical theory/conduct. Responsibility to business, clients, colleagues, and community at large and globally. prereq: 2604 or DHA 2604; or Interior Environments Minor

**IDES 3622. Computer Applications II.** (2 cr.; A-F only; Every Fall)

Advanced concepts/terms in computer modeling. Computer graphics, three-dimensional modeling, rendering, animation to provide representation strategies for interior design problem-solving/presentation. Applications such as Autodesk Revit, AutoCAD, Autodesk 3ds Max Design. prereq: 2622

**IDES 4160H. Honors Capstone Project.** (; 2 cr. [max 4 cr.]; A-F only; Every Fall & Spring)

Individualizes honors experience by connecting aspects of major program with special academic interests. prereq: Interior design honors

**IDES 4193. Directed Study in Interior Design.** (; 1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Independent study in interior design under tutorial guidance. prereq: Undergrad, inst consent

**IDES 4196. Internship in Interior Design.** (; 1 cr. ; S-N or Audit; Every Fall, Spring & Summer)

Supervised work experience relating activity in business, industry, or government to student's area of study. Integrative paper or project may be required. prereq: 3606, inst consent

**IDES 4607. Interior Design Studio VII.** (4 cr.; A-F only; Every Fall)

Advanced interior design problems dealing with large scale spaces. Historic precedent, adaptive use, renovation. prereq: [3605, 3606] or [DHA 3605, DHA 3606] with grade of at least C-

**IDES 4608. Interior Design Thesis.** (4 cr.; A-F only; Every Spring)

Comprehensive independent interior design project developed from student-conducted research/program developed in 4615W. prereq: [4615W or DHA 4615W], [4607 or DHA 4607] with grade of at least C-

**IDES 4615W. Interior Design Research.** (WI; 3 cr.; A-F only; Every Fall)

Research methods for programming interior design solutions. Developing comprehensive program. Issues that affect interior design research/practices. prereq: 3605 or DHA 3605

**IDES 4616. Sustainable Commercial Interior Design.** (3 cr.; A-F only; Every Spring)
Intent, requirements, submittals, technologies/strategies to achieve LEED CI standards in existing, new construction, or tenant improvement projects. prereq: 2613 or DHA 2613 or Architecture major or instr consent

**International Business (IBUS)**

**IBUS 1400. International Programs Elective.**
(1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer)
Education abroad program elective.

**IBUS 2950. Tracing the Global Supply Chain.**
(4 cr.; A-F only; Every Fall)
Concepts, principles, techniques for managing global supply chains. Emphasizes decision-making in global supply chain strategy through hands-on experiential learning. prereq: Approved application

**IBUS 3002. Managerial Accounting in Argentina and Chile.**
(4 cr.; A-F only; Every Fall)
Managerial accounting study abroad.

**IBUS 3003. Information Systems for Business Processes and Management: An International Perspective.**
(4 cr.; A-F only; Every Fall)
Study abroad.

**IBUS 3010. Introduction to Global Entrepreneurship.**
(4 cr. [max 12 cr.]; A-F only; Every Spring)
Terms, concepts, skills for analyzing fundamental business practices in global economy.

**IBUS 3021. Human Resources Management in Australia.**
(4 cr.; A-F only; Every Spring)

**IBUS 3033W. Business Communication in Spain.**
(WI; 4 cr.; A-F only; Every Spring)
Education abroad course. Similar to MGMT 3033W with additional international experience end of semester.

**IBUS 3080. Sustainability and Corporate Social Responsibility in Costa Rica.**
(4 cr.; A-F only; Every Spring)
Partnership with Caribou Coffee. Coffee value chain of Caribou Coffee, from coffee bean origins through coffee served at Caribou Coffee and stakeholders throughout. Students write report delivered to Caribou's top management team and employees.

**IBUS 3101. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies).**
(0-18 cr. [max 54 cr.]; Student Option; Every Fall & Spring)
Semester of study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. For current offerings, contact Carlson Global Institute. prereq: 60 cr

**IBUS 3400. International Programs Elective.**
(1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer)
Elective course for education abroad.

**IBUS 3401. International Programs Elective.**
(1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer)
Elective course for education abroad.

**IBUS 3402. International Programs Elective.**
(1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer)
Elective course for education abroad.

**IBUS 3500. International Business: Undergraduate Exchange - BLOCK.**
(18 cr. [max 90 cr.]; S-N only; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3501. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3502. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3503. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3504. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3505. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3506. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3507. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3508. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3509. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3510. International Business: Undergraduate Exchange.**
(0-18 cr. [max 90 cr.]; Student Option; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

**IBUS 3600. Undergraduate Summer Exchange.**
(0-4 cr.; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

**IBUS 3601. Undergraduate Summer Exchange.**
(0-4 cr.; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

**IBUS 3602. Undergraduate Summer Exchange.**
(0-4 cr.; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.
IBUS 3603. Undergraduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 3604. Undergraduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 3700. London School of Economics Summer Program. (0-18 cr.; S-N only; Every Summer) Summer study abroad at London School of Economics. Students select one or two sessions based on their academic needs/interests.

IBUS 3701. Vienna Summer Program in International Business (Undergraduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad at one of Carlson's School's international exchange partner universities. Vienna University of Economics/Business Administration. Students select intensive/enrichment courses based on academic needs/interests.

IBUS 3702. Copenhagen Summer Program in International Business (Undergraduate). (0-18 cr.; S-N or Audit; Every Fall, Spring & Summer) Summer study abroad at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. For current offerings, contact Carlson International Programs. prereq: 60 cr

IBUS 3703. Norway Summer Program in International Business (Undergraduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. A-F only; Every Fall & Spring)

IBUS 3704. Shanghai Summer Program in International Business (Undergraduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad at one of Carlson School's international exchange partner universities. Antai College of Economics and Management. Three-week program. Focuses on Scandinavian management/Norwegian life/society.

IBUS 3705. Shanghai Summer Program in International Business (Graduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad at one of Carlson School's international exchange partner universities. Antai College of Economics and Management. This is a three week summer program integrating intensive business education in China context with corporate experience.

IBUS 3800. CIMBA Summer Program. (0-18 cr.; Student Option; Every Summer) Consortium Institute of Management/Business Analysis (CIMBA) Summer Program in Italy. Four-week program.

IBUS 3999. International Experience Directed Study. (1-3 cr.; S-N only; Every Fall, Spring & Summer) Directed Study for international experience requirement. prereq: dept consent

IBUS 4010. Management of Technology in the Middle East. (3 cr.; A-F only; Every Spring) Undergraduate study abroad in Israel. prereq: Undergrad

IBUS 4050. Management of Innovation and Change. (4 cr.; A-F only; Every Fall) Applying theories/research on how new organizational programs, products, technologies are developed/implemented. Diagnostic skills. How innovation unfolds. prereq: [Mgmt 1001 or 3001 or 3010], approved application

IBUS 4080. Health Care Industry Dynamics in Africa--An International Business Perspective. (4 cr.; A-F or Audit; Every Fall) International business environment of South Africa.

IBUS 4082W. Brand Management. (WI; 4 cr.; A-F only; Every Fall & Spring) Brand asset management. Measuring brand knowledge. Building and leveraging brands. Managing brands globally. prereq: MKTG 3001, MKTG 3010, MKTG 3040


IBUS 4471. Information Systems and Innovation. (4 cr.; A-F only; Every Fall) Role of Information Systems in developing new and innovative processes, services and products to support growth strategies for organizations in a global context.

IBUS 5090. Study Abroad Independent Study. (1-4 cr.; A-F only; Every Fall & Spring) Independent study coordinated by faculty member.

IBUS 5091. Shanghai Summer Program in International Business (Graduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad at one of Carlson School's international exchange partner universities, Antai College of Economics and Management. This is a three week summer program integrating intensive business education in China context with corporate experience.

IBUS 5110. Business and the Environment in Costa Rica. (4 cr.; A-F only; Every Fall & Spring) How businesses maintain/increase profits by taking care of environment. Sustainable development, environmental strategy. Travel to Costa Rica to join students from INCAE (partner school) for series of courses. Case studies, site visits, field trips. Taught in English. prereq: Sr or grad student

IBUS 5111. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr. [max 60 cr.]; A-F only; Every Fall & Spring) Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5112. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr. [max 60 cr.]; A-F only; Every Fall & Spring) Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5113. Undergraduate Seminar: CIMBA (Consortium of Universities for International Studies). (1-6 cr. [max 60 cr.]; A-F only; Every Fall & Spring) Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5114. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr. [max 60 cr.]; A-F only; Every Fall & Spring) Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5115. Undergraduate Semester: CIMBA (Consortium of Universities for International Study). (1-6 cr. [max 60 cr.]; A-F only; Every Fall & Spring) Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5120. Global Business Practicum in Central and Eastern Europe. (4 cr.; A-F only; Every Spring & Summer) Rapidly changing business environment of Central/Eastern Europe. Students work in teams with students from WU-Vienna University of Economics/Business for two weeks in May/June in Central/Eastern Europe. prereq: Carlson grad student

IBUS 5130. France Seminar: Doing Business in the European Union (Graduate). (4 cr.; S-N only; Every Fall, Spring & Summer) Two-week study abroad program at Universite Jean-Moulin Lyon 3 in Lyon, France. Includes courses taught by international faculty, site visits, cultural excursions. prereq: Carlson grad student

IBUS 5140. Vienna Summer Program in International Business (Graduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad program at Europe's largest business school (WU-Vienna). Students take three business classes, plus German language. Program participants from Europe, Asia, Latin America, United States. prereq: Carlson grad student

IBUS 5150. India Seminar: Managing in a Global Environment. (4 cr.; A-F only; Every Spring) View of sourcing/delivery of knowledge-intensive tasks. Site visits, meetings with business executives/governmental agencies. Two weeks in India over January break, preceded by Friday evening classes in fall term B (November, early December).

IBUS 5160. Cologne Summer Program: European Management (Grad). (8 cr. [max 24 cr.]; S-N only; Every Summer) Summer study abroad at one of Carlson School's international exchange partner
IBUS 5170. Global Business Practicum in Northern China. (4 cr.; A-F only; Every Spring)
Collaboration with corporate partner/business school in China. Students work in multicultural teams to analyze real-life business problems that corporations face in China. Examine cultural, social, economic differences surrounding global business. prereq: Carlson grad student

IBUS 5171. Global Business Practicum in Southern China. (4 cr.; A-F only; Every Spring)
Collaboration with corporate partner/business school in China. Work in multicultural teams to analyze real-life business problems that corporations face in China. prereq: Carlson grad student

IBUS 5172. IBUS 5172: Global Business Practicum Brazil. (4 cr. [max 8 cr.]; A-F only; Every Summer)
Study abroad course. Short-term global enrichment program traveling to Brazil in May. "Queen in India market. prereq: Carlson grad student

IBUS 5175. India Seminar: Doing Business in India. (4 cr.; A-F only; Every Summer)
Live consulting project for international Dairy Queen in India market. prereq: Carlson grad student

IBUS 5190. Brazil Seminar: Doing Business in Brazil. (4 cr.; A-F only; Every Spring)
Two-week study abroad at Escola de Administracao de Empresas de Sao Paulo da Fundacao Getulio Vargas (FGV). Full class days, cultural tours, field trips, site visits. prereq: Carlson grad student

IBUS 5200. International Business: Undergraduate Exchange. (0-16 cr. [max 160 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5201. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5202. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5203. International Business: Undergraduate Exchange. (0.5-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5204. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5205. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5206. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5207. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5208. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5209. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5260. Integrated Corporate Reporting and the Triple Bottom Line. (4 cr.; A-F only; Every Spring)
View of integrated reporting (sustainability reporting) as it relates to various fields of business. Site visits, meetings with business executives/governmental agencies. Two weeks in the United Kingdom following commencement week, preceded by Spring B Term classes.

IBUS 5300. International Business: Graduate Exchange BLOCK. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. For current offerings, contact Carlson International Programs. prereq: Carlson grad student

IBUS 5301. Graduate Exchange in International Business - BLOCK. (0-18 cr. [max 54 cr.]; S-N only; Every Summer)
Summer study abroad at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5302. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5303. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5304. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5305. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5306. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5307. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5308. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5309. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5310. International Business: Graduate Exchange. (0-18 cr. [max 72 cr.]; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5400. Global Business Practicum. (4 cr. [max 12 cr.]; A-F only; Every Spring)
Collaboration with corporate partner and/or business schools around the world. Work in
multicultural teams to analyze real-life business problems that corporations face in the selected location. prereq: Grad student

IBUS 5600. Graduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5601. Graduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5602. Graduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5603. Graduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5604. Graduate Summer Exchange. (0-4 cr.; S-N only; Every Summer) Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5605. Shanghai Summer Program in International Business (Graduate). (0-18 cr.; S-N only; Every Summer) Summer study abroad at one of Carlson School's international exchange partner universities, Antai College of Economics and Management. This is a three week summer program integrating intense business education in China context with corporate experience.

IBUS 6041. IBUS 6041: Global Strategy and Modes of Entry. (4 cr.; A-F or Audit; Every Spring) Course explores issues related to target market analysis, modes of entry, decision making in international business to comprehend complexity of crafting global strategy. prereq: Carlson grad student

IBUS 6315. Ethical Environment of International Business (Graduate). (4 cr.; A-F only; Every Spring & Summer) Current international business ethics. Students spend two weeks in Europe meeting with leaders of multinational firms. governmental agencies, NGOs. Ethical challenges faced by individuals/organizations in era of globalization. Taught in English. prereq: Carlson grad student

IBUS 6316. Sustainability & Cooperative Advantage in Scandinavia. (4 cr.; A-F or Audit; Every Spring & Summer) Corporate responsibility through exploration of successful Scandinavian approach. prereq: Carlson grad student

IBUS 6400. Carlson MBA Global Discovery. (1-3 cr.; A-F only; Every Fall & Spring) How companies/public agencies operate effectively in emerging-market economies. How emerging-market politics, law, social trends are shaping current Minnesota business/agency strategies. Classroom/2-week international visit/symposium following return to United States. prereq: 2nd yr full-time Carlson MBA student

IBUS 6401. Marketing in the Mayhem: Why Chile Thrives and How Argentina Tries. (4 cr. max 8 cr.; A-F only; Every Fall, Spring & Summer) This course will explore the use of the Marketing Management Process by firms and governments in Argentina and Chile as they seek to grow. B-Term course followed by 2 weeks abroad. prereq: Graduate students only

IBUS 6402. Economic Diversification: Moving Beyond Oil in UAE and Oman. (4 cr. max 8 cr.; A-F only; Every Fall, Spring & Summer) The Middle East is one of the fastest growing economic areas in the world; it has historically had a heavy reliance on oil exports, but that is changing in many of these countries. This course will focus on the effect of fluctuating oil prices, economic diversification, and the impact of Islam on business. prereq: Graduate students only.

IBUS 6500. Mergers and Acquisitions in a Global Context. (1-4 cr.; A-F only; Periodic Fall & Spring) Challenges/strategies for success in mergers/acquisitions. prereq: Carlson grad student

IBUS 6997. MILI Global Valuation Lab. (4 cr. [max 8 cr.]; A-F only; Periodic Fall, Spring & Summer) International version of medical industry leadership institute valuation lab. Assess value of proprietary inventions in context of international markets.

Interprsnl Relations Research (IREL)

IREL 8001. Proseminar in Interpersonal Relationships Research. (; 2 cr.; S-N or Audit; Every Fall) Survey of major topics, including theoretical assumptions, methods, and samples of current research. prereq: Grad IRel minor

IREL 8021. Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships. (; 3 cr.; S-N only; Spring Even Year) Survey of topics in design/analysis of research on behavior in two-person interactions. prereq: Grad IRel minor, [one prior course in multiple regression or structural equation modeling], instr consent

IREL 8360. Seminar: Topics in Interpersonal Relationships Research. (; 1-3 cr. [max 6 cr.; Subject Option; Periodic Fall & Spring] Intensive study of topics. prereq: Grad IRel minor or instr consent

Introduced Species, Genotypes (ISG)


ISG 5020. Risk Analysis Modeling for Introduced Species and Genotypes. (; 1 cr.; S-N only; Every Spring) Four-day workshop. Role/mechanics of mathematical modeling within ecological risk assessment. Integrated exercises, cases. prereq: [5010 or equiv], instr consent

ISG 8001. Discussions in Introduced Species and Genotypes. (; 1 cr. [max 10 cr.]; S-N only; Every Fall & Spring) Forum for presentation of dissertation proposals, results from ISG practica, discussion of environmental risk assessment topics. Focuses on ongoing research or key publications on introduced species/genotypes.

ISG 8021. Problem Solving Practicum in Risk Analysis. (; 3 cr. [max 6 cr.]; A-F only; Every Summer) Students address real-world problems in environmental risk analysis of introduced species and genotypes, with faculty guidance and in consultation with public/private partner, and apply societal deliberation and scientific/policy analysis. prereq: 5010, 5020

ISG 8031. Cooperative Learning Practicum. (; 1 cr.; A-F only; Every Spring) Cooperative learning techniques. Scenario planning, decision cases. Students develop/test cooperative learning exercises for environmental risk assessment based on their research experience in 8021. Linking research to teaching. prereq: 8021

Istanbul (ISTN)

ISTN 1101. Introductory Turkish I. (5 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

ISTN 1102. Introductory Turkish II. (5 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

ISTN 3001. Contentious Politics: Turkey's Religious/Secular Balance. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ISTN 3002W. Intercultural Engagement: Creating a Culture of Respect. (WI; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ISTN 3003. Sustainable Food Systems of Turkey. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ISTN 3004. Design and its Discontent: Design, Society, Economy and Culture. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ISTN 3005. Social Change in the Global City. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ISTN 3006. The Many Religious Faces of Istanbul, Past and Present. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ISTN 3011. Turkish Design Studio: Sensory Communications Studio. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ISTN 3012. Turkish Design Studio: Sensory Communications Studio with Design Workshops. (6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ISTN 3013. Internships in Istanbul: A Comparative Approach to the Turkish Workforce. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ISTN 3014. Design Studio in Istanbul: Tradition and Innovation. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

Italian (ITAL)

ITAL 100. Reading Italian in the Arts and Sciences. (0 cr.; S-N only; Every Summer)
Designed to teach a basic reading knowledge of the Italian language; full time is devoted to intensive reading and translation of texts from a wide variety of disciplines and to the teaching of translation techniques.

ITAL 1001. Beginning Italian. (5 cr.; Student Option; Every Fall & Spring)
Emphasis on the four language skills (listening, speaking, writing, and reading) and on Italian culture.

ITAL 1002. Beginning Italian. (5 cr.; Student Option; Every Fall & Spring)
Listening, speaking, writing, reading. Italian culture, preq: 1001 or instr consent

ITAL 1003. Intermediate Italian. (5 cr.; Student Option; Every Fall, Spring & Summer)
Grammar review and development of intermediate level of proficiency in listening, reading, writing and speaking. Emphasis on some cultural aspects of contemporary Italy. preq: 1001-1002

ITAL 1004. Intermediate Italian. (5 cr.; Student Option; Every Fall & Spring)
Grammar review and development of intermediate level of proficiency in listening, reading, writing and speaking. Emphasis on some cultural aspects of contemporary Italy. preq: 1001, 1002, 1003

ITAL 1837. Imaging Italy: Italian and Italian-American Culture, History, and Society through Film. (AH,GP; 4 cr.; Student Option; Every Fall)
Weekly guest lectures and critical readings expand from different disciplinary perspectives upon issues raised by films. Urban life, religion, nationalism, opera, violence, leisure, food, fascism, terrorism, family, emigration/immigration, ethnicity, Mediterranean culture.

ITAL 1904. Freshman Seminar. (GP; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule. preq: Fr

ITAL 3015. Reading, Conversation, and Composition. (4 cr.; Student Option; Every Fall & Spring)
Intensive reading, writing, speaking practice. Study of cultural materials in authentic formats. preq: 1004

ITAL 3201. Reading Italian Texts: Poetics, Rhetoric, Theory. (3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
A basic course in understanding the rhetorical and poetic aspects of language and literature; interpretive methods and theoretical concepts. preq: 3015

ITAL 3203. Italian Travelers: From the Enlightenment to the Present. (3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Examines literary representations of travel, migration, immigration, exile, and tourism in Italy from the Enlightenment to the present. preq: 3015

ITAL 3209. Literature of Medieval City-States. (4 cr. [max 16 cr.]; Student Option; Periodic Fall)
The beginnings of Italian vernacular literature in the context of the city-states of the 11th to 14th centuries. preq: 3015

ITAL 3305. Staging the Self: Theater and Identity in Modern Italy. (3 cr. [max 16 cr.]; Student Option; Periodic Fall)
Theatrical representations of the self in modern Italy. Particular attention given to issues of identity, gender, and class in theatrical works ranging from Alfieri’s Mirra, Pirandello’s Enrico IV to Dacia Maraini’s Ciutemnestra. preq: 3015

ITAL 3459W. Senior Project. (WI; 2 cr.; Student Option; Every Fall & Spring)
Research/writing on issue/theme in Italian studies. Projects range from scholarly paper to artistic/creative writing or musical composition, photography, poetry, or fiction. Research/analytical component, preq: completion of pre-requisite for major (3015) and eight electives for the sum of 30 credits

ITAL 3550. Topics in 19th Century Italy. (3 cr. [max 12 cr.]; Student Option; Fall Odd Year)
Literature/culture of Italy in 19th century. Content varies depending on instructor. Literary, critical, cultural, historical, or social issues. Specific author, genre, or topic of interest. Readings. Specific content posted in department/listed in Course Guide. preq: 3015 or instr consent

ITAL 3637. From Ancient Rome to Renaissance Florence: Siena on the “French Road”. (3 cr.; A-F only; Periodic Summer)
Roman antiquity, Middle Ages, Renaissance. Economic/commercial history. Role of Italian trade with East/France. Italian culture from time of Caesars through medieval city-states/standard-setting culture of Italian Renaissance.

ITAL 3640. Topics in Italian Studies. (3 cr. [max 12 cr.]; Student Option; Periodic Spring)
Topics of interest in studies of Italian or Italian American culture of 20th century. Literary, critical, cultural, historical, or social issues, a specific author, a genre, or other topic. Content varies by instructor, see Course Guide. preq: 3015 or instr consent

ITAL 3806. Negotiating the Terms: Italian Film and Literature. (3 cr. [max 12 cr.]; Student Option;)
Examines cinematic representations of Italian literary texts; introduces the basic tools of literary and film analysis; discusses how both media impact Italian culture. Taught in English.

ITAL 3837. Imagining Italy: Italian and Italian-American Culture, History, and Society through Film. (AH,GP; 4 cr.; Student Option; Every Fall)
Weekly guest lectures and critical readings expand from different disciplinary perspectives upon issues raised by films. Urban life, religion, nationalism, opera, violence, leisure, food, fascism, terrorism, family, emigration/immigration, ethnicity, Mediterranean culture.

ITAL 3850. Topics in Italian Cinema. (3 cr. [max 9 cr.]; A-F only; Every Fall & Spring)
Examine theme, problem, style, period, or filmmaker in Italian cinema history. Attention devoted to locating Italian visual culture within context of wider transnational political/artistic networks. Content varies depending on year/instructor. preq: 3015 or instr consent

ITAL 4001. Beginning Italian for Graduate Research. (5 cr.; Student Option; Every Fall & Spring)
Emphasis on the four language skills (listening, speaking, writing, and reading) and on Italian culture. Meets concurrently with 1001. preq: instr consent

ITAL 4002. Beginning Italian for Graduate Research. (5 cr.; Student Option; Every Fall & Spring)
Listening, speaking, writing, reading. Italian culture. Meets concurrently with 1002. preq: instr consent

ITAL 4003. Intermediate Italian for Graduate Research. (5 cr.; Student Option; Every Fall & Spring)
Grammar review and development of intermediate level of proficiency in listening, reading, writing and speaking. Emphasis on some cultural aspects of contemporary Italy. Meets concurrently with 3004. preq: instr consent

ITAL 4004. Intermediate Italian for Graduate Research. (5 cr.; Student Option; Every Fall & Spring)
Grammar review and development of intermediate level of proficiency in listening, reading, writing and speaking. Emphasis on some cultural aspects of contemporary Italy. Meets concurrently with 3004. preq: instr consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
ITAL 4307. Novellistica. (3 cr.; Student Option; Periodic Fall & Spring)
Introduction to historical, formal and theoretical study of the Italian novella genre (including such alternative forms as the ‘racconto’) and the impact of this genre on world literature.
The study of the birth and development of the novella genre in Italian. Readings from and discussion of novellas and tales from: The Novellino, Boccaccio, Sacchetti, Bandello, Bigolini, Basile, Verga, Deledda, Moravia, Morante, Calvino, Ferrante prereq: 3015, 3201 or permission from the Italian DUS

ITAL 4970. Directed Readings. (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required. prereq: instr consent

ITAL 5201. Reading Italian Texts: Poetics, Rhetoric, Theory. (3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Rhetorical/poetic aspects of language and literature. Interpretive methods, theoretical concepts. prereq: grad student or instr consent

ITAL 5203. Italian Travelers: From the Enlightenment to the Present. (3 cr. [max 12 cr.]; Student Option; Periodic Fall)
Examines literary representations of travel, migration, immigration, exile, and tourism in Italy, from Enlightenment to present. prereq: grad student or instr consent

ITAL 5337. Nation and Narration: Writings in the 19th Century. (6 cr. [max 16 cr.]; Student Option; Periodic Fall)
Introduces the construction of modern Italian national identity by examining the role that literature plays in this process. Works by Manzoni, Foscolo, Leopardi, Gioia, Verga, Serao, and Deledda studied in the context of a range of sociopolitical and cultural issues. prereq: 3015

ITAL 5401. Mondo di Dante. (4 cr. [max 16 cr.]; Student Option; Periodic Fall)
Intensive reading of Dante’s Inferno, Purgatorio, and Vita Nuova with emphasis on Dante’s linguistic and cultural contributions. prereq: 3015, 3201 or instr consent

ITAL 5502. Making of Modern Italy: From the Enlightenment to the Present. (3 cr. [max 12 cr.]; Student Option; Periodic Spring)
Italian literary, cultural, and symbolic practices, from Enlightenment to present. prereq: grad student or instr consent

ITAL 5609. World of Dante. (4 cr.; Student Option;)
Taught in English. Intensive reading of Dante’s Inferno, Purgatorio and Vita Nuova with emphasis on the personal, poetic, and political staves of the journey of Dante’s pilgrim through hell to the earthly paradise.

ITAL 5640. Topics in Italian Studies. (3 cr. [max 12 cr.]; Student Option; Every Fall)
Topics of interest in studies of Italian and/or Italian American culture of the 20th century. Topics and readings may include literary, critical, cultural, historical, and/or social issues, a specific author, a genre, or other topics. Content varies by instructor. Specific content posted in the department and in the Course Guide. prereq: Ital 3015

ITAL 5970. Directed Readings. (1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required. prereq: instr consent

ITAL 8333. FTE: Masters. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required. prereq: instr consent

ITAL 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

ITAL 8992. Directed Readings. (1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Meets unique requirements decided on by faculty member and student: contact hours, number of credits, written/other work. prereq: instr consent

Japanese (JPN)

JPN 1011. Beginning Japanese I. (5 cr. [max 6 cr.]; Student Option; Every Fall & Summer)
Introduction to speaking, reading, writing Japanese.

JPN 1012. Beginning Japanese II. (5 cr.; Student Option; Every Spring & Summer)
Introduction to speaking, reading, writing Japanese. prereq: 1011

JPN 3021. Intermediate Japanese I. (5 cr.; Student Option; Every Fall)
Intermediate speaking, reading, writing in Japanese. prereq: 1012 or instr consent

JPN 3022. Intermediate Japanese II. (5 cr.; Student Option; Every Spring)
Intermediate-level instruction in speaking, reading, writing in Japanese. prereq: 3021 or instr consent

JPN 3031. Third Year Japanese I. (4 cr.; Student Option; Every Fall)
Advanced intermediate-level instruction in speaking, reading, writing Japanese. Development of reading proficiency in modern Japanese prose. prereq: 3022 or instr consent

JPN 3032. Third Year Japanese II. (4 cr.; Student Option; Every Spring)

JPN 3090H. Honors Course: Tutorial. (1-4 cr.; Student Option; )

JPN 3290. Japanese Language Teaching Tutorial. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
Students tutor beginning students of Japanese and are part of department’s Japanese language team. prereq: Grade of A in 4042

JPN 4001. Beginning Japanese I for Graduate Student Research. (5 cr.; Student Option; Every Fall & Summer)

JPN 4002. Beginning Japanese II for Graduate Student Research. (5 cr.; Student Option; Every Spring & Summer)
Speaking, reading, writing Japanese. Meets with 3021. prereq: 4002

JPN 4003. Intermediate Japanese I for Graduate Student Research. (5 cr.; Student Option; Every Fall)
Speaking, reading, writing Japanese. Meets with 3021. prereq: 4003

JPN 4005. Third Year Japanese I for Graduate Student Research. (4 cr.; Student Option; Every Fall)

JPN 4006. Third Year Japanese II for Graduate Student Research. (4 cr.; Student Option; Every Spring)

JPN 4041. Advanced Japanese Conversation and Composition I. (4 cr.;
Student Option; Every Fall)
Practice in advanced spoken/written Japanese. Assignments include essays, summaries, formal interviews in Japanese. prereq: 3032 or instr consent

JPN 4042. Advanced Japanese Conversation and Composition II. (4 cr.;
Student Option; Every Spring)
Practice in advanced spoken/written Japanese. Typical assignments include essays, summaries, formal interviews in Japanese. prereq: 4041 or instr consent

JPN 5040. Readings in Japanese Texts. (3 cr. [max 9 cr.]; A-F or Audit; Every Fall & Spring)
Students read authentic materials of various types to increase reading and speaking ability. Topics specified in Class Schedule. prereq: 4042 or equiv or instr consent

JPN 5071. Communicative Competence for Japan-Oriented Careers. (4 cr.; Student Option; Periodic Fall)
Effective communication using spoken and written Japanese in contexts likely to be
encountered by a career-oriented professional in Japan. prereq: 4041 or 4042 or instr consent

JPN 5211. Introductory Classical Chinese I. (3 cr.; Student Option; Periodic Fall) Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

JPN 5212. Introductory Classical Chinese II. (3 cr.; Student Option; Periodic Spring) Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: 5211 and two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

JPN 5993. Directed Studies in Japanese. (1-15 cr.; No Grade Associated; Every Fall, Spring & Summer) Individual study with guidance of a faculty member. Prereq instr consent, dept consent, college consent.

JPN 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

JPN 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

JPN 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

JPN 8777. Thesis Credits: Master’s. (1-18 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

JPN 8888. Thesis Credit: Doctoral. (1-24 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Jewish Studies (JWST)

JWST 1034. Introduction to Jewish History and Cultures. (HIS; 3 cr.; Student Option; Every Fall) Jewish history, society, culture from Second Temple period (5th century BCE) to modern era as illuminated by literature, philosophy, art, film, music, religious law/custom, artifacts of daily life. Emphasizes political, social, cultural contexts that shaped development of Jewish ideas, practices, and institutions.development of Jewish ideas, practices, and institutions.

JWST 1201. The Bible: Context and Interpretation. (LITR; 3 cr.; Student Option; Periodic Fall & Spring) Introduction to the modern academic study of the Old Testament/Hebrew Bible in the historical context of literature from ancient Mesopotamia. Read Babylonian Epic of Creation, Epic of Gilgamesh, Hammurabi, Genesis, Exodus, Psalms. Stories of creation, law, epic conflict, and conquest.

JWST 3034. Introduction to Jewish History and Cultures. (HIS; 3 cr.; Student Option; Every Fall) Jewish history, society, culture from Second Temple period (5th century BCE) to modern era as illuminated by literature, philosophy, art, film, music, religious law/custom, artifacts of daily life. Emphasizes political, social, cultural contexts that shaped development of Jewish ideas, practices, and institutions.

JWST 3201. The Bible: Context and Interpretation. (LITR; 3 cr.; Student Option; Every Fall & Spring) Introduction to the modern academic study of the Old Testament/Hebrew Bible in the historical context of literature from ancient Mesopotamia. Read Babylonian Epic of Creation, Epic of Gilgamesh, Hammurabi, Genesis, Exodus, Psalms. Stories of creation, law, epic conflict, and conquest.

JWST 3202. Bible: Prophecy in Ancient Israel. (3 cr.; Student Option; Fall Even, Spring Odd Year) Survey of Israelite prophets. Emphasizes Amos, Hosea, Isaiah, Jeremiah, Ezekiel, Second Isaiah. Prophetic contributions to Israelite religion. Personality of prophets. Politics, prophetic reaction. Textual analysis, biblical scholarship. Prophecy viewed cross-culturally. prereq: Rel 1001 or CNES 1201 or CNES 3201


JWST 3204. Dead Sea Scrolls. (3 cr.; Student Option; Spring Odd Year) Introduction to Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for understanding development of the Bible, Background of Judaism and Christianity. Archaeological site of Qumran.

JWST 3205. Women, Gender, and the Hebrew Bible. (AH; 3 cr.; Student Option; Spring Odd Year) How men, women, gender, sexuality is portrayed in Hebrew Bible. Social/religious roles/status of women in ancient Israel. Read biblical texts from academic point of view.

JWST 3502. Ancient Israel: From Conquest to Exile. (3 cr.; Student Option; Periodic Fall) Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focuses on issues raised by archaeological data related to Israelite conquest of Canaan. prereq: Knowledge of Hebrew not required. 3501 recommended

JWST 3504. Ancient Jewish Culture and Identity. (3 cr.; Student Option; Periodic Fall) Ancient Judaism from the Persian restoration (520 BCE) to Roman times (second century CE). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.


JWST 3521W. History of the Holocaust. (WI; 3 cr.; Student Option; Fall Odd Year) Study of the 1933-1945 extermination of six million Jews and others by Nazi Germany on basis of race. European anti-Semitism, implications of social Darwinism and race theory, perpetrators, victims, onlookers, resistance, and theological responses of Jews and Christians.

JWST 3601. Fleeing Hitler: German and Austrian Filmmakers Between Europe and Hollywood. (AH; 3 cr.; Student Option; Fall Odd Year) German/American films by famous directors who left Europe in Nazi period. Analysis of films by Fritz Lang, Max Ophuls, Robert Siodmak, Otto Preminger, Billy Wilder, Douglas Sirk, and others. Films as art works and as cultural products of particular social, political, and historical moments.


JWST 3606. Christians, Muslims, and Jews in the Middle Ages. (GP,HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year) Muslim/Christian expansion, jihad/crusade, anti-Jewish violence/persecution. Trade, intellectual exchange, religious dialogue.
JWST 3729. Nazi Germany and Hitler's Europe. (3 cr.; Student Option; Periodic Fall & Spring) Comprehensive exploration of Third Reich, how Nazis came to power, transformations of 1930s, imposition of racial politics against Jews/others, nature of total war. Historical accounts, memoirs, state documents, view films.


JWST 3900. Topics: Jewish Studies. (3 cr. [max 15 cr.]; A-F or Audit; Periodic Fall & Spring) Historical, religious, sociological, anthropological, and humanistic study of Judaism and the Jewish people. Approach, method of study vary with topic.

JWST 4000W. Final Project, Writing Intensive. (WI; 4 cr.; A-F or Audit; Periodic Fall & Spring) Independent research/writing under supervision of a faculty sponsor. A student may approach any JwSt faculty member to develop a program of independent research/writing in an area of student's choosing, prereq: JwSt major, permission of dir of undergrad studies

JWST 4001W. Final Project, Writing Intensive. (WI; 1 cr.; A-F or Audit; Every Fall & Spring) Independent research and writing, under supervision of a faculty sponsor. Student makes a contract with instructor to write an in-depth research paper, or comparable project, to be completed in conjunction with a JwSt 5xxx course, prereq: concurrent registration is required (or allowed) in 5xxx, JwSt major, permission of dir of undergrad studies

JWST 4878W. Israeli-Palestinian Situation. (GP, WI; 4 cr.; Student Option; Every Fall & Spring) Situation as clash of two communities. History, politics, respective narratives of each community. Divisions within each community that are consequential for reconciliation. Examples of reconciliation literature from both communities.

JWST 5513W. Scripture and Interpretation in Israelite Religion and Judaism. (WI; 3 cr.; A-F or Audit; Spring Odd Year) Idea of divine revelation. Impact on religion/ literature. How history of Bible's creation, transmission, interpretation help us think critically about role of revelation in religious traditions. prereq: At least one upper level course (3xxx or higher) in academic biblical or religious studies

JWST 5992. Directed Readings. (1-12 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent


JOUR 1001H. Honors: Introduction to Mass Communication. (SOC, TS; 3 cr.; A-F or Audit; Every Fall) Mass communication messages/industries. News, advertising, public relations, books, music, film, TV, video games. Technologies of media production. Delivery systems. Political, legal, ethical, social, global aspects of mass communication. Honors, [pre-junior or non-junior major]

JOUR 1501. Digital Games, Sims and Apps. Storytelling, Play and Commerce. (AH, TS; 3 cr.; Student Option; Every Fall) Introduction to academic study of video games, computer simulation/mobile game applications. Digital games as technology, mass communication industry, cultural form/set of design practices.

JOUR 1904. Freshman Seminar. (GP; 3 cr.; A-F or Audit; Every Fall & Spring) Topics specified in class schedule.

JOUR 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall) Topics specified in class schedule.

JOUR 3004V. Honors: Information for Mass Communication. (WI; 3 cr.; A-F only; Every Spring) Information resources for professional/ academic work in mass communication. Techniques for locating, retrieving, appraising, verifying information acquired from public records, libraries, research institutions, databases, Internet, observation, interviews. Honors. [Jour major or mass comm minor or approved BIS/IDIM/ICP program]

JOUR 3004W. Information for Mass Communication. (WI; 3 cr.; A-F only; Every Spring, Fall & Summer) Information resources for professional/ academic work in mass communication. Techniques for locating, retrieving, appraising, verifying information acquired from public records, libraries, research institutions, databases, Internet, observation, interviews. prereq: Jour major or jour minor or approved BIS/IDIM/ICP program (or allowed) in 3004W or concurrent registration is required (or allowed) in 3101 or 3101H or concurrent registration is required (or allowed) in 3004V, [Jour major or admitted pre-jour or approved BIS/IDIM/ICP program]

JOUR 3006. Visual Communication. (3 cr.; Student Option; Every Fall & Spring) Visual media, role of images in mass communication. Social, cultural, historical, psychological approaches.

JOUR 3007. The Media in American History and Law: Case Studies. (HIS; 3 cr.; Student Option; Every Fall) Media in socioeconomic-political-technological context of specific historical period. Focus on legal context/ethics questions.

JOUR 3101. News Reporting and Writing. (3 cr.; A-F only; Every Fall & Spring) Basic news gathering, journalistic writing. Developing story ideas. Problems associated with handling of news/features. Professional standards/responsibilities. prereq: [3004W or 3004V or concurrent registration is required (or allowed) in 3004W or concurrent registration is required (or allowed) in 3004V], [Jour major or admitted pre-jour or approved BIS/IDIM/ICP program]

JOUR 3102. Multimedia Production and Storytelling. (3 cr.; A-F only; Every Fall & Spring) Assemble content for distribution across integrated media platforms. Audio, slide shows, video with sound, computer-based management of photos/video, web-related skills. Media platforms. prereq: [3004W or 3004V or concurrent registration is required (or allowed) in 3004W or concurrent registration is required (or allowed) in 3004V], [Jour major or admitted pre-jour or approved BIS/IDIM/ICP program]

JOUR 3103. Interactive and Data Journalism. (3 cr.; A-F only; Every Fall) Introduction to concepts, tools, techniques for journalism on digital platforms. Audience interactivity around news. Stories through data visualizations. Best practices for social media/blogging. Finding, assessing, structuring data. prereq: [3004W or 3004V], [Jour major or admitted pre-jour or approved BIS/IDIM/ICP program]

JOUR 3121. Intermediate News Reporting. (3 cr.; A-F only; Every Fall & Spring) Reporting news fundamental to basic beats in most news organizations. Crime, government, politics, environment, health, in-depth profiles, issues relating to civic life. prereq: [3004W or 3004V], [Jour major or approved BIS/IDIM/ICP program]

JOUR 3155. Editing for Print and Digital Audience. (3 cr.; A-F only; Every Spring) Improving copy through copy editing/rewriting. Selecting/editing news-editorial content for newspapers, magazines, online services. Experience using news judgment to present information in print/on web. prereq: [3004W or 3004V, 3101 or 3101H], [Jour major or approved BIS/IDIM/ICP program]

JOUR 3173W. Magazine & Feature Writing. (WI; 3 cr.; A-F only; Every Fall & Spring)
JOUR 3201. Principles of Strategic Communication. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Preparation for advanced coursework in advertising or public relations. prereq: [3004W or 3004V, 3101 or 3101H, or 3279W]. [jour major or approved BIS/IDIM/ICP program]

JOUR 3241. Advertising Strategy and Creative Development. (3 cr.; A-F only; Every Fall & Spring)
Advertising appeals/strategy. Advertising for print/broadcast/web. Individual/group projects. prereq: [3004W or 3004V, 3201], [jour major or approved BIS/IDIM/ICP program]

JOUR 3251. Evaluative Research in Strategic Communication. (; 3 cr.; A-F only; Every Fall & Spring)
Applied quantitative research methods in advertising/public relations campaign development, management, and evaluation. Focus on scientific primary research methods. prereq: [3004W or 3004V, 3201 or 3202]. Jour major or approved BIS/IDIM/ICP major

JOUR 3253. Account Planning. (; 3 cr.; A-F only; Every Fall & Spring)
Role of account planning in integrated strategic communications development. Students master skills needed to become an account planner/apply skills in various situations/settings. prereq: [JOUR 3004W or JOUR 3004V, [JOUR 3201 or JOUR 3202], Jour major or approved BIS/IDIM/ICP major

JOUR 3261. Media Planning. (3 cr.; A-F only; Every Fall & Spring)
Media strategy, planning, selection process within context of broader marketing communications process. Paid, owned, earned media across advertising, digital (including social), direct marketing/public relations disciplines. prereq: [3004W or 3004V], [3201 or 3202], [jour major or approved BIS/IDIM/ICP program]

JOUR 3275. Digital Strategy in Strategic Communication. (3 cr.; A-F only; Every Fall & Spring)
Skills course focused on digital media, including integrating variety of social networking platforms with conventional strategic communication activities, prereq: [3004W or 3004V], [3201 or 3202], [jour major or approved BIS/IDIM/ICP program]

JOUR 3279W. Professional Writing for Strategic Communication. (WI; 3 cr.; A-F only; Every Fall & Spring)
Writing expertise for public relations and advertising agency work, corporate and nonprofit strategic communication and development of tactical thinking. prereq: [3004W or 3004V, 3201 or 3202], [jour major or approved BIS/IDIM/ICP]

JOUR 3321. Media Design. (3 cr.; A-F only; Every Fall, Spring & Summer)
Basic principles of graphic design. Develop aesthetic sense/graphic design skills through study/creation of effective communication tools. Tutorial guides. Develop software technology skills necessary to complete assignments. prereq: [3004W or 3004V or concurrent registration is required (or allowed) in 3004W or concurrent registration is required (or allowed) in 3004V]. [jour major or admitted pre-jour or approved BIS/IDIM/ICP program]

JOUR 3451. TV, Radio and Digital News Reporting. (3 cr.; A-F only; Every Fall & Spring)
News writing, reporting, video photography/editing, on-air delivery. prereq: [3004W or 3004V, 3101 or 3101H or 3279W], Jour 3102, [jour major or approved BIS/IDIM/ICP program]

JOUR 3551. Economics of New Media. (TS; 3 cr.; Student Option; Every Spring)
Economic issues related to traditional/new media companies. Emerging communications technologies.

JOUR 3552. Internet and Global Society. (GP; 3 cr.; Student Option; Every Fall)
Structure/processes of Internet/global society in comparative context. Internet, via World Wide Web, as ideal site to explore how/why societies come to see world/issues.

JOUR 3614. History of Media Communication. (HIS,TS; 3 cr.; Student Option; Every Fall & Spring)
Historical perspective on tools of communication from earliest times to present. Impact of new technologies on society.

JOUR 3741. Diversity and Mass Communication. (DSJ; 3 cr.; Student Option; Every Fall)
Past/present depictions of people of color in movies, literature, radio/TV against anthropological, psychological, sociological knowledge/experience. Personal/political effects of media depictions.

JOUR 3745. Mass Media and Popular Culture. (AH,DSJ; 3 cr.; Student Option; Every Fall, Spring & Summer)
Mass media’s role in formation of popular culture/cultural discourse. Prevalent media metaphors, caricatures, stereotypes. Social/commercial pressures influencing media representation.

JOUR 3751. New Media and Culture. (AH,TS; 3 cr.; Student Option; Every Fall, Spring & Summer)
History, theories, social impact of digital/interactive media on culture. How new media, including Internet, mobile devices, websites, applications, social media, may change ways people communicate/distribute/process information.

JOUR 3771. Mass Media Ethics: Moral Reasoning and Case Studies. (CIV; 3 cr.; Student Option; Every Fall, Spring & Summer)
Overview of ethical dilemmas faced by journalists, advertisers, public relations/communications specialists. Case studies, ethical principles/theories, professional codes of ethics.

JOUR 3775. Administrative Law and Regulation for Strategic Communication. (CIV; 3 cr.; Student Option; Every Spring)
Mass communication law/regulation for professional strategic communicators. Court decisions/regulations affecting legal rights/privileges relevant to advertising, public relations, new media professions.

JOUR 3776. Mass Communication Law. (3 cr.; A-F only; Every Fall & Spring)
Brief historical background. First Amendment rights, basic law of defamation, free press/fair trial, access to news, access to press, privacy, contempt, obscenity, regulation of broadcasting/advertising.

JOUR 3776H. Mass Communication Law. (; 3 cr.; A-F only; Every Spring)

JOUR 3796. Mass Media and Politics. (3 cr.; Student Option; Every Fall)

JOUR 3991. Special Topics in Mass Communication: Context. (; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall)
Context course not regularly offered. Topics specified in Class Schedule.

JOUR 3993. Directed Study. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Directed study, projects. Prereq [jour major or jour minor or approved IDIM major or ICP major or BIS major or imper consent, dept consent, college consent.

JOUR 3996. Directed Internship. (; 1 cr. [max 3 cr.]; S-N or Audit; Every Fall, Spring & Summer)
Internship supervised by communications organization at which student is working and by student’s academic sponsor. prereq: Jour major, dept consent

JOUR 4171. Covering the Arts. (3 cr.; A-F only; Every Spring)
Assignments follow Twin Cities arts/entertainment scene or particular arts organization (e.g., Jungle Theater) through its season. Weekly writing assignments, readings, field trips, guest lectures from artists/arts journalists, prereq: [3004W or 3004V, 3101 or 3101H], [jour major or approved BIS/IDIM/ICP program] or instr consent

JOUR 4193. Brovold-Sim Community Journalism Practicum: Murphy News Service. (3 cr.; A-F only; Every Fall & Spring)
Serve as staff writer for student-produced Murphy News Service. Work with instructors/editors to create bylined stories in print, online/multimedia formats for Twin Cities-area newspapers and news service website. Regular off-campus reporting at participating

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newsletters. Weekly staff meetings. prereq: [3004W or 3004V], [3101 or 3101H]. [jour major or approved BIS/IDIM/ICP program]

JOUR 4242. Advertising Portfolio Development. (3 cr.; A-F only; Every Fall & Spring)
Creative development, conceptual thinking, Develop creative ideas based on strategies. Emphasizes print. Applying creative thought to advertising ideas. How to put book together.
prereq: [3004W or 3004V], 3201, 3241, [jour major or approved BIS/IDIM/ICP program]

JOUR 4243. Digital Content Development and Production for Brand Communications. (3 cr.; A-F only; Every Fall & Spring)
Conceptual and practical skills to create, produce, publish and distribute content for branded storytelling including digital audio and video, blogs, web sites, and content created for social platforms; aspects of user experience and graphic design; skills to adapt and modify content after analyzing audience data; professional ethics. prereq: [3004W or 3004V], 3201, 3241 or Jour 3279W. [jour major or approved BIS/IDIM/ICP program]

JOUR 4245. Psychology of Advertising. (3 cr.; Student Option; Every Fall & Spring)
Psychological principles, research techniques, applications in advertising/selling. Consumer attitudes/behavior. Psychological mechanisms upon which effectiveness of advertisements/ commercials depends.

JOUR 4259. Strategic Communication Case Analysis. (3 cr.; A-F only; Every Fall & Spring)
Strategic communication cases related to campaigns/issues in business, government, education, or community. prereq: [3004W or 3004V], [3201 or Jour 3202], any one additional 32xx skills course, [jour major or approved BIS/IDIM/ICP program]

JOUR 4262. Management for Strategic Communication. (3 cr.; A-F only; Every Fall & Spring)
Concepts/methods for effective management in field of mass communication. prereq: [3004W or 3004V], [3201 or 3202], one additional JOUR 32xx skills course, jour major or approved BIS/IDIM/ICP program

JOUR 4263. Strategic Communication Campaigns. (3 cr.; A-F or Audit; Every Fall & Spring)
Developing campaign strategy/tactics. Planning/decision-making skills. Students work in groups with varying specializations. prereq: [3004W or 3004V], 3201, any 32xx skills course, any 42xx skills course or concurrent registration is required (or allowed) in any 42xx skills course, jour major or approved BIS/IDIM/ICP program

JOUR 4272. Interactive Advertising. (3 cr.; A-F or Audit; Every Spring)
Interactive advertising models. Issues related to creating, measuring, pricing, targeting interactive ads. Interactive ads in global, legal, ethical contexts. prereq: Jour major or mass comm minor or approved BIS/IDIM/ICP program

JOUR 4274W. Advertising in Society. (WI; 3 cr.; Student Option; Every Fall & Spring)
Forms of regulation. Self-regulation/governmental. Critique of advertising's role in society. Current issues (e.g., stereotyping, political advertising, advertising to children). Ethics in advertising.

JOUR 4302. Photojournalism. (3 cr.; A-F or Audit; Every Fall & Spring)
Practice of photojournalism in contemporary digital environment. Visual storytelling, digital processing, professional/ethical issues. prereq: [3004W or 3004V], 3102. [jour major or approved BIS/IDIM/ICP program]

JOUR 4303. Documentary Photojournalism. (3 cr.; A-F only; Every Spring)
Conceptualize, research, produce documentary projects consisting of edited photographs/ accompanying text. Projects presented in print or online. Examples of differing approaches, exemplary documentary work. prereq: [3004W or 3004V], 3102. [jour major or approved BIS/IDIM/ICP program] or instr consent

JOUR 4451. Advanced Multimedia Storytelling. (3 cr.; A-F or Audit; Every Fall)
Long-form storytelling using video, audio, graphics, and still photography, edited into multimedia presentations for journalistic and persuasive messages.

JOUR 4452. Electronic Newscast Producing. (3 cr.; A-F only; Every Spring)
Planning, writing, producing live TV newscasts. Lecture, lab. prereq: [3004W or 3004V], [3101 or 3101H], 3451, [3121 or concurrent registration is required (or allowed)] in 3121. [jour major or approved BIS/IDIM/ICP program]

JOUR 4721. Mass Media and U.S. Society. (DSJ,SOC; 3 cr.; Student Option; Every Spring)

JOUR 4721H. Mass Media and U.S. Society. (DSJ,SOC; 3 cr.; A-F only; Every Spring)
Economic, political, social determinants of character/content of mass communications in America. Effect, structure, functioning of mass media. Problems, prospects, criticism. Professionalism, technology, reform. prereq: Honors

JOUR 4733H. Honors Thesis Seminar. (WI; 3 cr.; A-F only; Every Fall & Spring)
Students work under supervision of instructor, with input from subject or methodological advisers, to define research question, conduct research, and write thesis. Students serve as consultants to one another. prereq: Jour major, [jr or sr], honors

JOUR 4801. Global Communication. (3 cr.; Student Option; Every Spring)

JOUR 4990. Special Topics in Mass Communication: Professional. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Professional-skills-learning opportunity not regularly offered. Topics specified in Class Schedule. prereq: [3101 or 3201 or 3202], 3004. [jour major or approved IDIM major or ICP major or BIS major]

JOUR 4991. Special Topics in Mass Communication: Context. (3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall & Spring)
Special context topics not regularly offered. Topics specified in Class Schedule.

JOUR 4992. Field Based Practicum. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring)
Professional-skills-learning experience on-site at media organization. Topics specified in Class Schedule. prereq: Jour major

JOUR 4993H. Honors: Projects. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Honors projects. Prereq Jour major, honors div regis, college consent, dept consent, instr consent.

JOUR 5001. Introduction to Mass Communication Theory and Research. (3 cr.; A-F only; Every Fall)
Course is designed to provide an overview of the evolution and content of the major intellectual perspectives, theories, and methodological approaches that serve as the basis for the mass communication discipline. Provides the intellectual base for first-year master's students' graduate work in mass communication, as well introduces advanced undergraduate students to graduate study in the discipline. prereq: Grad students enrolled in Mass Communication MA or PhD program

JOUR 5131. In-Depth Reporting. (3 cr.; A-F only; Every Fall)
Techniques/issues of special project stories. Explanatory, investigative, civic, literary, or ethnographic journalism. Topics (e.g., civil rights, governmental malfeasance, health care problems) typically involved in stories. prereq: [3004W or 3004V], [3101 or 3101H], 3121. [jour major or approved BIS/IDIM/ICP program]

JOUR 5155. Database Reporting. (3 cr.; A-F only; Every Spring)
Obtaining and analyzing digital data for computer-assisted reporting that can be published on various media platforms. Using spreadsheets and databases to manage information, find news stories, produce maps and graphics. prereq: [jour major or approved IDIM major or ICP major or BIS major]

JOUR 5174. Magazine Editing and Production. (3 cr.; A-F only; Every Fall & Spring)
Writing, editing, illustration, design, layout, photo-composition of print or web magazine. Emphasizes reporting, telling substantive stories. Work in groups with varying specializations. prereq: [3004W or 3004V], [3155 or 3173W or 3279W or 3321 or 4302], [jour major or approved BIS/IDIM/ICP program]

JOUR 5251. Strategic Communication Theory. (3 cr.; Student Option; Every Spring)
Psychological principles, research techniques, applications in advertising/selling. Consumer attitudes/behavior. Psychological mechanisms upon which effectiveness of advertisements/commercials depends.

**JOUR 5501. Communication, Public Opinion, and Social Media.** (3 cr.; Student Option; Every Fall) Theories of mass communication, persuasion, attitude change. Functions of mediated communication in formation/diffusion of public opinion about major social/political issues. Social media as tool for measuring/influencing public opinion.

**JOUR 5541. Mass Communication and Public Health.** (3 cr.; Student Option; Every Fall) Intersection of mass media, public health behavior. Role of theory in understanding intended/unintended campaign effect. Role of health journalism. Decisions that inform media-based interventions.

**JOUR 5542. Theory-based Health Message Design.** (3 cr.; A-F or Audit; Every Spring) Best practices for message design across media/contexts. Students apply concepts to design health campaign messages that affect various audiences. Implications of theories of message engagement for current public health practice.

**JOUR 5543. Public Health Campaign Evaluation.** (; 3 cr.; A-F or Audit; Every Fall) Evaluate process and outcomes of message-based health interventions. Utilize campaign evaluation literature. Develop recommendations for evaluation research design based on cross-sectional, experimental, and time-based designs. Focus on evaluation options within constraints.

**JOUR 5552. Law of Internet Communications.** (3 cr.; A-F or Audit; Every Spring) Whether/how/which traditional media laws/regulations apply to Internet. Developing law of communication on Internet, global/ethical issues.

**JOUR 5601W. History of Journalism.** (WI; 3 cr.; Student Option; Every Spring) Development of American media from beginnings in Europe to present day. Rise of film/radio/television/Internet. Relation of communications development to political, economic, social trends.

**JOUR 5606W. Literary Aspects of Journalism.** (WI; 3 cr.; Student Option; Every Spring) Literary aspects of journalism. American/British writers, past/present. Lectures, discussions, weekly papers, critiques.

**JOUR 5725. Management of Media Organizations.** (3 cr.; Student Option; Every Fall) Introduction to concepts/principles of media management. Strategic planning, leadership, organizational strategies, ethical/legal issues. Working in teams. Balance sheets, income statements. Motivating/promoting people.

**JOUR 5777. Contemporary Problems in Freedom of Speech and Press.** (3 cr.; A-F or Audit; Every Fall) Legal/constitutional derivation of freedom of press/speech. Emphasizes case law, statutes, judicial theories. Leading cases in privacy, torts, prior restraints, news gathering/dissemination. Access to courts/government, including via Internet. Legal-research techniques. prereq: Jour major or jour minor or approved IDS/IDIM/ICP program

**JOUR 5990. Special Topics in Mass Communication: Professional.** (; 3 cr. [max 6 cr.]; A-F or Audit; Every Spring) Professional skills and learning opportunity not regularly offered. Topics specified in class schedule.

**JOUR 5991. Special Topics in Mass Communication: Context.** (; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Spring) Special context topics not regularly offered. Topics specified in Class Schedule.

**JOUR 5993. Directed Study.** (1-3 cr.; A-F or Audit; Every Fall, Spring & Summer) Directed study/projects. Prereq [Jour major or jour minor or approved IDS/IDIM major or ICP major or BIS major], GPA of at least 3.00, college consent, dept consent, instr consent.

**JOUR 8001. Studies and Theories of Mass Communication.** (3 cr.; A-F or Audit; Every Fall) Introduction to key concepts, theories, methods in study of mass communication from social sciences perspective. Survey of research literature using individualistic/structural approaches.

**JOUR 8002. Studies in Mass Communication II.** (3 cr.; A-F or Audit; Every Spring) Literature on history of the field, cultural and humanistic approaches to its study, and legal and ethical issues. prereq: 8001

**JOUR 8003. Digital Media Issues and Theories.** (3 cr.; A-F or Audit; Periodic Fall & Spring) Nonprofessional skills course. Prepares entering graduate students to work in changing media environment. Political, social, economic, legal, ethical, technological implications nationally/globally. Produce scholarly research about changing media. prereq: Journalism grad student

**JOUR 8009. Pro-seminar in Mass Communication.** (1 cr.; S-N only; Every Fall) Introduction/socialization to scholarly discipline of mass communication, mass communication pedagogy, pathways to successful career. Develop action plan for completing graduate school/starting career in academy or relevant communication industries. prereq: Grad students enrolled in Mass Communication MA or PhD program

**JOUR 8191. Health Journalism: Introduction to Health and Medical Journalism.** (; 3 cr.; A-F or Audit; Every Fall) Best practices in health/medical reporting in different formats/media. Story ideas that challenge conventional wisdom about health care. Elements of health beat. Narrative/investigative styles of journalism. Students do semester-long project. prereq: Enrolled in MA in health journalism or instr consent

**JOUR 8192. Advanced Health Journalism: Computer-Assisted Reporting on Health.** (; 3 cr.; A-F or Audit; Every Spring) How to use data/databases to tell health news stories or help with health campaigns. Databases, how to access them. How to mine data for effective communication to consumer audience. prereq: Enrolled in MA in health journalism or instr consent

**JOUR 8193. Health Communication Capstone.** (; 3 cr.; A-F or Audit; Every Spring) Focus on different aspects of a health issue, audience, context, and message mix that is central to the Health Communication M.A. program. Develop a final project focusing on a health communication topic of interest. Projects would be a publishable article, research paper, multimedia production, or any other format relevant for the chosen topic. Project is accompanied by a reflection paper.

**JOUR 8194. Health Communication Practicum.** (; 3 cr.; A-F only; Every Summer) Field-based practicum for students enrolled in the Health Communication M.A. program. Work with a local non-profit or for profit organization in the health care domain. Participatory observation study: work with organization staff on a strategic communication project and use experiences to analyze how message, audience, and context design processes take place in professional health communication settings.

**JOUR 8200. Strategic Communication Research Methods.** (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Concepts, analytical techniques, and methods to analyze audiences, target markets, and social trends affecting communication strategy in context of complex and rapidly changing media environments. prereq: Strat Comm MA grad major

**JOUR 8201. Factors Affecting Communication Strategy.** (; 3 cr.; A-F only; Every Fall, Spring & Summer) Literature/research concerning identification/analysis of the media and environmental, regulatory, competitive, and economic factors that affect the development of communication strategy. prereq: Strat Comm MA grad major

**JOUR 8202. Generation and Selection of Communication Strategies.** (; 3 cr.; A-F only; Every Fall, Spring & Summer) Concepts/methods to support analytic/creative processes that lead to development of breakthrough communication strategies. Criteria for selecting among strategic alternatives. prereq: Strat Comm MA grad major

**JOUR 8203. Integration of Communication Strategies Across Media.** (; 3 cr.; A-F only; Every Fall, Spring & Summer) Concepts, analytical techniques, and methodologies used to plan communication
strategies and implement communication campaigns utilizing a diverse range of media. prereq: 8200, 8201, 8202, strat comm MA grad major

JOUR 8204. Measuring the Effectiveness of Strategic Communication Campaigns. (3 cr.; A-F only; Every Fall, Spring & Summer) Examination, evaluation, and application of concepts/methods to evaluate effectiveness of strategic communication campaigns and their components. prereq: 8203, Strat Comm MA grad major

JOUR 8205. Cases in Strategic Communication. (3 cr.; A-F only; Every Fall, Spring & Summer) Case study analysis concerning development, implementation, and evaluation of communication strategies. Cases cover broad range of organizations, focus on such issues as brand introduction, brand reinforcement, revitalizations, crisis communication, issues management, and legal/ethical considerations. prereq: 8203, strat comm MA grad major

JOUR 8206. Directed Study: Development of an Integrated Strategic Communication Campaign. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Project to develop a case study analysis concerning development, implementation, and evaluation of a strategic communication campaign. prereq: 8205, strat comm MA grad major

JOUR 8290. Special Topics in Strategic Communication. (3 cr.; A-F only; Every Summer) Topics specified in Class Schedule. prereq: Strat Comm MA grad major

JOUR 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

JOUR 8442. Seminar: Broadcast News. (3 cr.; A-F or Audit; Periodic Fall & Spring) Major issues. Confrontations between federal government and national news departments. Historical studies. prereq: 4442 or instr consent

JOUR 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

JOUR 8501. Seminar: The Process of Quantitative Mass Communication Research. (3 cr.; A-F or Audit; Every Fall) Logic of social sciences research. Relationship between theory and research, concept explanation, measurement, instrumentation, and design issues. prereq: 9 cr soc sci, EPsy 5260 or equiv or concurrent registration is required (or allowed) in EPsy 5260

JOUR 8502. Seminar: Multi-method research in Mass Communication. (3 cr.; A-F or Audit; Every Spring) Quantitative/qualitative research principles/techniques applied to mass communication and kindred questions. Reliability, generalizability, and validity in their classic/contemporary senses. Survey methods, focus groups, interviews, other methods. Emphasizes "triangulation" of diverse methods. prereq: 8501, [EPsy 5260 or equiv or concurrent registration is required (or allowed) in EPsy 5260]

JOUR 8503. Seminar: Qualitative Methods in Mass Communication Research. (3 cr.; A-F or Audit; Every Spring) Qualitative research methodology/data analysis techniques used in field of mass communication. How to conduct qualitative research to address questions related to mass communication. Ethnography, interviews, focus groups, case study, qualitative content analysis, historical research. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8504. Seminar: Analyzing Media Content. (3 cr.; A-F or Audit; Periodic Fall & Spring) Methods of analyzing media content/application of methods to theoretically-driven studies of media content. Conceptual/methodological issues surrounding analyzing media content in today's contemporary digital media environment, including collecting social media data, computer-aided analyses, prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8513. Seminar: Ethnographic Methods in Mass Communication Research. (3 cr.; A-F or Audit; Every Spring) Theoretical foundations in anthropology/sociology. Field projects. prereq: [8001, 8002] or instr consent; same as Anth 8810

JOUR 8514. Seminar: Advanced Mass Communication Theories. (3 cr. [max 9 cr.]; A-F or Audit; Periodic Fall & Spring) Research paradigms, concepts, findings for developing general theory of mass communication. prereq: 8001

JOUR 8601. Seminar: Methods in Mass Communication History Research. (3 cr.; A-F or Audit; Every Fall & Spring) Critical analysis of research in journalism/communication history. Research designs/methods. Development of a research project. prereq: 8001, 8002

JOUR 8602. Seminar: History of Mass Communication. (3 cr.; A-F or Audit; Periodic Spring) Research in history/development of U.S. mass media

JOUR 8603. Seminar: Theories and Models in Mass Communication History Research. (3 cr.; A-F or Audit; Periodic Fall & Spring) Literature on theory in historical research. Uses of theoretical models in historical explanations. Role of theory in historical research, debate about uses. Specific works in journalism/communication history in context of theoretical models. Development of major paper examining models/theories relevant to student's project. prereq: 5601, instr consent

JOUR 8620. Seminar: Advertising Theory and Research. (3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Advertising as persuasive communication. Current research/theory related to advertising decision-making process. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8621. Seminar: Public Relations Theory and Research. (3 cr.; A-F only; Periodic Fall & Spring) Study of theoretical body of knowledge in public relations field. Diverse roles played by public relations in organization. Current state of public relations research in regard to theory building. How theory informs professional practice of public relations. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8650. Seminar: Psychology of Media Effects. (3 cr.; A-F only; Periodic Fall & Spring) In-depth study of psychological concepts/theories concerning individual cognitive processing of content of both traditional/new electronic media. Critically evaluate latest empirical research concerning how individuals respond to the content of both traditional mass media/newest electronic digital media. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8651. Seminar: Mass Communication, Audiences, and Society. (3 cr.; A-F or Audit; Periodic Fall & Spring) Interplay between social theories/media studies. Pragmatism, structural-functionalism, Marxism, political economy, cultural studies, globalization. prereq: 8001 or 8002 or equiv

JOUR 8661. Seminar: Mediated Political Communication in the Digital Age. (3 cr.; A-F or Audit; Every Fall) Mediated political communication in the digital age. How news, advertising, and entertainment media shape political perceptions, motivate voters, and influence policy decisions. Agenda-setting, priming, and framing, networked communications, micro-targeting, and mobile technology.

JOUR 8662. Seminar: Literary Aspects of Journalism. (3 cr.; A-F or Audit; Periodic Fall & Spring) Research in literary aspects of journalism exemplified in careers/works of American/British writers. prereq: 5606

JOUR 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

JOUR 8671. Seminar: Communication Ethics–Public/Civic Journalism. (3 cr.; A-F or Audit; Periodic Fall & Spring) Historical underpinnings, philosophical debate, theoretical dynamics, legal concerns, ethical implications.

JOUR 8673. Seminar: Media Management. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Management issues in media organizations. Relation to dynamics of organization structure, employees, markets, economics/finances. prereq: 5725 recommended

JOUR 8675. Seminar: Issues in Information Access and Communication. (3 cr.; A-F or Audit; Periodic Fall) Societal, industry, technological, and policy aspects/developments that affect information access, particularly through mass media. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8678. Seminar: Constitutional Law--Theories of Freedom of Expression. (3 cr.; A-F or Audit; Every Spring) Problems of constitutional/tort law affecting the press. Underlying theories. prereq: 5777 or instr consent or law student

JOUR 8679. Seminar: Research Methods in Media Ethics and Law. (3 cr.; A-F or Audit; Periodic Fall & Spring) Research at intersection of first amendment and media ethics.

JOUR 8681. Seminar: International Media Perspectives. (3 cr.; A-F or Audit; Periodic Fall & Spring) Main problems/currents. Concepts, research, policy relevant to global development. Issues of freedom/constraint, media technology, role of journalism in world affairs.

JOUR 8720. Seminar: Mass Media and Health. (3 cr.; A-F only; Periodic Fall & Spring) Theories, methods, research that characterize field of health communication. Mass media influence on health, including use of mass media to promote health behaviors. Theoretical frameworks that inform health communication scholarship, as well as methodological approaches to studying health communication issues. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8721. Seminar: Communication Agencies as Social Institutions. (3 cr.; A-F or Audit; Every Fall & Spring) Influence/effects of mass communication, internal dynamics of media organizations, criticism/modes of reform. Theoretical frameworks for analysis.

JOUR 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

JOUR 8801. Seminar: Comparative Research in Mass Communication, a Cross-National Approach. (3 cr.; A-F or Audit; Periodic Fall & Spring) Comparative research designs/strategies. Analysis of production, presentation, transmission, and consumption of mass media products/services (particularly news, entertainment, and information) across national borders. Theoretical concerns, empirical problems, policy. Ethical issues involving research on form/content of mass communication within/between countries. prereq: 4801 or 5825

JOUR 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

JOUR 8990. Special Problems in Mass Communications. (3-4 cr.; max 12 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. prereq: Mass comm grad student or instr consent

JOUR 8993. Directed Study. (1-6 cr.; A-F or Audit; Every Fall, Spring & Summer) Directed study. prereq: Grad mass comm major or minor, instr consent, dept consent

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Kenya (KNYA)

KNYA 1221. Beginning Swahili I. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

KNYA 1222. Beginning Swahili II. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

KNYA 3001. Engineering in the Developing World. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

KNYA 3002. Intercultural Perspectives on Work. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

KNYA 3225. Intermediate Swahili I. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

KNYA 3226. Intermediate Swahili II. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

KNYA 3231. Advanced Swahili. (4 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

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Kinesiology (KIN)

KIN 1050. Beginning Military Physical Fitness Training. (1-1 cr.; max 4 cr.; A-F or Audit; Every Fall & Spring) The Army’s model of physical fitness training is used to address five aspects of fitness in the context of running, weight training, strength exercise, circuit training, and team sport activities. Students are organized into groups of similar fitness levels.

KIN 1871. Survey of Kinesiology, Recreation, and Sport. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Professional practice and disciplinary dimensions of kinesiology, recreation, and sport. Subdisciplines, relevant issues, practical applications.

KIN 1904. Freshman Seminar: Global Perspectives. (GP; 3 cr.; max 6 cr.; Student Option; Periodic Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule. prereq: Fr

KIN 1905. Freshman Seminar. (1-3 cr.; max 6 cr.; Student Option; Every Fall) Interdisciplinary seminar. Topics specified in Class Schedule.

KIN 3001. Lifetime Health and Wellness. (SOCS; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Overview of health/wellness. Physical, emotional, intellectual, spiritual, social, environmental, and financial health. Influence of societal changes on general health/wellness of diverse populations.

KIN 3027. Human Anatomy for Kinesiology Students. (3 cr.; A-F or Audit; Every Spring) Introduction to human anatomy. Emphasizes musculoskeletal anatomy germane to athletic training, biomechanics, exercise physiology, motor learning/development.

KIN 3050. Advanced Military Physical Fitness Training. (1-4 cr.; A-F or Audit; Every Fall, Spring & Summer) Students take on leadership roles in implementing Army’s model of physical fitness training. Model addresses five aspects of fitness in the context of running, weight training, strength exercise, circuit training, and team sport activities. prereq: 4 cr of 1050 or instr consent

KIN 3112. Introduction to Biomechanics. (4 cr.; A-F only; Every Fall, Spring & Summer) Mechanical principles governing human motion. Human bone, muscle, and neurophysiology. Measurements of human performance. Clinical/applied sport biomechanics. Lab introduces technology for assessing human motor function such as electromyography or force sensors. prereq: [PHYS 1101W or PHYS 1201W or PHYS 1301W or PHYS 1401W or 1107], [3027 or 3111 or ANAT 3001 or ANAT 3601 or ANAT 3611 or INMD 3001 or INMD 3001]; 3385 recommended

KIN 3114. Prevention and Care of Athletic Injuries. (3 cr.; A-F only; Every Fall, Spring & Summer) Principles in athletic training for prevention/care of injury. Taping/bracing techniques. Lab. prereq: [3027 or ANAT 3001 or ANAT 3601 or ANAT 3611 or equiv], [CEHD student or instr consent]

KIN 3126W. Sport and Exercise Psychology. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Thoughts, feelings, and behaviors of people in physical activity contexts. Foundations approach to theory/research in sport and exercise psychology. prereq: Kin major or instr consent

KIN 3131W. History and Philosophy of Sport. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Introductory description and interpretation of the historical and philosophical development of physical education and sport from primitive societies to 20th century civilization. prereq: Kin major or instr consent
KIN 3132. Introduction to Motor Development Across the Lifespan. (3 cr.; A-F only; Every Spring & Summer) Developmental aspects of human movement behavior/learning. Life span change of motor skills. prereq: Kin major or instr consent

KIN 3135. Introduction to Motor Learning and Control. (3 cr.; A-F or Audit; Every Fall & Spring) Main theoretical ideas/research that have advanced motor control/learning over last three decades.

KIN 3136. Mental Skills Training for Sport. (3 cr.; A-F only; Every Fall & Spring) Experientially-based course. Using mental skills training strategies (e.g., imagery, goal setting, relaxation, cognitive restructuring, motivation) for enhancing sport performance and personal growth of athletes.

KIN 3143. Organization and Administration of Sport. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) How to organize/administer sports/activities. Practice/class organization, meet/game organization, facility/equipment needs, finances. prereq: Kin major or instr consent

KIN 3168. Soccer Coaching Theory and Skill Development. (2 cr.; A-F only; Every Spring) Coaching theory and skill development necessary to coach soccer. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3169. Volleyball Coaching Theory and Skill Development. (2 cr.; A-F only; Every Spring) Coaching theory and skill development necessary to coach volleyball. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3171. Baseball Coaching Theory and Skill Development. (2 cr.; A-F only; Every Fall & Summer) Coaching theory and skill development necessary to coach baseball. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3172. Basketball Coaching Theory and Skill Development. (2 cr.; A-F only; Every Fall & Summer) Coaching theory and skill development necessary to coach basketball. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3173. Football Coaching Theory and Skill Development. (2 cr.; A-F only; Every Spring & Summer) Coaching theory and skill development necessary to coach football. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3178. Tennis Coaching Theory and Skill Development. (2 cr.; A-F only; Periodic Fall & Summer) Coaching theory and skill development necessary to coach tennis. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3179. Track and Field Coaching Theory and Skill Development. (2 cr.; A-F only; Every Fall) Coaching theory and skill development necessary to coach track and field. prereq: [Enrolled in coaching program or KIN major or instr consent], skills sufficient for participating in drills/game/match/context for demonstration/teaching purposes

KIN 3327. Teaching Physical Education in the Elementary School. (2 cr.; A-F only; Every Fall & Spring) Overview of the elementary physical education process with focus on a classroom teacher's perspective and needs. Representative experiences include participation, lecture, micro-teaching, final test.

KIN 3385. Human Physiology. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Functional/integrative approach organized by level of description, from molecular genetics to dynamic movement/clinical conditions. Cellular mechanisms for major physiological functions. Exercise, fitness, health, growth. prereq: [KIN 3027 or ANAT 3001 or ANAT 3601 or ANAT 3611], KIN major or instr consent

KIN 3505. Intro to Human-Centered Design. (3 cr.; Student Option; Every Fall) Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

KIN 3696. Supervised Practical Experience. (1-10 cr.; A-F only; Every Fall, Spring & Summer) On-the-job supervised practical experience in the fields of sport and exercise under a specialist in a particular area of study or emphasis. prereq: instr consent

KIN 3720. International Studies in Kinesiology. (2-4 cr.; [max 12 cr.]; Student Option; Periodic Fall, Spring & Summer) Topics from research exploration, to academic and engagement activities. Delivered in an international setting. Course requirements are determined by instructor(s) and reflect advanced undergraduate rigor. prereq: instr consent

KIN 3982. Research Methods in Kinesiology. (3 cr.; A-F only; Every Fall, Spring & Summer) How to understand/interpret/read research. Research question, study design, quantitative/ qualitative methods. Instrumentation, statistical methods, study limitations/implications. Critiquing peer-reviewed articles. Designing a research study. prereq: Kin major or instr consent

KIN 3993. Directed Study in Kinesiology. (1-10 cr.; A-F only; Every Fall, Spring & Summer) Students work with faculty and graduate students on research or scholarly/creative activities. Students usually assist with faculty scholarship or carry out projects of their own under faculty supervision. prereq: instr consent

KIN 3993H. Directed Study in Kinesiology: Honors. (1-10 cr.; A-F only; Every Fall, Spring & Summer) Student-selected clinical or research experience. prereq: Kin honors, instr consent

KIN 4001H. Honors Seminar in Kinesiology. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring) Contemporary issues in kinesiological research. Laboratory rotations, development of UROP project proposal, development of senior thesis topic, advanced study, career opportunities in Kinesiology, special learning opportunities. prereq: Kinesiology honors

KIN 4133. Perceptual-Motor Control and Learning. (3 cr.; A-F or Audit; Every Fall & Spring) Concepts/principles of coordination/control of perceptually guided movement. Constraints imposed by properties of environment, body (including the nervous system), and goals of behavior. Why we move the way that we do. prereq: [3112, 3132, 3135, KIN major] or instr consent

KIN 4134. The Aging Motor System. (3 cr.; A-F only; Every Fall & Spring) Impact of aging on the motor system and its influence on activities of daily living (ADL); posture, falls, participation in physical activity, performance operating personal transportation systems. Effects of aging (behavioral and biological) on coordination/control and its related perceptual-cognitive correlates. prereq: [3132, 3135, KIN major] or instr consent

KIN 4136. Embodied Cognition. (3 cr.; A-F only; Every Fall & Spring) Introduction to relations between physical behavior/mental activity. Cognitive, emotional, social aspects. Concepts of embodied cognition, their relation to traditional concepts of mind/body. Lifespan development, empirical research. prereq: 3132 or 3135 or instr consent

KIN 4214. Health Promotion. (3 cr.; A-F only; Every Fall & Spring) Behavioral and environmental theories of health promotion. How to develop and evaluate programs. Smoking cessation, asthma management programs. Students develop a health promotion program for their class project.

KIN 4385. Exercise Physiology. (4 cr.; A-F only; Every Fall, Spring & Summer) Effects of exercise on physiological systems of human body. Energy/nutritional requirements of exercise, exercise prescription, athletic conditioning, ergogenic aids, exercise in

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
environmental extremes, gender/heritability factors related to adaptation to training. prereq: [3385 or PHSL 3051, or equiv], kin major] or instr consent

KIN 4441. Movement Neuroscience. (3 cr. [max 6 cr.]; A-F only; Periodic Fall) Neural basis of human motor function. Neuroanatomy and neurophysiology of motor control and learning. Seminar for students in kinesiology, neuroscience, physical therapy, physiology, psychology, bioengineering, and human movement science. prereq: 3135 or instr consent

KIN 4520. Current Topics in Kinesiology. (1-2 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Issues in kinesiology or in areas not normally available through regular curriculum offerings. prereq: Upper div in KIN or REC or SMGT or coaching or instr consent

KIN 4641. Training Theory & Analytics I for Sport Performance. (3 cr.; A-F only; Every Fall & Spring) Course prepares students to systematically design training & conditioning programs for performance, specific to conditioning within aerobic and anaerobic demands. This course utilizes mathematical models with physiological adaptations to maximize performance in sport, dance, public safety and military elites. prereq: KIN 4385 or exercise physiology course], [upper level undergrad or M.Ed. or grad student]

KIN 4697. Student Coaching and Seminar. (3 cr.; S-N or Audit; Every Fall, Spring & Summer) Student coaching practicum under supervision of mentor. Seminar classes. Development of integrative project. prereq: [Coaching minor or certificate] student, GPA of at least 2.50

KIN 4741. Training Theory & Analytics 2 for Sport Performance. (3 cr.; A-F only; Every Fall, Spring & Summer) Course prepares students to systematically design training & conditioning programs for performance, specific to speed, power, reaction & agility. This course utilizes periodization models with expected physiological & neuromuscular adaptations to maximize human performance in sport, dance, public safety and military elites. prereq: KIN 4641, [upper level undergrad or M.Ed. or grad student]

KIN 4981. Understanding Kinesiology Research. (3 cr.; A-F only; Every Fall, Spring & Summer) Preparers students to critically analyze research specific to kinesiology. prereq: Intro statistics recommended

KIN 5001. Foundations of Human Factors/ Ergonomics. (3 cr.; A-F or Audit; Every Fall) Variability in human performance as influenced by interaction with designs of machines and tools, computers and software, complex technological systems, jobs and working conditions, organizations, and sociotechnical institutions. Emphasizes conceptual, empirical, practical aspects of human factors/ergonomic science.

KIN 5103. Developmental/Adapted Physical Education. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Introduction to physical education for students with disabilities. Emphasizes conceptual, organizational, and administrative issues. Topics include historical and legal foundations, service components, individualized education plans, professional roles, and assessment of movement skills.

KIN 5104. Physical Activities for Persons with Disabilities. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Different approaches to providing physical education service and related movement interventions for persons with disabilities. Topics: movement behavior foundations, movement skill progressions, unique considerations for specific impairments, and sport for persons with disabilities

KIN 5111. Sports Facilities. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use. prereq: KIN or REC grad student or MEd student

KIN 5115. Event Management in Sport. (3 cr.; A-F or Audit; Every Fall & Spring & Summer) Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events, benefits, professional events. prereq: Grad student, instr consent

KIN 5122. Applied Exercise Physiology. (3 cr.; A-F or Audit; Periodic Fall) Mechanisms of cardiorespiratory and muscular responses to exercise; application of exercise physiology to assessment of work capacity, athletic conditioning, and requirements of human powered vehicles; low to moderate exercise as an intervention in lowering risk for common health problems. prereq: 4385 or equiv or instr consent

KIN 5123. Motivational Interventions in Physical Activity. (3 cr.; A-F only; Every Fall & Spring) Psychological principles related to physical activity (PA). Delivery of motivational interventions for physical activity. Motivational PA interventions. Two papers, one presentation, two exams. prereq: 3126W or grad student

KIN 5126. Social Psychology of Sport & Physical Activity. (3 cr.; A-F only; Every Fall & Spring) Theory/research on social influences, individual differences, motivational processes. How sport/physical activity contribute to psycho-social development. Social psychological factors influencing physical activity beliefs/behaviors. prereq: 3126W or equiv or grad student or instr consent

KIN 5136. Psychology of Coaching. (3 cr.; A-F only; Every Fall, Spring & Summer) Psychological dimensions of coaching across age levels, including coaching philosophy, leadership, communication skills, motivation, and mental skills training for performance enhancement.

KIN 5141. Nutrition and Exercise for Health Promotion and Disease Prevention. (3 cr.; A-F only; Every Fall) Requirements/physiologic roles of nutrients/physical activity in promotion of health. Assessment of energy requirements. RDAs, food composition/safety, weight management. Prevention of chronic diseases. Coronary heart disease. prereq: FScN 1112 or equiv

KIN 5142. Applied Nutrition for Sport Performance and Optimal Health. (3 cr.; A-F only; Every Spring) This course is designed for students interested in nutrition as it relates to health, exercise and athletic training. Evidenced based information is used to apply current nutrition concepts to improve health, physical and athletic performance. Case studies as well as personal data are employed throughout course to support concepts of lecture.

KIN 5152. Curriculum Development in Physical Education. (3 cr.; A-F or Audit; Every Spring) Trends, issues, and challenges in early childhood/K-12 physical education. Potential effect on curriculum. prereq: initial licensure/MEd phys ed student

KIN 5196. Practicum: Development/Adapted Physical Education. (1-4 cr.; S-N only; Every Fall & Spring) Observation of, participation in physical education instruction for students with disabilities. Current issues in developmental/adapted physical education. Exchange of ideas/problems. prereq: [5103 or 5104], instr consent


KIN 5203. Health Media, Consumerism, and Communication. (2 cr.; A-F only; Every Spring) Effects of media, consumerism, technology, and health related issues. Students form/defend opinions on positive/negative aspects of how health information is disseminated and how individual health decisions are made.

KIN 5204. Methods in Health Education. (3 cr.; A-F only; Every Fall) Background knowledge/skills to deliver comprehensive health education program. Techniques, skills, and methods for teaching active learning projects. Lessons/units in health curriculum discussed/demonstrated. Focuses on grades 5-12. prereq: Health licensure student or instr consent

KIN 5205. Health Education Curriculum. (3 cr.; A-F only; Every Fall)
KIN 5235. Advanced Biomechanics II: Kinetics. (3 cr.; A-F or Audit; Spring Odd Year)
Kinetic aspects of human movement (single/multi-joint torques, simple inverted pendulum models, mass-spring systems). Analysis of experimental data and of computer simulations. Lectures, seminars, lab. prereq: [3112 or equiv], PMed 5135, undergrad college physics, intro calculus

KIN 5371. Sport and Society. (3 cr.; A-F or Audit; Every Spring)
Sport, sporting processes, social influences, systems. Structures that have effected and exist within/among societies, nations, and cultures. Contemporary issues such as social differentiation, violence, and honesty. prereq: [3126W, grad student] or instr consent

KIN 5375. Youth Sport Science. (3 cr.; A-F only; Every Spring)
Cognitive, behavioral, and biological factors having important implications for competitive sport participants from early childhood through high school age. Emphasis on translating sport science research into practical implications for youth sport coaches, teachers, and administrators.

KIN 5385. Exercise for Healthy Aging & Disease Prevention and Management. (3 cr.; A-F only; Every Spring)
Exercise prescription/physiology with modifications required because of special considerations associated with aging, gender differences, or presence of medical conditions. prereq: Physiology or biology undergrad

KIN 5421. Sport Finance. (3 cr.; A-F or Audit; Every Fall)
Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies associated with aging, gender differences, or presence of medical conditions. prereq: Physiology or biology undergrad

KIN 5435. Advanced Theory and Techniques of Exercise Science. (3 cr.; A-F only; Every Spring)
Theoretical constructs, in-depth description of procedures used in exercise science research and clinical settings. Laboratory exercises, lectures. prereq: [3385, 4385, Kin major] or instr consent

KIN 5441. Applied Sport Science Research. (3 cr.; A-F only; Every Fall, Spring, & Summer)
Introduction to varied contributions of sport sciences to athletic performance. Evaluation of historical research’s contributions toward modern day research questions.

KIN 5461. Issues in the Sport Industry. (3 cr.; A-F only; Every Fall)
Critical analysis of management issues within sport industry. Strategic management, corporate social responsibility, human resource management/diversity, governance, sport globalization, sport development. prereq: postbac or grad student or instr consent

KIN 5485. Advanced Electrocardiogram Interpretation. (3 cr.; A-F only; Every Fall)
Placement and interpretation. Clinical exercise testing hands-on experience in electrocardiogram for resting and exercise testing situations. prereq: [3385, 4385] or instr consent

KIN 5505. Human-Centered Design - Principles and Applications. (3 cr.; Student Option; Every Fall)
Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

KIN 5511. Sport and Gender. (3 cr.; A-F only; Every Fall)
Critically examines women's involvement in/ contributions to sport, physical activity, and leisure.

KIN 5585. Pediatric Physiology and Health: Concepts and Applications. (2 cr.; A-F only; Every Summer)
Current understanding of pediatric medicine and exercise physiology. Use of physical activity and weight management in the treatment of various diseases (i.e, obesity) that affect children and adolescents. prereq: 3385 or 4385

KIN 5601. Sport Management Ethics and Policy. (3 cr.; A-F or Audit; Every Spring)
How to critically analyze ethical concepts that underpin or inform sport policies and evaluate sport policies from a normative point of view. Selected sport policy issues are used to illustrate relevance of ethical considerations in policy development and to explore the ethical implications of sport policy. prereq: MEd or grad student or instr consent

KIN 5631. Programming and Promotion in Sport. (3 cr.; A-F or Audit; Every Fall & Spring)
Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing. Discussion, practical application. prereq: Kin or Rec grad student or instr consent

KIN 5641. Scientific Theory and Application of Training and Conditioning in Sport. (3 cr.; A-F only; Every Spring & Summer)
Current scientific literature on physiological adaptation through training/conditioning for sport. Applying methods in research journals to improve physiological adaptation through training/conditioning with sport specificity. prereq: 4385 or SPST 3641 or SPST 4641 or exercise physiology course or instr consent

KIN 5643. Applied Motion Capture and Movement Analysis Technology. (3 cr.; A-F only; Every Fall)
Course provides students with the knowledge and tools to effectively analyze human movement patterns in a wide variety of field-based settings, such as assessing sport skill performance or measuring movement deficits after injury. Students will comprehend the basic, underlying components of movement and movement deficits. It is strongly suggested students have taken Physics, Biomechanics, and Human Anatomy. Credit will not be received if taken KIN 5720: Special Topics in Kinesiology with the topic title, Sport Movement Analysis.

KIN 5696. Practicum in Kinesiology. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Practical experience in kinesiology under supervision of a University faculty member and an agency supervisor. prereq: [Kin MEd or grad student], instr consent

KIN 5720. Special Topics in Kinesiology. (2-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings. prereq: Kin upper div undergrad or grad student or instr consent

KIN 5723. Psychology of Sport Injury and Rehabilitation. (3 cr.; A-F only; Every Fall)
Psychosocial bases of risk factors preceding sport injury, responses to the occurrence of sport injury, and the rehabilitation process. Lecture, discussion, guest lecture, interviews, and presentation experience. prereq: Intro psych course

KIN 5725. Organization and Management of Physical Education and Sport. (3 cr.; A-F only; Every Spring & Summer)
Comprehensive analysis of organization and management of physical education and sport in educational settings. Focus on management and planning processes, management skills, functions, roles, decision making, leadership, shared systems, and organizational motivation. For physical education teachers, coaches, community sport administrators. prereq: Grad/initial licensure or instr consent

KIN 5801. Legal Aspects of Sport and Recreation. (4 cr.; A-F or Audit; Every Fall & Spring)
Legal issues related to recreation, park, and sport programs/facilities in public/private sectors. prereq: Kin or rec major

KIN 5804. National Collegiate Athletic Association (NCAA) Compliance. (2 cr.; A-F only; Every Spring & Summer)
Governance structure, policies, and procedures in intercollegiate athletics. Careers in college athletics as coach, administrator, athletic trainer, counselor, etc. prereq: [Upper div undergrad or grad student] in KIN, instr consent

KIN 5841. Elite Performance and Environmental Considerations. (3 cr.; A-F only; Every Summer)
An examination of elite athletic performance and the effects of environmental conditions on sport performance. Topics include altitude, heat and humidity, cold, wind, and other high stress environments. Students will investigate strategies such as nutrition/dehydration,
KIN 5941. Clinical Movement Neuroscience. (3 cr.; A-F only; Periodic Spring) Various neural subsystems involved in controlling human motor function. How injury and disease of the nervous system affect motor behavior. Possibilities for rehabilitation and treatment. Lectures, seminars, class presentations, prereq: [3027 or ANAT 3001 or ANAT 3601 or ANAT 3611 or equiv], [PHSL 3051 or equiv]; [4441]

KIN 5981. Research Methodology in Kinesiology, Recreation, and Sport. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Defines/reviews various types of research in exercise sport science, physical education, and recreation studies. Qualitative research, field studies, and methods of introspection as alternative research strategies to traditional scientific paradigm. prereq: 3151 or equiv

KIN 5987. Professional Skills and Grant Writing for Health Sciences. (2-3 cr.; Student Option No Audit; Spring Odd Year) Introduction to structure/function of different organizations (e.g., NIH, AHA); Writing/ reviewing grants/manuscripts. Preparing for a job in academia. prereq: Grad student

KIN 5992. Readings in Kinesiology. (1-9 cr.; A-F only; Every Fall, Spring & Summer) Independent study under tutorial guidance. prereq: [KIN upper div undergrad or MEd or grad student], instr consent

KIN 5995. Research Problems in Applied Kinesiology. (1-16 cr.; A-F only; Every Fall, Spring & Summer) Selected topics in physical activity and human performance. prereq: [KIN upper div undergrad or MEd or grad student], 15 cr of major coursework [including 4981 or 5981], instr consent

KIN 6151. Theoretical Foundations of Curriculum and Instruction in Physical Education. (2 cr.; A-F or Audit; Every Summer) Selection of effective instructional strategies/ assessment. Design, progression, and presentation of tasks in physical education curriculum. prereq: initial licensure/MED phys ed student

KIN 6201. Clinical Experience I: Health Education. (1-4 cr.; A-F only; Every Spring) Half-day supervised teaching in urban or suburban middle or high school health education setting.

KIN 6202. Pedagogy II: Secondary Physical Education. (4 cr.; A-F or Audit; Every Summer) Instructional components for teaching/learning process of grades 6-12 physical educator in diverse settings. prereq: initial licensure/MEd phys ed student

KIN 6522. Pedagogy II: Secondary Physical Education. (4 cr.; A-F or Audit; Every Summer) Instructional components for teaching/learning process of grades 8-12 physical educator in diverse settings. prereq: initial licensure/MEd phys ed student

KIN 6596. Clinical Experience I: Physical Education. (4 cr.; S-N or Audit; Every Fall) Half-day supervised teaching in an urban elementary school physical education setting. prereq: 6515, 6521, 6522, initial licensure/MEd phys ed student or instr consent

KIN 6597. Clinical Experience II: Physical Education. (1-4 cr.; A-F only; Every Spring) Half-day supervised teaching in urban or suburban elementary, middle, or high school physical education setting. prereq: 6596, initial licensure/MEd phys ed student or instr consent

KIN 6598. Clinical Experience III: Physical Education. (2-6 cr.; A-F only; Every Spring) Supervised teaching in urban or suburban elementary, middle, or high school physical education setting. prereq: [6597, init licensure/ MEd phys ed student] or instr consent


KIN 8002. Proseminar in Human Factors/ Ergonomics. (1 cr. [max 2 cr.]; A-F or Audit; Every Fall & Spring) Issues/concerns tailored to interests of faculty/students regarding human factors/ergonomics. Interaction of performance/behavior with design factors in performance environment. prereq: Enrollment in good standing, grad HumF minor

KIN 8122. Seminar: Exercise Physiology. (2 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Classic/contemporary literature in exercise physiology/allied disciplines. Contributions of major leaders in field. Opportunities for interdisciplinary research. Spring semester students/faculty in exercise science present original research. prereq: 5122 or equiv or instr consent

KIN 8126. Sports Medicine Psychology. (3 cr.; A-F only; Periodic Spring) Advanced seminar course. Multidisciplinary contributors to sports medicine psychology. Theory, research, and practice in the behavioral/social aspects of injury prevention/ experiences among physically active populations across the life span. prereq: Grad student or instr consent

KIN 8127. Doctoral Sport Management Seminar. (3 cr.; A-F only; Periodic Fall & Spring) Analysis of current literature, theoretical constructs, research methodology and design relative to sport management. Focuses on student-selected topics, research problems. prereq: PhD student, instr consent

KIN 8132. Seminar: Motor Development. (3 cr.; A-F or Audit; Periodic Spring) Contemporary research literature on motor skill development from before birth to senescence. Emphasizes interaction between physical/environmental/performer constraints. Coordination/control of movement. prereq: grad student or instr consent

KIN 8135. Seminar: Motor Control and Learning. (3 cr.; A-F or Audit; Periodic Spring) Advanced reading/discussion of research on motor control, motor learning, human performance. prereq: grad student or instr consent

KIN 8136. Developmental Sport and Exercise Psychology. (3 cr.; A-F only; Every Fall & Spring) Sport and exercise psychology from a life span developmental perspective. Theoretical perspectives, self-perceptions, social influences, emotional development, motivational processes, self-regulation, development of expertise, moral development, sport injury, and gender and cultural diversity. prereq: Grad student or instr consent

KIN 8211. Seminar: Perception and Action. (3 cr.; A-F or Audit; Periodic Spring) Survey of theory/research on use of perceptual information for control of action. Behavioral research on perceptual guidance of daily activities (e.g., standing, walking, driving). Perceptual control in context of expertise (e.g., sports). Performer-motor development. prereq: grad student or instr consent

KIN 8285. Cellular and Molecular Exercise Physiology. (3 cr.; A-F only; Periodic Fall & Spring) This course emphasizes the cellular and molecular mechanisms in response to acute and chronic physical exercise. Biochemical pathways of regulating energy metabolism during exercise, change of gene expression as adaptation to altered diet, environmental factors and aging, and cellular oxidative-antioxidant homeostasis will be the main foci. The course will expose graduate students and advanced undergraduate students to current topics of biomedical issues affecting human health and wellbeing, modern techniques of exercise science research, and important research articles in literature. prereq: KIN 3385: Human Physiology and KIN 4385: Exercise Physiology; KIN 5122: Applied Exercise Physiology; college level chemistry. Suggested: organic chemistry, or instr consent Credits will not be given if taken as KIN 5720 with the same title.

KIN 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

KIN 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent
KIN 8666. Doctoral Pre-Thesis Credits. (1-6 cr. ; S-N only; No Grade Associated) Every Fall, Spring & Summer. 
tbd prereq: Doctoral student who has not passed prelim oral; Dept consent required; No grade associated; 4 completions allowed; up to 24 combined cr.

KIN 8696. Internship: Applied Sport Psychology. (3-6 cr. ; S-N or Audit; Periodic Fall & Spring) 
Supervised internship: emphasis on educational sport psychology approaches to athletic performance enhancement and psychological adjustment to sport injury. prereq: 5126, 8126, Kin PhD student, instr consent

KIN 8777. Thesis Credits: Master's. (1-18 cr. ; max 50 cr.) ; No Grade Associated; Every Fall, Spring & Summer) 
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only

KIN 8888. Thesis Credit: Doctoral. (1-24 cr. ; max 100 cr.) ; No Grade Associated; Every Fall, Spring & Summer) 
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

KIN 8980. Graduate Research Seminar in Kinesiology. (1 cr. ; max 9 cr.) ; S-N only; Every Fall & Spring) 
Reporting/discussion of student/faculty research activity. prereq: KIN M.S. or Ph.D. or SMGT M.A. or instr consent

KIN 8995. Research Problems in Kinesiology. (1-12 cr. ; S-N only; Every Fall, Spring & Summer) 
Individual scholarly research, prereq: Kin Ph.D. student or SMGT grad student or instr consent

Korean (KOR)

KOR 1011. Beginning Korean I. (5 cr. ; Student Option; Every Fall) 
Basic grammatical structure, vocabulary, expressions of modern colloquial Korean. Introduces Korean writing system.

KOR 1012. Beginning Korean II. (5 cr. ; Student Option; Every Spring) 
Basic grammatical structure, vocabulary, expressions of modern colloquial Korean.

KOR 3021. Intermediate Korean I. (5 cr. ; Student Option; Every Fall) 
Speaking, reading, writing at intermediate level in modern colloquial Korean. Simple narration/ written reports. Some basic Chinese characters may be introduced. prereq: 1011

KOR 3022. Intermediate Korean II. (5 cr. ; Student Option; Every Spring) 
Speaking, reading, writing at intermediate level in modern colloquial Korean. Simple narration/ written reports. Introduction of additional basic Chinese characters. prereq: 3021

KOR 3031. Third Year Korean I. (4 cr. ; Student Option; Every Fall) 
Speaking, reading, writing at advanced level in modern colloquial Korean. Narration, written reports. Further Chinese characters introduced. prereq: 3022

KOR 3032. Third Year Korean II. (4 cr. ; Student Option; Every Spring) 
Speaking, reading, writing at advanced level in modern colloquial Korean. Narration, written reports. Further Chinese characters introduced. prereq: 3031

KOR 3290. Korean Language Teaching Tutorial. (1 cr. ; max 2 cr.) ; S-N only; Every Fall & Spring) 
Students tutor beginning students of Korean and are part of department's Korean language team. prereq: Grade of A in 3032

KOR 3993. Directed Studies. (1-3 cr. ; max 12 cr.) ; Student Option; Every Fall & Spring) 
Directed study in topics of Korean literature, culture, language, or linguistics. Prereq instr consent, dept consent, college consent.

KOR 4001. Beginning Korean I for Graduate Student Research. (5 cr. ; Student Option; Every Fall) 

KOR 4002. Beginning Korean II for Graduate Student Research. (5 cr. ; Student Option; Every Spring) 
Basic grammatical structure, vocabulary, expressions of modern colloquial Korean. Meets with 1012. prereq: 4001

KOR 4003. Intermediate Korean I for Graduate Student Research. (5 cr. ; Student Option; Every Fall) 
Speaking, reading, writing in modern colloquial Korean. Simple narration/written reports. Basic Chinese characters may be introduced. Meets with 3021. prereq: 4002, grad student

KOR 4004. Intermediate Korean II for Graduate Student Research. (5 cr. ; Student Option; Every Spring) 
Speaking, reading, writing at intermediate level in modern colloquial Korean. Narration/ written reports. Introduction of additional basic Chinese characters. Meets with 3022. prereq: 4003

KOR 4005. Third Year Korean I for Graduate Student Research. (4 cr. ; Student Option; Every Fall) 

KOR 4006. Third Year Korean II for Graduate Student Research. (4 cr. ; Student Option; Every Spring) 

KOR 4041. Advanced Readings in Modern Korean I. (4 cr. ; Student Option; Every Fall) 
Speaking, listening, reading, writing. Content/ task-based course. Study vocabulary/read novels, journals, selections from Korean history/arts. Writing summaries, reports, simple reaction papers. prereq; 3032 or equiv or instr consent

KOR 4042. Advanced Readings in Modern Korean II. (4 cr. ; Student Option; Every Spring) 
Speaking, listening, reading, writing. Content/ task-based course. Study vocabulary/read novels, journals, selections from Korean history/arts. Writing summaries, reports, simple reaction papers. prereq; 4041 or equiv or instr consent

KOR 5040. Readings in Korean Texts: North Korean Dialect. (3 cr. ; max 9 cr.) ; Student Option No Audit; Periodic Fall) 
Expose advanced students of Korean to various North Korean contexts. Improve ability to understand North Korean literary work. Various authentic texts from North Korea. Mostly taught in Korean. prereq: 3022 or intermediate level of Korean proficiency

KOR 5140. Readings in Sino-Korean Texts. (3 cr. ; max 9 cr.) ; Student Option; Every Fall & Spring) 
Sino-Korean vocabulary/characters necessary for advanced and superior level of knowledge in Korean. Students conduct research projects based on specialized readings in their own fields of study. prereq: 3032 or equiv or instr consent

KOR 5211. Introductory Classical Chinese I. (3 cr. ; Student Option; Periodic Fall) 
Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

KOR 5212. Introductory Classical Chinese II. (3 cr. ; Student Option; Periodic Spring) 
Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: 5211 and two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

KOR 5993. Directed Studies. (1-5 cr. ; max 15 cr.) ; Student Option No Audit; Every Fall & Spring) 
Guided individual study of Korean language or linguistics. prereq: instr consent, dept consent, college consent

Laboratory Medicine and Path (LAMP)

LAMP 4177. Nature of Disease: Pathology for Allied Health Students. (; 3 cr. ; Student Option: Every Spring & Summer) 
Human disease as alteration of normal structure/function of anatomy/physiology. Variety of lectures cover their area of expertise. Grade based on five unit exams. Offered online in spring and summer. prereq:
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Biogeochemistry, human-environment interactions, environmental biophysics, and global environmental change.

**LAAS 5051. Thesis Proposal Writing for Land & Atmospheric Science.** (2 cr.; A-F or Audit; Every Spring)
Grant proposals, including proposal formats of various funding sources, how to develop a significance statement, hypotheses and objectives, background, methods, project summary, clinical, and budget. Critique proposal samples/discuss other aspects of seeking funding for research. Discuss LAAS graduate program prelim exam process.

**LAAS 5311. Soil Chemistry and Mineralogy.** (3 cr.; Student Option; Every Fall & Spring)
Structural chemistry, origin/identification of crystalline soil clay minerals. Structure of soil organic matter. Chemical processes in soil: solubility, adsorption/desorption, ion exchange, oxidation/reduction, acidity, alkalinity. Solution of problems related to environmental degradation, plant nutrition, and soil genesis. prereq: [Chem 1022 or equiv], Phys 1102, grad or instr consent

**LAAS 5425. Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere.** (3 cr.; A-F or Audit; Fall Odd Year)
Basic laws governing atmospheric motion through analysis of atmospheric dynamics and thermodynamics at the micro, synoptic, and global scales. Fundamental thermodynamic and dynamical processes/equations governing the behavior of the atmosphere/apply to larger-scale geophysical situations. prereq: One yr college-level [calculus, physics]

**LAAS 5426. Atmospheric Processes II: Radiation, Composition, and Climate.** (3 cr.; A-F or Audit; Spring Odd Year)

**LAAS 5480. Special Topics in Land and Atmospheric Science.** (1-4 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
 Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule. prereq: grad student or instr consent

**LAAS 5515. Soil Formation: Earth Surface Processes and Biogeochemistry.** (3 cr.; A-F or Audit; Every Fall)

**LAAS 5521. Soil and Environmental Genomics.** (3 cr.; Student Option; Every Fall)
Molecular and genomic approaches to answer ecological questions related to soil and environmental sciences. Genomic/transcriptomics/proteomics. Metagenomics and single cell genomics. Includes computer exercise to learn basic bioinformatics. No prior programming skills are required. prereq: SOIL 5611 (or env. science course); MICB 4111, BIOL 4121 recommended.

**LAAS 8005. Supervised Classroom or Extension Teaching Experience.** (2 cr.; S-N or Audit; Every Fall & Spring)
Teaching experience in biosystems and agricultural engineering or agronomy and plant genetics or horticultural science or soil, water, and climate or plant pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

**LAAS 8128. Land and Atmospheric Science Seminar.** (1.5 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring)
Students present an open seminar on an advanced topic and attend seminars presented by other graduate students.

**LAAS 8195. Research Problems in Soils.** (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Directed research on special topics of interest in soil science or climatology supervised by individual or small groups of faculty. prereq: [Grad major in soil sci or related field], instr consent

**LAAS 8333. FTE: Master’s.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

**LAAS 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

**LAAS 8550. Teaching Experience.** (1 cr. [max 6 cr.]; S-N or Audit; Every Fall & Spring)
Provides students with practical experiences in instructional techniques in a university setting. prereq: Grad major in soil sci or related field, instr consent

**LAAS 8666. Doctoral Pre-Thesis Credits.** (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**LAAS 8777. Thesis Credits: Master’s.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**LAAS 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

**Landscape Architecture (LA)**

**LA 1001. Sustainability by Design.** (ENV; 3 cr.; A-F only; Every Spring)
How the Twin Cities region (as example of many metropolitan areas) can adapt to climate change, depleted energy resources, and other environmental impacts. How cities and places are designed, how places influence sustainable lifestyles. How to adapt the Twin Cities/other cities to a changing world.

**LA 1201. Learning from the Landscape.** (AH,DSJ; 3 cr.; A-F or Audit; Every Fall)
Physical elements shaping the world. Shapes, forms, and order of towns, cities, and countryside. How design, planning, and natural systems, taken together, shape physical surroundings. Lectures, discussions, field trips.

**LA 1301. Introduction to Landscape Architecture Drawing.** (AH; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Development of basic skills in perceiving/representing material environment. Sketching/drawing conventions of visual phenomena/forms.

**LA 1401. The Designed Environment.** (AH; 3 cr.; A-F or Audit; Every Fall & Spring)
Examination of relationships between place and space, and realms of the ideal and real, public and private. Survey of how the fields of architecture, landscape architecture, and urban design have explored those issues.

**LA 1601. Design and Equity.** (AH,DSJ; 3 cr.; A-F or Audit; Every Spring)
Investigate world from new perspectives. Spaces of everyday life that reflect/shape values. Meets with LA 3601.

**LA 2301. Advanced Representation for Environmental Design.** (3 cr.; Student Option; Every Fall)
Perceiving/representing material environment. Multiple media approaches in environmental design representation. Analytic diagramming as means of developing design ideas. Interface between hand rendered and digital representation. prereq: 1301

**LA 2302. Computer-Aided Representation for Environmental Design.** (3 cr.; Student Option; Every Spring)
Use of computer-aided design (CAD) technologies in developing, representing, and communicating environmental design ideas. Adobe Creative Suite?, Autodesk AutoCAD?, DynaSCAPE? ESRI ArcMap?, etc. Integration of images generated from various computer and hand-rendered technologies. prereq: 1301, 2301

**LA 3001. Understanding and Creating Landscape Space.** (3 cr.; A-F or Audit; Every Fall)
Introduction to spatial design issues at all scales. prereq: Landscape design and planning [major or minor] or instr consent
LA 3002. Informants of Creating Landscape Space. (3 cr. ; A-F or Audit; Periodic Fall) Development of the design program. Site analysis of landscape space. Design exercises show how design program and site analysis inform creation of landscape space in developing schematic designs at varying geographic scales and in different geographic settings. Lectures, readings, discussions. prereq: 3001, Arch 3401, 3501
LA 3003. Case Studies in Sustainable Landscape Planning and Design. (3 cr.; Student Option; Every Fall) Sustainable landscape design/planning practices. Integrative potential between practices and changes in global biodiversity, quality of air/water resources, development/consumption of resources, and climate. Practice/metrics-based selection, deployment, and management of sustainable design.
LA 3004. Regional Environmental Landscape Planning. (4 cr.; Student Option; Every Spring) An exploration of critical regional landscape parameters affecting the growth and development of metropolitan areas. Students assess these parameters and prepare a multifunctional land use plan for a defined locale. prereq: prereq FR 3131 or Concurrent registration is required (or allowed) in FR 3131 or GEOG 3561 or Concurrent registration is required (or allowed) in GEOG 3561, or equivalent
LA 3204. Holistic Landscape Ecology and Bioregional Practice. (3 cr.; A-F or Audit; Every Spring) Bioregional practice, how it responds to landscape ecology of great bioregions. Scientific/cultural basis for bioregional design and landscape sustainability. prereq: [EEB 3001 or ESPM 3108], or BED major or equiv
LA 3413. Introduction to Landscape Architectural History. (GP, HIS; 3 cr.; A-F or Audit; Every Spring) Study of landscape architecture's roots by examining the creation of landscapes over time. Influences of ecological and environmental issues as well as political, economic, and social contexts on the cultural construction of landscape ideas and meaning and creation of landscape architectural works.
LA 3501. Environmental Design and Its Biological and Physical Context. (ENV; 3 cr.; A-F or Audit; Every Spring & Summer) Dynamic relationships between environmentally designed places and biological/physical contexts. Integration of created place and biological/physical contexts. Case studies, student design.
LA 3514. Making the Mississippi. (CIV; 3 cr.; A-F or Audit; Every Spring) Environmental parameters affecting growth/development of metropolitan areas. Students assess these parameters and prepare a multifunctional land use plan for a defined locale.
LA 3571. Landscape Construction: Site Systems and Engineering. (3 cr.; A-F or Audit; Every Fall)

Theory applications of landform systems for design. Landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues. Spatial accommodation of vehicles in landscape architecture, including road design. prereq: BED major or BED minor or instr consent
LA 4001. Sustainable Landscape Design and Planning Practices. (3 cr.; Student Option; Every Fall) Changes in global biodiversity. Quality of air/water resources. Development/consumption of energy resources. Climate change. Design for sustainable practices to create evocative/meaningful landscapes. prereq: 1301, [2301 or ARCH 3301], 3001, 3002
LA 4002. Implementation of Sustainable Landscape Design and Planning Practices. (3 cr.; Student Option; Every Spring) Capstone experience. Service-learning project. Groups of students develop sustainable landscape designs/plans that address project implementation.

LA 4096. Internship in Landscape Design and Planning. (1 cr.; S-N only; Every Fall, Spring & Summer) Supervised professional experience in supervised professional services and relate these experiences to their education in environmental design. prereq: 1301, 2301, 2302, 3001, 3002, 3003
LA 4160H. Thesis/Capstone Project. (2 cr. max 4 cr.; A-F only; Every Fall & Spring) Individualizes honors experience by connecting aspects of major program with special academic interests.
LA 4755. Infrastructure, Natural Systems, and Space of Inhabited Landscapes. (TS; 3 cr.; A-F or Audit; Every Fall) Seminar, cross-disciplinary. Urban infrastructural solutions to mitigate/reverse anthropogenic impacts on Earth. Design of sustainable urban infrastructure systems. Policy options, technologies. Criteria, design methods. prereq: Jr or sr
LA 5001. Sustainable Landscape Design and Planning Practices. (3 cr.; Student Option; Every Fall) Systemic, formal and spatial relationships. Quantitative and qualitative changes in global biodiversity, quality of the earth's air, soil, and water resources, development and consumption of energy resources and climate change. Development of design processes for selection, deployment, and management of sustainable practices. prereq: 5201, 5203
LA 5002. Implementation of Sustainable Landscape Design and Planning Practices. (3 cr.; Student Option; Every Spring) Design exploration of a complex urban site. Habitation patterns and sociocultural systems that slow and reverse environmental degradation and climate change. Researching/creating landscape patterns that address multi-scalar sustainability. prereq: 5201, 5203
LA 5003. Case Studies in Sustainable Landscape Planning and Design. (3 cr.; Student Option; Every Fall) Ecology, design, materials, policy, and community. Working from site to regional scales, evaluate case studies through the lens of larger issues and systems, including infrastructure, urban water cycle, transportation, energy, health, food systems, innovation, and metrics.
LA 5004. Regional Environmental Landscape Planning. (4 cr.; Student Option; Every Spring) An exploration of critical regional landscape parameters affecting the growth and development of metropolitan areas. Students assess these parameters and prepare a multifunctional land use plan for a defined locale. prereq: PA 5271 or LA 5131 or FR 3131 or GEOG 3561 or GEOG 5561 or equivalent
LA 5131. Geospatial Data Analysis and Design. (3 cr.; A-F only; Every Fall) Introduction to geospatial data analysis/application in landscape architectural, environmental design research/practice. prereq: Master of Landscape Architecture Student or instr consent
LA 5201. Making Landscape Spaces and Types. (6 cr.; A-F or Audit; Every Fall) Design exploration using 3-D models and historical precedent studies to create outdoor spaces for human habitation and use. Application of the basic landscape palette of landform, plants, and structures to give physical, emotional, cognitive, and social definition to created places. prereq: B.E.D accelerated status or LA grad or instr consent
LA 5202. Landscape Analysis Workshop. (1 cr.; S-N or Audit; Every Fall) Introduction to field techniques for site analysis, including vegetation, soil, and landform description. One-week session, before fall term, at lake Itasca Forestry and Biological Station.
LA 5203. Ecological Dimensions of Space Making. (6 cr.; A-F or Audit; Every Spring) Design studio experience drawing on ecological, cultural, aesthetic influences to explore development of design ideas responsive to ecological issues and human experience. prereq: LA major or instr consent; recommended for both BED and Grad students
LA 5204. Metropolitan Landscape Ecology. (3 cr.; A-F only; Every Fall & Spring) Theories/principles of holistic landscape ecology. People, nature, and environmental stewardship in metropolitan landscapes. Urban areas, rural areas that provide food, water, energy, and recreation. prereq: BED accelerated status or LA grad student or instr consent
LA 5301. Introduction to Landscape Architecture Drawing. (3 cr.; Student Option; Every Fall & Spring)
Perceiving/representing material environment. Sketching/drawing conventions, visual phenomena/forms. prereq: LA grad student or accelerated B.E.D. student

LA 5351. AutoCAD I. (3 cr.; Student Option; Every Fall, Spring & Summer) Basic concepts, tools, and techniques of computer-aided drawing. Introduction to current AutoCAD release software. Strategies and techniques for producing dimensioned and annotated drawings. Introduction to 2-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus. prereq: B.E.D. major or LA grad or instr consent; may not be taken for graduate credit

LA 5352. AutoCAD II. (3 cr.; Student Option; Every Fall) Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD release software. Strategies and techniques for producing dimensioned and annotated drawing. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus. prereq: Arch 5351 or LA 5351, B.E.D. major or LA grad or instr consent; may not be taken for graduate credit


LA 5376. Representation I. (4 cr.; max 8 cr.; A-F only; Every Fall) Develop observation skills. Develop ability to communicate ideas clearly through visual expression. Learn/explain conventions of landscape architectural drawing. Basic tools/techniques associated with Adobe Photoshop CS6. Promote fluidity between analog/digital media. Create drawing personality/graphic style. prereq: Master of Landscape Architecture (MLA) or Accelerated Bachelor of Environmental Design.

LA 5377. Representation II. (4 cr.; max 8 cr.; A-F only; Every Spring) Explore multi-media rendering techniques. Increase knowledge of art materials/graphic programs. Increase hand-drawing ability. Color theory, contemporary graphic styles. Layout, grid/systems/type. Increase speed of drawing/producing renderings. Create or strengthen graphic style. prereq: Master of Landscape Architecture (MLA) or Accelerated Bachelor of Environmental Design

LA 5378. Representation III. (3 cr.; A-F or Audit; Every Spring) Increase skills learned in Representation I and Representation II and develop 3-D modeling skills, distill complex information to visually explain a design concept while gaining skills that are valuable in the workplace and create portfolio quality work.

LA 5400. Topics in Landscape Architecture. (1-3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Current topics in landscape architecture. Taught by regular or visiting faculty in their areas of specialization. prereq: B.E.D. accelerated status or LA grad or instr consent

LA 5401. Directed Studies in Emerging Areas of Landscape Architecture. (1-3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5402. Directed Studies in Landscape Architecture History and Theory. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5403. Directed Studies in Landscape Architecture Technology. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5404. Directed Studies in Landscape Architecture Design. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5405. Interdisciplinary Studies in Landscape Architecture. (1-6 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Research, planning, or design projects. Topics vary. prereq: instr consent

LA 5407. Landscape Architecture Studio. (3-4 cr.; A-F or Audit; Every Fall & Spring) Architecture, and Planning. (3-4 cr.; A-F or Audit; Every Fall & Spring) Methods and theories in urban design and human behavior. Students develop urban design journal as tool for experiencing, analyzing and rendering the landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions. prereq: Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark

LA 5408. Landscape Architecture, and Planning. (3-4 cr.; A-F or Audit; Every Fall & Spring) Methods and theories in urban design and human behavior. Students develop urban design journal as tool for experiencing, analyzing and rendering the landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions. prereq: Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark

LA 5413. Introduction to Landscape Architectural History. (3 cr.; A-F or Audit; Every Fall) Introductory course examines the multiple phenomena/forms. prereq: One course in history at 1xxx or higher

LA 5514. Making the Mississippi. (3 cr.; A-F or Audit; Every Spring) Critical environmental parameters affecting growth/development of metropolitan areas. Students assess these parameters and prepare a multi-functional land use plan for a defined locale.

LA 5527. Plants in Design. (3 cr.; A-F or Audit; Every Fall & Spring) Design principles for using plants in landscape. Cultural/ecological principles in design projects of various scales. Lectures, presentations, field trips, readings; project/conference or course project

LA 5576. Ecological Restoration Project Planning and Management. (3 cr.; A-F only; Every Fall) Applied practice of ecological restoration of landscapes. Grasslands, wetlands, forests, disturbed agricultural sites, former industrial parcels. Restoration management, skills needed to lead successful projects. prereq: MLA student, senior B.E.D.) or senior or grad with one college course in ecology/one college course in plant science or botany or instr consent

LA 5705. Regreening Minds, Cities, and Regions. (3 cr.; A-F; Every Fall) Emerging types of green spaces. Urban agriculture, urban waterscapes, urban wilderness. Politics, policies, metrics, planning of alternative visions of urban natural sustainability in America's cities. Role of social networks in creating emerging types of green spaces. prereq: Landscape Architecture graduate student or instr consent

LA 5755. Infrastructure, Natural Systems and the Space of Inhabited Landscapes. (3 cr.; A-F or Audit; Every Fall) Cross-disciplinary exploration of urban infrastructural solutions to mitigate/reverse anthropogenic impacts on Earth. Design of sustainable urban infrastructure systems, policy options, available technologies, criteria, design methods. prereq: Grad student

LA 5771. Landscape Infrastructure and Systems I. (3 cr. [max 6 cr.]; A-F only; Every Fall) Basic principles, techniques, skills of creating infrastructures of built landscapes. Basic concepts of simple plant taxonomy, plant community structure, earthwork, water management, landscape structures. Small site scale design development. prereq: Master of Landscape Architecture Student. [Accelerated Track B.E.D or instr consent]

LA 5772. Landscape Infrastructure Systems II. (3 cr. [max 6 cr.]; A-F only; Every Spring) Principles, techniques, skills of creating ecological infrastructures of built landscapes systems. Builds on basic concepts taught in LA 5771. Focuses on ecological connections among plants, landscape structure, earthwork techniques, water management, landscape structural systems. prereq: Master of
LA 8201. Designing Landscapes for Dwelling and Settlement. (6 cr.; A-F or Audit; Every Fall & Spring) Professional design studio. Hypothetical projects include development of schematic master plans for site layout, grading, and planting. Design for residential, commercial, and civic use with attention to zoning and other controls, environmental quality, human behavior, markets, project finance, and techniques. Requires concurrent registration in LA 8202. prereq: 5203, 5571, grad LA major, concurrent registration is required (or allowed) in 8202 or instr consent

LA 8202. Design of Planned Developments. (2-3 cr.; Student Option; Every Fall & Spring) Issues related to planned community developments: historical precedents; design for residential, commercial, and civic uses; role of zoning and other controls; deed restrictions; preparation of design brief; environmental quality; human behavior; market; project finance; and techniques of site development. prereq: Grad LA major or instr consent

LA 8204. Regional Landscape Space. (3 cr.; A-F or Audit; Periodic Fall & Spring) Theoretical investigations and current advances in the use of land (topography, landscape perception, regional economics, and public policy as informs of design decision-making in regional landscapes at or exceeding township level. Geographic information systems as design tools. prereq: Grad LA major or instr consent

LA 8205. Urban Form Options: Landscape Architecture Studio. (6-8 cr.; Student Option; Every Fall & Spring) Urban landscape design issues, theories, and problems explored via formal/spatial inquiry in studio, reading, and the exposition of ideas in paired seminar. Urban systems, gathering spaces, ecology, infrastructure, recreation, and public space. prereq: 2 yrs of studio, grad LA major or instr consent

LA 8206. Making Urban Landscape Space. (6 cr.; A-F only; Every Fall) Studio course focusing on the restoration and reuse of urban land (urban ecology) sites. Biological and mechanical remediation processes and the development of hard and soft site infrastructures to deal with storm water, energy generation, and the handling of waste. Re-design sites in terms of new uses and economies, and to re-integrate sites into existing and future urban systems of transportation. prereq: MLA grad student

LA 8207. Cities on Water International Workshop. (4-8 cr. [max 16 cr.]; A-F only; Every Spring) Intensive studio course on international applications of sustainable urban design. prereq: Grad LA or ARCH major or instr consent

LA 8301. Landscape Architecture: Research Issues and Methods. (3 cr.; A-F or Audit; Every Fall & Spring) Alternative methodological approaches to landscape architectural research and consideration of their appropriateness for contemporary research topics. prereq: 8201 or concurrent registration is required (or allowed) in 8201, grad LA major or instr consent

LA 8302. Professional Practice. (3 cr.; A-F or Audit; Every Spring) Office and project management case studies. Organizational behavior, marketing, sales, strategic planning, financial and cost accounting, insurance, legal issues and contracts. prereq: 8205, grad LA major or instr consent

LA 8333. FTE: Masters. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

LA 8400. Topics in Landscape Architecture. (1-8 cr. [max 96 cr.]; Student Option; Every Fall, Spring & Summer) Seminar offered by regular or visiting faculty in their area of specialization. Content varies with interest of instructor.

LA 8401. Directed Studies in Emerging Areas of Landscape Architecture. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Current topics in landscape architecture. Seminar offered by regular or visiting faculty in their area of specialization. Subject matter varies with instructor. prereq: instr consent

LA 8402. Directed Studies in Landscape Architecture History and Theory. (1-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Advanced independent studies under direction of landscape architecture faculty. prereq: Grad LA major or instr consent

LA 8403. Directed Studies in Landscape Architecture Technology. (1-6 cr.; max 12 cr.); Student Option; Every Fall & Spring) Advanced independent studies under direction of landscape architecture faculty. prereq: Grad LA major or instr consent

LA 8404. Directed Studies in Landscape Architecture Design. (1-6 cr.; Student Option; Every Fall & Spring) Advanced independent studies under direction of landscape architecture faculty. prereq: Grad LA major or instr consent

LA 8405. Interdisciplinary Studies in Landscape Architecture. (1-6 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Research, planning, and/or design project. Sample topics: energy efficient design, historic preservation, urban revitalization, agricultural land use, computerized land-use planning, housing. prereq: Grad LA major or instr consent

LA 8406. Concepts of Landscape Evaluation. (3 cr.; A-F or Audit; Periodic Fall & Spring) Philosophical basis for wide-ranging approaches to evaluating qualitative aspects of landscape. Aesthetic factors and integration of landscape evaluation into regional design decision-making. prereq: Grad land arch major or instr consent

LA 8407. Perception Manipulation in Design of Exterior Space. (3 cr.; Student Option; Periodic Fall & Spring) Historic and modern design devices that alter one's sense of spatial control and arrangement to create illusionary situations in exterior environment. Organized to inform and test principles of perception distortion in exterior space. prereq: Grad land arch major or instr consent

LA 8408. 18th-Century Landscape Theory: Nature and the Sublime, the Beautiful, and the Picturesque. (3 cr.; A-F or Audit; Periodic Fall & Spring) Eighteenth-century landscape architectural theory underpinned most modern western traditions in landscape architecture. These theoretical positions framed the nature of Nature in the context of human experience through treatises and works of landscape architecture. prereq: Grad land arch or arch major or instr consent

LA 8409. Fitting Buildings to the Land. (3 cr.; A-F or Audit; Periodic Fall & Spring) Exercises and projects in site manipulation to adjust structures and attendant uses and circulation to specific land parcels. prereq: Land arch or arch grad student with 1 yr grad design or instr consent

LA 8411. The foundational studio course on international applications of sustainable design in urban Europe. (2-8 cr. [max 16 cr.]; A-F only; Every Spring) Design preparation for restoration/reuse of abandoned sites in urban/exurban areas reclaimed from/influenced by saltwater coastal environments. prereq: Grad LA or ARCH major or instr consent

LA 8554. Project Programming. (2 cr. [max 4 cr.; A-F only; Every Fall]) Individual research in preparation for final studio. prereq: 8203, [grad land arch major or instr consent]

LA 8555. Advanced Landscape Planning and Design. (6 cr.; A-F or Audit; Every Spring) Advanced studies in area of student's choice. prereq: 8205, grad land arch major or instr consent

LA 8574. Landscape Storm Water Management. (3 cr.; A-F only; Every Fall & Spring) Theory and applications of hydrology and storm water management techniques. Applied hydrology, catchment delineation, storm water runoff models, and storm water management techniques (detention ponds, swales, channels, culverts, small storm sewer systems, run-off systems, sedimentation, and erosion control systems). prereq: 8201, grad land arch major or instr consent

LA 8575. The Art and Ecology of Landscape Detail. (3 cr.; Student Option; Every Fall & Spring)
Design of pavements, enclosures, decks, lighting, electrical, and irrigation systems for landscape architecture. Theory/principles of design of light structures, properties/use of materials, construction communication. Landscape integrity and economic viability as performance issues. Prereq: Grad LA major or instr consent

LA 8741. Metropolitan Design Workshop and Optional Seminar. (3-6 cr.; A-F or Audit; Every Spring) Introduction to discipline/methodologies of urban design. Contributing fields/issues, including government/community goals, land use, housing, economic development, natural resources, services, and transportation. Implementation program. Prereq: Enrollment in CMD prog or instr consent

LA 8773. Landscape Infrastructure and Systems III. (3 cr. [max 6 cr.]; A-F only; Every Fall) Third course in landscape infrastructure/systems sequence that introduces technical skills required to work/obtain professional licensure as landscape architect. Programming, qualitative/quantitative performance of constructed hydrologic systems, planting design, representation of constructed systems, paving systems for hydrologic control. Prereq: Master of Landscape Architecture Student or instr consent

LA 8774. Landscape Infrastructure and Systems IV. (3 cr. [max 6 cr.]; A-F only; Every Fall) Fourth course in landscape infrastructure/systems sequence that introduces students to technical skills required to work/obtain professional licensure as landscape architect. Use/implementation of complex constructed assemblies in urban context. Prereq: Master of Landscape Architecture Student or instr consent

LA 8775. Landscape Infrastructure and Site Technology V. (3 cr.; A-F only; Every Spring) Seminar, cross-disciplinary. Advanced inquiry into complex site-scale problems requ/apply theory. Professional practice applications with emphasis on urban/post-industrial sites. Programmatic, regulatory/construction contexts. Directed research of emerging/speculative infrastructure, Prereq: 8773, 8774 preferred, students outside of Master of Landscape Architecture program are encouraged to enroll upon demonstration of similar pre-requisite coursework and instr consent

LA 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) Prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

Lang, Teaching, and Technology (LGT)

LGT 5101. Applications of Technology in Language Teaching. (3 cr.; Student Option; Every Fall & Spring) Explore uses of technology in language teaching; theoretical background, demonstrations, and applications.

LGT 5110. Technology in the Second Language Classroom. (2 cr.; Student Option; Every Spring & Summer) Examine, evaluate, and use technology in language teaching. Theoretical background, demonstration, hands-on exploration.

LGT 5710. Special Topics in Language Teaching and Technology. (2 cr. [max 6 cr.]; Student Option; Periodic Fall & Summer) Examine, evaluate, apply specific area of technology to K-higher education, second/foreign language teaching/learning in classroom, independent study, distance education environments.

Language Centr CLA Courseshare (LANG)

LANG 1021. Beginning Czech I. (4 cr.; Student Option; Every Fall) CourseShare course hosted by Indiana University. Received via video conferencing. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 1051. Beginning Persian I. (4 cr.; Student Option; Every Fall) CourseShare course hosted by University of Wisconsin-Madison. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 1071. Beginning Polish I. (4 cr.; Student Option; Every Fall) CourseShare course hosted by Ohio State University. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 1111. Beginning Turkish I. (4 cr.; Student Option; Every Fall) CourseShare course hosted by the University of Wisconsin-Madison. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 1121. Beginning Vietnamese I. (4 cr.; Student Option; Every Fall) Online CourseShare course hosted by Michigan State University. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 2011. Accelerated Catalan I. (2 cr.; Student Option; Every Fall) CourseShare course hosted by the University of Chicago. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 2021. Intermediate Czech I. (3 cr.; Student Option; Every Fall) CourseShare course hosted by Indiana University. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 2051. Intermediate Persian I. (4 cr.; Student Option; Every Fall) CourseShare course hosted by the University of Wisconsin-Madison. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LAT 1001. Beginning Latin I. (5 cr.; Student Option; Every Fall) Introduction to grammar/vocabulary of classical Latin as written in Rome in 1st centuries BCE/CE. Forms/simple constructions. Some reading of simple, heavily adapted passages from ancient texts.

LAT 1002. Beginning Latin II. (5 cr.; Student Option; Every Spring) Continuation of Latin 1001. More complex constructions, including participles, clauses, indirect discourse. Some reading of adapted passages from ancient texts. Prereq: Grade of at least C- or S in 1001 or instr consent

LAT 3003. Intermediate Latin Prose. (4 cr.; Student Option; Every Fall) Introduction to Latin prose authors of 1st centuries BCE/CE. Readings of continuous passages of unadapted Latin texts (history, speeches, letters). Review of grammar/vocabulary as needed. Some discussion of major themes/issues in Roman culture as illustrated by texts. Prereq: Grade of at least C- or S in 1002 or 5001 or instr consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
LAT 3004. Intermediate Latin Poetry. (4 cr.; Student Option; Every Spring) Introduction to Roman epic poetry. Readings of selections from Vergil’s Aeneid. Quantitative meter and poetic devices. Discussion of major themes and issues as developed in Vergil’s poetry.

LAT 3199. Latin AP Credit. (4-8 cr.; No Grade Associated; Every Fall) Prereq score of [3 or 4 or 5] on [AP Vergil or AP Latin Literature] exam.

LAT 3993. Directed Studies. (; 1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent and dept consent

LAT 4951W. Major Project. (WI: 4 cr.; Student Option; Every Fall & Spring) Research project using documents and other sources from the ancient world. Students select project in consultation with a faculty member who directs the research and writing. prereq: [Greek-Latin or Latin major], three 3xxx Latin courses, instr consent, dept consent

LAT 5001. Intensive Latin. (3 cr.; Student Option; Every Fall) Covers material usually taught over two semesters. prereq: Prev experience in another foreign language is desirable

LAT 5003. Intermediate Latin Prose for Graduate Student Research. (; 4 cr.; Student Option; Every Fall) Introduction to Latin prose authors of 1st centuries BCE/CE. Readings of continuous passages of unadapted Latin texts (history, speeches, letters). Review of grammar/vocabulary as needed. Some discussion of major themes/issues in Roman culture as illustrated by texts. prereq: [Grade of at least [C- or S] in [1002 or 5001] or instr consent]

LAT 5004. Intermediate Latin Poetry for Graduate Research. (; 4 cr.; Student Option; Every Spring) Introduction to Roman epic poetry. Readings of selections from Vergil’s Aeneid. Quantitative meter and poetic devices. Discussion of major themes and issues as developed in Vergil’s poetry. Meets with 3004.

LAT 5100. Advanced Reading. (; 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring) Reading in Latin texts/authors. Texts/authors vary. prereq: [3004 or equiv], at least two yrs of college level Latin. Must contact Classical/Near Eastern Studies department for permission to register.

LAT 5200. Advanced Reading in Later Latin. (; 3 cr. [max 18 cr.]; Student Option; Periodic Fall & Spring) Authors of late antiquity, Middle Ages, Renaissance. Topics specified in Class Schedule. prereq: [LAT 3004 or equiv], at least two yrs of college level Latin. Must contact Classical and Near Eastern Studies department for permission to register.

LAT 5701. Latin Prose Composition. (; 3 cr.; Student Option; Periodic Fall & Spring) Latin grammar, syntax, diction, and prose style. Graduated exercises in prose composition. prereq: Grad student or instr consent

LAT 5703. Epigraphy. (; 3 cr.; Student Option; Periodic Fall & Spring) Practical/theoretical introduction to Latin epigraphy (study/interpretation of inscriptions). Readings/discussion of epigraphic texts. Their value as historical documents, as evidence for development of Latin language, and as literary texts. prereq: Grad student or instr consent

LAT 5705. Introduction to the Historical-Comparative Grammar of Greek and Latin. (; 3 cr.; Student Option; Periodic Fall & Spring) Historical/comparative grammar of Greek and Latin from proto-Indo-European origins to classical norms. prereq: Two yrs college [Greek or Latin] or instr consent

LAT 5800. Sight Reading for Graduate Students. (; 1 cr. [max 6 cr.]; S-N only: Every Fall & Spring) Practice in reading Latin texts at sight. prereq: Enrolled in a grad program in Department of Classical/Near Eastern Studies

LAT 5993. Directed Studies. (; 1-4 cr. [max 18 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent, dept consent

LAT 5994. Directed Research. (; 1-12 cr. [max 20 cr.]; Student Option; Every Fall & Spring) Guided research on original topic chosen by student. prereq: Grad student or instr consent

LAT 5996. Directed Instruction. (; 1-12 cr. [max 20 cr.]; Student Option; Every Fall & Spring) Supervised teaching internship. prereq: Grad student or instr consent

LAT 8100. Readings in Latin Prose. (; 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring) Reading/discussion of Latin prose texts.

LAT 8120. Latin Text Course. (; 3 cr. [max 15 cr.]; Student Option; Every Fall & Spring) Students attend 3xxx Latin courses. Supplementary work at discretion of instructor. prereq: 3111 or dept consent; not for students in dept of Classical and Near East Studies

LAT 8200. Readings in Latin Verse. (; 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring) Reading/discussion of Latin poetic texts. prereq: Advanced grad student

LAT 8262. Survey of Latin Literature I. (; 3 cr.; Student Option;) Extensive readings in variety of works from republican and early Augustan period

LAT 8263. Survey of Latin Literature II. (; 3 cr.; Student Option;) Variety of works from Augustan and imperial periods

LAT 8267. Graduate Survey of Latin Literature of Late Antiquity. (; 3 cr.; Student Option; Periodic Spring) Latin literature of 3rd to 6th centuries A.D., including Ammianus and Augustine. prereq: instr consent, dept consent

LAT 8300. Readings in Latin Texts. (; 3 cr. [max 18 cr.]; Student Option; Every Fall & Spring) Reading/discussion of literary or documentary texts from Roman antiquity. Topics may include subjects that draw on various sources, genres, or methods. prereq: Advanced grad student

LAT 8910. Seminar. (; 3 cr. [max 30 cr.]; Student Option; Periodic Fall & Spring) Topics in Latin literature examined in depth. Emphasizes current scholarship, original student research.

Latin American Studies (LAS)

LAS 3401W. Early Latin America to 1825. (GP,WI,HIS; 4 cr.; A-F or Audit; Every Fall & Spring) Societies of Americas, Spain, and Portugal before contact. Interactions among Native Americans, African slaves, and Europeans, from colonization through independence. Religion, resistance, labor, gender, race. Primary sources, historical scholarship.

LAS 3402W. Modern Latin America 1825 to Present. (GP,WI,HIS; 4 cr.; Student Option; Every Fall, Spring & Summer) National and contemporary period 1825 to present. Social, cultural, political, and economic change.

LAS 3429. Latin American History in Film and Text. (AH,GP; 3 cr.; Student Option; Periodic Fall, Spring & Summer) Cinematic representations of Latin America in the context of other historical and literary narratives. Experiences of Latinos in Hollywood. Compare U.S. films with those produced in Latin America. Specific themes vary by term (e.g., women, revolution, colonialism).

Law School (LAW)

LAW 3000. Introduction to American Law and Legal Reasoning. (3 cr.; A-F only; Every Fall) Law pervades all areas of modern life. Yet it remains mysterious to those without legal training. This course will equip you to better answer such questions by exploring the tools that lawyers use to interpret and apply the law. Students will learn to think like lawyers through a series of contemporary case studies that require reading, writing, thinking, and problem solving like a lawyer. Cases will be drawn from topics such as contracts, torts, civil procedure, property, business law, criminal law, sports law, privacy, and law and science.

LAW 5000. Introduction to American Law and Legal Reasoning. (3 cr.; A-F only; Every Fall) Law pervades all areas of modern life. Yet it remains mysterious to those without legal training. This course will equip you to better answer such questions by exploring the tools that lawyers use to interpret and apply the law.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Students will learn to think like lawyers through a series of contemporary case studies that require reading, writing, thinking, and problem solving like a lawyer. Cases will be drawn from topics such as contracts, torts, civil procedure, property, business law, criminal law, sports law, privacy, and law and science.

**LAW 5001. Introduction to the American Legal System.** (2 cr.; A-F only; Every Fall) This is an intense introduction to American law, providing an overview of a wide variety of constitutional, statutory and common law legal issues. A primary focus will be on American constitutional law: legislative, judicial, and executive powers; the legal structure of states; and the constitutional rights of individuals (including rights of free speech, freedom of religion, due process, and equal protection). We will also examine the American system of litigation: the structure of the court system, the jurisdiction of federal (national) and state courts, and the litigation process. We will also address some common law substantive topics in American law including torts and contracts. Students will have the opportunity to learn how to read and interpret American legal materials, to do legal research within the legal system, and to write an analytical legal memorandum.

**LAW 5003. Writing, Analysis & Persuasion.** (3 cr.; A-F only; Every Fall) Writing, analysis and persuasion are integral parts of patent law practice. Performing a patent search, for example, requires the ability to distinguish the novel features of the invention from those of the prior art. Procuring patent protection requires a showing that the invention is not “obvious” in light of the prior art. These are matters upon which reasonable minds may disagree - and often do. Writing, analysis and persuasion are essential tools of the successful patent practitioner. Through this course, students will be exposed to a broad range of persuasive and analytical techniques. We will explore how these techniques are used across a variety platforms, from written work product to images and visual media. Students will also enhance their writing skills through a number of progressively more challenging iterative writing exercises.

**LAW 5025. Patent Law Proseminar.** (1 cr.; A-F only; Every Fall) The field of patent law extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to current topics and compelling issues in patent law presented by leading patent and intellectual property law professionals. Students will gain real-world insights from in-house and private practice attorneys and agents, with a focus on patent prosecution and patent litigation.

**LAW 5026. Intellectual Property & Technology Proseminar.** (1 cr.; A-F only; Every Spring) The field of intellectual property extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to a broad range of IP related topics presented by leading practitioners working at the intersection of law and technology. Students will gain real-world insights into the challenges that new technologies are creating in the fields of patent law, biotechnology, 3D printing, international IP, trade secrets, privacy law, copyrights, and trademarks.

**LAW 5051. Business Associations/Corporations.** (4 cr.; Student Option; Every Fall & Spring) The initial part of this course is an introduction to the general law of multi-person unincorporated business organizations, principally partnerships, limited partnerships and limited liability companies. Matters covered include the procedures for forming such organizations and the rights and obligations of the participants as among themselves and with respect to third persons. The remaining class hours constitute the first portion of the basic Corporations course, and will cover such matters as corporate organization; the distribution of powers among the corporate board of directors, its officers and its stockholders; the proxy system; control devices in the close corporation; and the fiduciary duties of directors, officers and controlling shareholders. Matters dealing with corporate finance? (issuance of shares, payment of dividends, and corporate reorganizations) are covered in Advanced Corporate Law.

**LAW 5051. Financial Regulation.** (3 cr.; Student Option; Periodic Fall & Spring) This course will be a high-level overview of several different areas of financial regulation: banking regulation, insurance regulation, and elements of securities regulation (particularly broker-dealer and investment company regulation).

**LAW 5052. Energy Law.** (3 cr.; Student Option; Periodic Fall & Spring) This course provides an introduction to U.S. energy law. The first portion of the course introduces the nation’s primary sources of energy: coal, oil, biofuels, natural gas, hydropower, nuclear, wind, solar, and geothermal energy. In doing so, it explores the physical, market, and legal structures within which these energy sources are extracted, transported, and converted into energy. The second portion turns to the two major sectors of our energy economy: electricity and transportation. The third part of the course explores case studies of hot topics in energy law and policy that highlight the complex transitions taking place in the energy system. These topics include Smart Grid development, electric vehicles, risks and benefits associated with hydraulic fracturing and deepwater drilling, and the continued role of nuclear energy. In addition to traditional textbook reading and class discussion, the course will include industry, government, and nonprofit guest speaker presentations and in-class simulated exercises.

**LAW 5075. Ethics for Patent Agents.** (1 cr.; A-F only; Every Spring) This course is designed to provide students with an introduction and understanding of the ethics and rules of professional responsibility and the unauthorized practice of law. Scope: This course covers ethics and professional responsibility for lawyers, ethics and professional responsibility for patent agents and patent attorney's and the unauthorized practice of law. Goals: This course will provide students with the framework that will guide their actions and conduct as future patent professionals by introducing them to various scenarios that they are likely to encounter in their professional career. By the end of the course, students will understand the principles behind the ethics and rules of professional responsibility and the unauthorized practice of law as it applies to nonlawyers. prereq: Master of Science Patent Law Students.

**LAW 5076. Essentials of Business for Lawyers.** (3 cr.; Student Option; Every Fall & Spring) This course will teach you how to: (1) Understand basic accounting principles; (2) Read an annual report and analyze financial statements; (3) Look beyond numbers to gauge the financial performance and strength of an entity; (4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and (5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques and practices related to finance, accounting and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives, including organizational behavior, marketing and quantitative analysis. The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm’s top management team or as outside counsel.

**LAW 5100. Tax I.** (3 cr.; A-F only; Periodic Fall & Spring) This basic course in federal income taxation introduces the student to the Internal Revenue Code and the income taxation of individuals through the following topics: definition of income, relevant accounting concepts, exclusions, deductions, income splitting, sales and dispositions of property, amortization, capital losses, and current issues of tax policy.

**LAW 5103. Data Privacy Law.** (3 cr.; A-F only; Periodic Fall & Spring) Every single day, the newspaper contains stories?plural intended?about data privacy and security. Whether they concern the National Security Agency, Facebook, or a data breach at a small business, the handling of personal information has become a central concern of our time. In response, a complex law of data privacy has emerged, and now it is a fast growing area of legal practice. This course will equip students to counsel
LAW 5112. Essentials of Business. (3 cr.; A-F only; Periodic Fall & Spring) This course will teach you how to: (1) Understand business operations; (2) Read an annual report and analyze financial statements; (3) Look beyond numbers to gauge the financial performance and strength of an entity; (4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and (5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques and practices related to finance, accounting and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives, including organizational behavior, marketing and quantitative analysis. The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm’s top management team or as outside counsel.

LAW 5242. Patent Application Drafting. (1 cr.; A-F only; Every Spring) Patent Application Drafting. Students must also be enrolled in Law 5232 Patent Prosecution Practice I to take this course.

LAW 5250. Patent Portfolio Management. (2 cr.; A-F only; Every Fall) Patent portfolio management is the art of aligning patent strategy with business objectives. In general, the successful portfolio manager must have the ability to transform complex patent information into actionable insights that provide decision-making value to a wide variety of stakeholders. This course introduces students to the various practices and skills that go into building, implementing, and managing a patent portfolio whether from the point of view of a small, innovative, start-up company or a Fortune 500 company in a highly competitive market space.

LAW 5290. Patent Law Capstone: Innovation. (3 cr.; A-F only; Every Spring) This capstone course introduces students to the principles of successful innovation and the integral role of patents in this process. This is a course in innovation. There are no right or wrong answers. Large companies with very smart people often launch products that fail. Venture capitalists seeking to invest in winners more-often-than-not end up investing in losers. Innovation is an art not a science. There is no “secret formula” that guarantees success. There are simply different tools, skills, methods of analysis and approaches that may or may not work better than others. We will explore the art of innovation and the integral role that patents play in turning an idea into an innovation. Goals: Students will learn how to research complex subject matter across the intersecting domains of business, finance, marketing, science, technology and intellectual property. Students will then develop the ability to present their findings in a clear and concise manner that is understandable to and can be acted upon by a cross-functional audience of high-level decision makers.

LAW 5603. Intellectual Property Survey. (3 cr.; Student Option; Periodic Fall & Spring) The intellectual property survey course presents an overview of patent, copyright, and trademark law. The course also may include some coverage of trade secrets, unfair competition, or federal preemption of state intellectual property laws. The course provides an opportunity for students to acquaint themselves with the major branches of intellectual property law, and may be most useful for students who intend to pursue careers in general business law or civil litigation; intend to specialize in one of the major branches of intellectual property law but want to develop a basic understanding of the other branches as well; or are interested in learning something about the field before committing to further in-depth study of one or more of its branches. Students should not enroll in this course if they already have taken, or will have taken by the end of the semester in which they plan to enroll in this course, two or more of the following courses: Patent Law, Copyright Law, Trademark Law, or Unfair Competition Law.

LAW 5606. Administrative Law. (3 cr.; Student Option; Periodic Fall & Spring) Law governing judicial review of the decisions of government officials and agencies. Decisions of federal and state officials subject to various kinds of judicial review range from regulatory decisions by public service commissions governing the rates of suppliers of electricity and local telephone service to decisions governing entitlement to benefits under welfare programs. Some decisions have wide-ranging social and economic effects such as rulemaking decisions under the Clean Air Act while the impact of other decisions may be limited to a few individuals. The course is designed to assist motivated students to acquire the skills necessary to master a complex and difficult body of law.

LAW 5608. Trademarks. (3 cr.; Student Option; Periodic Fall & Spring) This course will consider how marketers secure and enforce trademark rights. Trademarks are the indicators that consumers rely upon to determine the origin of goods and services. The course will focus on U.S. federal trademark law, but will also look at state and international trademark law as well as related areas such as false advertising, publicity rights, and cybersquatting. This course will provide a solid foundation for subsequent work in practicing trademark law (application, enforcement, licensing, or litigation) or more general intellectual property law. It will also be useful to attorneys who do any work with trademark-dependent industries such as retail sales, advertising, or media and entertainment. Finally and more generally, trademark law

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offers excellent case studies of the interaction between law, culture, and technology, and of the evolution of traditional doctrine under pressure from rapid changes in surrounding circumstances.

**LAW 5613. Copyright.** (3 cr.; Student Option; Periodic Fall & Spring)
This course provides a detailed introduction to the basic law of copyright?traditional copyright subject matter, the concept of originality and authorship, copyright transfers (and terminations of transfers), infringement, and fair use. The course coverage excludes patent law, except in brief overview, and only touches briefly upon related areas of intellectual property law. Copyright (and copyright-like schemes) have increasingly become a necessary tool of the general practitioner as a result of the explosive growth in economic value of information-based products, like computer software and digital networks and databases. The lawyer ignorant of basic copyright principles will be increasingly handicapped in many areas of practice, such as negotiating technology transfers, drafting contractual rights, developing schemes of protection and privacy, distinguishing criminal from non-criminal behavior, and in litigation.

**LAW 5624. Strategic Management of Intellectual Property.** (3 cr.; Student Option; Periodic Fall & Spring)
Firms competing in a knowledge economy depend increasingly on intellectual property (IP): patents, trademarks, copyrights, trade secrets, domain names. Adroit firms understand that IP-based competition demands close coordination between legal and strategic management executives. This course introduces you to fundamental IP concepts, competitive strategies, and public policy challenges from legal and strategic management perspectives. Learn how the scope of IP protection and legal weaponry to vindicate IP rights has changed substantially in the past 15 years. Learn how IP management fits within a broader strategy for sustained profitability in high-tech industries. Learn how firm IP strategy to limit competitors is reconciled with antitrust policies promoting competition. Learn how managers price IP-protected products and services differently in developed versus developing economies. Come away with legal and managerial tools for applying IP-based strategies that will advance your firm and career.

**LAW 5707. Intellectual Property Transactions.** (2 cr.; A-F only; Every Spring)
Intellectual property rights have been described as a “word and shield.” Rights holders are thought to act offensively by suing or threatening to sue infringers and seeking money damages, irrespective of the holders? marketing and product sales programs. Or they act defensively to protect their current or future market positions by having federal courts enjoin competitors. This course considers a third way: intellectual property rights are also valuable intangible assets that may be bought and sold. In this course, we will explore the principal theories and practices of intellectual property transactions. We will be considering closely the doctrines regulating the assigning and licensing of patent, copyright, trademark and other intellectual property rights, and we will be questioning critically whether these laws and practices encourage or inhibit commercial activity and innovation. While studying specific transactions in the course, we will be examining the practical uses of intellectual property law to meet commercial objectives.

**LAW 5908. Independent Research and Writing.** (1-2 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Students may earn 1 or 2 credits (and in exceptional circumstances, 3 credits) for researching and writing a note, article, memo, or other paper on a legal topic. At least 3,750 words are required for one credit, at least 7,500 for two credits, and at least 11,250 for three credits. To register, the student should confer with a supervising faculty member, draft a description of the proposed project, and complete the online Independent Research form. LAW 5908 is for students who are not enrolled in the Law School, as well as MSPL candidates. Other law school degree candidates should enroll in LAW 7606 or LAW 7608 instead of LAW 5908.

**LAW 6000. First Year Law Coursework.** (13-16 cr. [max 32 cr.]; A-F only; Every Fall & Spring)
First year Law Students have 16-credits of required coursework in fall and 13-credits of required coursework in spring. Registration in Law 6000 represents registration in these courses.

**LAW 6001. Contracts.** (4 cr.; A-F only; Every Fall)
Basic course in law of contract and promissory obligation; formation of contracts; legal validity and construction; breach; legal and equitable remedies for breach; conditions; third-party rights.

**LAW 6002. Legal Research & Writing.** (1 cr.; P-F only; Every Fall)
This year-long course covers the process of communicating about the law. Our goal is to teach students the building blocks of legal communication through multiple practice exercises so that students can repeat the process on their own after successful completion of the course. In the fall (one credit), we begin at orientation with a short exercise, then move on to email, letter, and office memorandum exercises written in an objective/predictive mode. In the spring (two credits), we proceed gradually to a persuasive trial court brief and delivery of formal oral arguments. The spring also includes a Statutory Interpretation module (one credit).

**LAW 6003. Legal Writing & Research & Statutory Interpretation.** (3 cr.; P-F only; Every Spring)
Preparation of memoranda/briefs. Tutorial instruction in legal research, analysis, writing. Use of modern law library for research. Introduction to legal bibliography and the basic doctrines of statutory interpretation--textual canons, legislative history, administrative interpretation.

**LAW 6004. Property.** (4 cr.; A-F only; Every Spring)
The law's protection of possession and ownership of real and personal property.

**LAW 6005. Torts.** (4 cr.; A-F only; Every Fall & Spring)
Civil liability for infliction of harm, including assault, battery, false imprisonment, infliction of mental distress, negligence, and their respective defenses; function of torts process.

**LAW 6006. Civil Procedure.** (4 cr.; A-F only; Every Fall & Spring)
This course addresses rules governing civil litigation, with emphasis on rules applicable in federal district courts. Topics may include due process, pleading, joinder, discovery, case management, the relationship between judges and juries, settlement, alternative dispute resolution, summary judgment, post-trial motions, finality, and preclusion. The course will also provide a brief survey of the topics covered in Civil Procedure II.

**LAW 6007. Constitutional Law.** (3 cr.; A-F only; Every Fall & Spring)
Judicial review authority; problems of government structure (federalism, intergovernmental relations, separation of powers); and individual rights and limitations on government power (protection of economic and property claims, equality under the law, personal liberties, freedom of speech and of religion).

**LAW 6009. Criminal Law.** (3 cr.; A-F only; Every Fall & Spring)

Purposes/functions of capital processes and of several deprivations they impose. Requisites for official designation of acts and persons as "crimes" and "criminals." Justifications for acts otherwise designated "criminal." Emphasizes concepts of criminal responsibility. Nature/limits of criminal sentencing process. prereq: dept consent

**LAW 6010. Perspectives: 1L.** (3 cr.; A-F only; Every Spring)
This course, offered in first-year and upper-year sections, is team-taught by faculty who approach the law from three different disciplinary perspectives. The disciplines presented will vary from year to year.

**LAW 6011. International Law: 1L.** (3 cr.; A-F only; Every Spring)
The course is an introduction to public international law. It will examine the sources and history of the law of nations, and how international law is formed, interpreted and (sometimes) enforced. It will also provide a brief introduction to the law of international organizations (specifically the United Nations), concepts of jurisdiction and conflicts of jurisdiction among nation states, international protection of human rights, the law of war, international criminal law, and the control of the use of force (including peacekeeping and related topics).

**LAW 6013. Law In Practice: 1L.** (3 cr.; P-F only; Every Spring)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
This course introduces first year students to the skills needed to apply emerging knowledge of legal doctrine and reasoning in the actual practice of law. The course involves a series of simulation experiences related to two case files: one litigation case and one transactional matter. Students attend Law Firm classes taught by Law School faculty that explore the doctrinal and strategic issues in the simulated cases. Students also perform simulations in Practice Groups? of eight students led by local practicing attorneys. Each student individually takes and defends a deposition. Groups of two students engage in client or witness interviews, client counseling, and negotiation simulations. Students also complete either a simulated conference in the chambers of a local judge or engage in a simulated mediation conducted by a qualified neutral.

**LAW 6015. Civil Procedure II: LL.M.** (3 cr.; A-F only; Every Spring) This course builds on Civil Procedure I by examining additional facets of civil litigation. Topics may include personal jurisdiction, subject matter jurisdiction, venue, preliminary injunctions and temporary restraining orders, the Erie doctrine, appeals, and class actions.

**LAW 6016. Essentials of Business for Lawyers.** (3 cr.; A-F only; Every Spring) This course will teach you how to: (1) Understand basic accounting principles; (2) Read an annual report and analyze financial statements; (3) Look beyond numbers to gauge the financial performance and strength of an entity; (4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and (5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques and practices related to finance, accounting and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives, including organizational behavior, marketing and quantitative analysis.

The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm's top management team or as outside counsel.

**LAW 6017. Humphrey Law Course.** (2 cr. [max 6 cr.]; P-F only; Every Fall & Spring) Topics selected according to fellow's interests. Leadership and the law. Lawyer's role in society. Human rights. Fellows organize collaborative presentations with Law School faculty, other U of M faculty, or professionals in their fields of interest.

**LAW 6018. Legislation and Regulation.** (3 cr.; A-F only; Every Spring) This course explores lawmaking in the administrative state. Topics include: the legislative process, delegation of legislative authority to administrative agencies, the rulemaking process, statutory interpretation by courts and agencies, and judicial review of agency decisions. The course will focus on how statutes structure and constrain judicial and administrative decisionmaking.

**LAW 6019. Leadership and Law - LL.M.s.** (2 cr.; A-F only; Periodic Spring) In this age of globalization, leadership and professionalism within the legal profession takes on new and complex meanings. Research has demonstrated that introducing legal practitioners to emotional intelligence competencies impacts their professionalism and professional identity by increasing their ability to persuade, advocate, influence, and communicate. In this course students will begin to develop their personal leadership identity and explore how that identity is influenced by culture. Students will explore what it means for the lawyer to be a leader. They will be challenged to: determine their professional strengths and developmental needs; consider how individual personality and cultural traits affect group processes in legal institutions; explore the contextual nature of professionalism and how to adjust techniques based upon cultural cues (especially in international settings); navigate professional, legal settings to maximize their organizational impact; and discover and develop various leadership skills.

**LAW 6020. Introduction to American Law.** (2 cr.; S-N only; Every Fall) American law, background.

**LAW 6021. LL.M. Legal Writing and Legal Skills I.** (3 cr.; A-F only; Every Fall) The fall course introduces legal writing and focuses on legal analysis. Students will draft and edit letters and office memoranda and engage in exercises such as mock client meetings and professional presentations. The focus of the fall semester is predictive legal writing. Some time will also be spent discussing how to prepare for and take law school exams.

**LAW 6022. LL.M. Legal Writing and Legal Skills II.** (2 cr.; A-F only; Every Spring) The spring semester course continues to build upon the foundation presented in the fall semester and to examine the fundamentals of U.S. legal analysis and legal writing. The focus of the second semester is persuasive legal writing and students will draft and edit a legal memorandum for motion practice in litigation as well as professional correspondence. To accomplish these goals, students act as attorneys in fictitious law firms, representing either the plaintiff or the defendant in litigation matters. Students will also engage in simulated oral exercises such as mock client meetings and mock oral arguments. We will also spend time examining how to improve legal writing by doing editing and revising exercises and by analyzing samples of good (and bad) legal writing.

**LAW 6023. Seminar: LL.M. Legal Reading, Writing and Analysis.** (3 cr.; A-F only; Every Fall) This class is designed to help LL.M. students build the skills necessary to succeed in law school? whether they plan to earn only a LL.M. degree or to continue their studies an earn a J.D. or S.J.D. degree -- and in their future professional and academic endeavors.

**LAW 6024. Applied Welfare Economics and Public Policy.** (3 cr.; A-F only; Periodic Spring) Basic concepts underlying measurement of welfare change, problems of market failure/externalities, social welfare functions, distribution within/across generations. Application of concepts based on case studies of the environment, returns to research, technical change, and agricultural policy.

**LAW 6025. Wrongful Convictions.** (2 cr.; A-F only; Every Fall) Wrongful Convictions is run in conjunction with the Innocence Project of Minnesota. Its purpose is to educate students about the causes of wrongful convictions as well as provide students with an opportunity to work on hypothetical courtroom situations in a classroom setting. The reading materials and classroom discussion will cover such topics as unreliable eyewitness identifications, false confessions, jailhouse informant testimony, ineffective assistance of counsel, government misconduct, problematic forensic science, and racial bias in the court system. We will also discuss how DNA testing works and its application in the courtroom. Students are expected to perform in-class exercises such as examination of witnesses making eyewitness identification, challenging confessions, cross-examine a cooperating witness and conduct voir dire on racial bias. Finally, students will be required to evaluate inmate applications for assistance submitted to the Innocence Project of Minnesota as part of their midterm sample assignment and final assignment.

**LAW 6026. Gaming Law.** (3 cr.; A-F only; Periodic Spring) This course covers the law related to one of the fastest growing and most regulated industries in the United States. It will focus on the $28 billion a year industry of Indian gaming and the issues tribes frequently face. The core of the course will develop an understanding of the relationship between federal, tribal, and state gaming regulatory schemes. It also reaches several substantive law fields, including administrative law, constitutional law, contracts, federal Indian law, labor law, and tribal law. Students do not need a background in federal Indian law or tribal law to successfully complete this course.

**LAW 6027. Seminar: Law of Piracy, Security, and Maritime Spaces.** (2 cr.; A-F only; Periodic Fall) This course will examine in particular the United Nations Convention on the Law of the Sea (UNCLOS). It will focus on the law of maritime affairs and the protection of the rights of states and individuals in the seas. Students will study the law of the sea, international law, and the role of the United Nations in the development of international law. Students will also learn about the legal principles governing the use of the seas and the rights and obligations of states in this regard. The course will be taught by a scholar who is an expert in the field of maritime law.

**LAW 6028. LL.M. Judicial Observation.** (1-2 cr.; S-N only; Every Spring) This course presents an opportunity to observe the workings of the judicial system and to gain insight into the role of the judge. Students will attend court proceedings and other judicial activities, and will participate in group discussions and writing assignments. The course will cover a variety of topics, including the history and role of the judiciary, the role of the judge in the courtroom, and the impact of judicial decisions on society. Students will also gain an understanding of the legal process and the role of the lawyer in the courtroom.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
LAW 6030. Contemporary Problems in Freedom of Speech and Press. (3 cr.; A-F only; Periodic Fall)
This course will consider how growing concerns about privacy and national security will affect traditional First Amendment legal theory and practice. We will examine significant court decisions, statutory and regulatory schemes (such as the USA FREEDOM Act and the Espionage Act), and international initiatives (such as ?The Right to be Forgotten? and the EU-US "Privacy Shield"). We will consider their impact on U.S. law governing news gathering and dissemination, prior restraints, access to courts and to government information, as well as government surveillance and regulation of electronic communications. Students will write and orally present a research paper on a relevant legal topic selected in consultation with the instructor, and will also write a short reflection essay roughly midway through the semester. Well-prepared participation in class discussions and regular attendance are important course requirements.

LAW 6031. Smart Growth. (; 2 cr. [max 3 cr.]; A-F only; Periodic Spring)
This course examines emerging legal strategies to address the fiscal, environmental, and social impacts of unregulated metropolitan regional growth (?urban sprawl?). Topics include: inequalities in access to housing, jobs, and educational opportunities; local fiscal competition; local, state & regional regulatory responses to metropolitan development; environmental impacts of metropolitan development; and evolving legal structure of regional governance in America's large metropolitan areas.

LAW 6034. Sem: Women's Legal History. (2-3 cr.; A-F only; Periodic Spring)
Passage of National Historic Preservation Act (NHPA) as watershed in cultural property law. NHPA direction of federal government to protect/preserve cultural property.

LAW 6035. Corporate Externship. (; 3 cr.; P-F only; Periodic Summer)
Students observe/work in corporate legal environment in an organization. Students choose among divisions of corporate practice: transactions, employment, litigation management, compliance, or contract management. Weekly one-hour discussions on observations/issues of corporate practice.

LAW 6036. Reproductive Rights. (3 cr.; A-F only; Every Fall)
The age-old debate on the rights of individuals to sexual determination and reproductive autonomy rages on. It grows more contentious as new technological and heated political confrontations alter the playing field. This course, using cases, statutes, and ancient and contemporary critical writings, examines the legal foundations and social implications of regulating contraception, abortion, pregnancy, childbirth, and assisted reproduction. It addresses access, funding, the rights of men, women, minors, fetuses, and government. It also explores ethical considerations and international perspectives.

LAW 6037. Emerging Sciences and Technologies: Law, Ethics and Policy. (3 cr.; A-F only; Periodic Fall)
This interdisciplinary course will examine issues at the nexus of law, ethics, public policy, and emerging sciences and technologies (ES&T) including nanotechnology, genetic and biomedical engineering, cognitive science, synthetic biology, and robotics. Topics we will explore include the role of science and technology as both a tool for and the subject of law and policy; the legal, ethical, economic, and policy implications of ES&T research and development; environmental and human health risk analysis and regulation (e.g., EPA, FDA, OSHA, and state and local regulatory mechanisms); intellectual property issues; liability issues; and global impacts. Topics will be approached from the perspective of different stakeholders (e.g., federal agencies, industry, academic researchers, the environment, international organizations, and the public) and in the context of different application areas (e.g., drugs, devices, food, agriculture, energy, environmental remediation) using a variety of interdisciplinary approaches. Students will present on a broad range of interests are encouraged to enroll.

LAW 6038. Biomedical Ethics. (; 3 cr.; A-F only; Periodic Fall)
Topics in biomedical ethics. Patients' rights/ duties, informed consent, confidentiality, ethical issues in medical research, initiation/ termination of medical treatment, euthanasia, abortion, allocation of medical resources.

LAW 6039. Great Cases. (3 cr.; A-F only; Periodic Spring)
Eighteen U.S. Supreme Court cases that have shaped our nation. Five nationally publicized trial court cases. Historical, political, and legal context.

LAW 6040. Perspectives on the Law. (3 cr.; A-F only; Every Spring)
This course, offered in first-year and upper- year sections, is team-taught by faculty who approach the law from three different disciplinary perspectives. The disciplines presented will vary from year to year.

LAW 6041. Investment Management Law. (2 cr.; A-F only; Periodic Spring)
This course will cover policy and regulation governing pooled investment vehicles and their managers. We will engage in a close study of the Investment Company Act of 1940 and its companion statute, the Investment Advisers Act of 1940. The primary focus will be the regulation of mutual funds, but attention will also be given to alternative investment vehicles, such as hedge funds, private equity funds and exchange-traded funds.

LAW 6042. Nonprofits and Public Sectors Externships. (3 cr.; A-F only; Periodic Summer)
Legal experience in nonprofit and public sectors. Under supervision of practicing attorneys. With classroom seminar.

LAW 6043. Nonprofit and Public Sector Externship. (2 cr.; P-F only; Periodic Summer)
Externships for nonprofit/public sectors.

LAW 6043. Nonprofit and Public Sector Externship. (2 cr.; P-F only; Periodic Summer)
Externships for nonprofit/public sectors.

LAW 6044. Immigration Law Externship - Center for New Americans. (; 2-3 cr. [max 6 cr.]; P-F only; Every Fall & Spring)
Externship in immigration law with Center for New Americans.

LAW 6046. Human Trafficking. (2 cr.; A-F only; Periodic Spring)
Seminar will examine the breadth and depth of efforts to combat and raise awareness about human trafficking, a form of modern-day slavery in which people are compelled through force, fraud, coercion, or other means to engage in commercial sexual exploitation or forced labor. An optional two-credit externship, Law 6047, is available.

LAW 6047. Human Trafficking Externship. (; 2 cr.; A-F only; Periodic Spring)
Registration in the Law 6046 Sem: Human Trafficking is required to enroll in this externship. Students gain a practical experience by participating in an externship at a human trafficking-related placement and apply the classroom lessons in the legal work place.

LAW 6049. Unincorporated Business Associations. (; 3 cr.; A-F only; Every Fall)
This course introduces students to the main features of leading forms of unincorporated business associations, including limited liability companies (LLCs), partnerships, limited partnerships, and limited liability partnerships. Topics covered include authority and management structure, fiduciary duties, financial rights, transfer rights, and dissociation and dissolution. The course is structured around a series of exercises in which students negotiate, draft, and analyze the governing agreement for a simulated LLC. The course is strongly recommended for students who have taken the 1L Corporations elective.

LAW 6050. Commercial Paper. (; 2-3 cr.; A-F or Audit; Every Fall & Spring)
Commercial payment and credit devices, such as checks, drafts, and promissory notes, and applicable commercial and banking practices. Articles 3 and 4 of the Uniform Commercial Code.

LAW 6051. Business Associations/ Corporations. (; 4 cr.; A-F only; Every Fall)
The initial part of this course is an introduction to the general law of multi-person unincorporated business organizations, principally partnerships, limited partnerships and limited liability companies. Matters covered include the procedures for forming such organizations and the rights and obligations of the participants as among themselves and with respect to third persons. The remaining class hours constitute the first portion of the basic Corporations course, and will cover...
such matters as corporate organization; the distribution of powers among the corporate board of directors, its officers and its stockholders; the proxy system; control devices in the close corporation; and the fiduciary duties of directors, officers and controlling shareholders. Matters dealing with ?corporate finance? (issuance of shares, payment of dividends, and corporate reorganizations) are covered in Advanced Corporate Law.

**LAW 6052. Sales.** (2-3 cr.; A-F only; Every Fall & Spring)


**LAW 6053. Analytical Methods for Lawyers: An Introduction.** (3 cr.; A-F only; Periodic Spring)

The course provides the analytical foundations for legal practice in the modern world?a world in which sound legal advice requires the mastery of the techniques and language of disciplines such as economics, decision theory and game theory. After a brief review of the methodology of law and economics, this course exposes students to a broad survey of micro-economics, decision-theory, and game-theory concepts. These analytical methods play a crucial role in the design and understanding of legal rules. The second part of the course builds on these premises to study the economic structure of several areas of law. Through this course students will develop a framework for the analysis of legal rules that will aid them in the remainder of their legal studies and professional life.

**LAW 6055. Advanced Corporate Law.** (3 cr.; A-F only; Every Spring)

This course will focus on corporate finance and reorganization. Specifically, the course will explore: methods of financing the corporate enterprise including capital stock structures with preferred and common stock, as well as debt types and obligations; payments to stockholders by way of dividends, redemptions, purchase of shares or spin-offs; and reorganizations including mergers, sales of assets, and recapitalizations. The evaluation is by way of final essay exam.

**LAW 6057. Judicial Externship.** (2-3 cr.; P-F only; Every Fall, Spring & Summer)

The judicial externship class provides an opportunity for students to learn about both lawyering and judging by observing and participating in the work of a judge and his or her staff. Each student is assigned to a judge and serves as a part-time law clerk for one semester. Positions are typically available with federal district, bankruptcy, courts of appeals, and magistrate judges, with state court of appeals, district court, and tax court judges, and with tribal courts. Working as externs, students prepare research memoranda, observe judicial proceedings, and participate in the drafting of opinions and orders. A student may select to register for 2 credits (100 hours of work) or 3 credits (150 hours of fieldwork). Students will document and reflect on their fieldwork in journals and will interact with other students in the class through online discussion groups, in a few classes scheduled during the noon hour, and in periodic small group meetings with the instructor. Graded H/P/LP/F.

**LAW 6058. Human Rights Advocacy.** (3 cr.; A-F only; Every Fall)

This course will study the histories, philosophies and activities of human rights activists and organizations. The course examines the theoretical basis of the human rights movement, the principles underlying key organizations in the human rights field, as well as their strategies, tactics, and programs. The class will use case studies and other active methods to understand and to evaluate the work of human rights activists. Topics to be considered include fact-finding and documentation, campaigns on human rights issues, cultural relativism, economic rights, and corporate responsibility for human rights. Students will consider the basic organizational structure and fundraising needs of NGOs. Students will design and present a research project based on their selection of in-class topics. Readings include material on the history of NGOs; roots and development of the human rights movement; analysis of key NGOs; advocacy within international institutions; and reports and publications from NGOs working in the field.

**LAW 6059. Constitutional Law - Theories of Freedom of Expression.** (3 cr.; A-F only; Periodic Spring)

This course will survey the evolution of First Amendment law as it affects the legal rights and privileges of the print and electronic media. Topics will include prior restraints, libel, privacy, reporters? privilege, access to courts (including free press/fair trial), commercial speech, and obscenity/indecency. The course will examine the statutory and common law rights of access to information and will consider the constitutional implications of government regulation of media content, including the new media. We will read court opinions as well as seminal scholarly articles on the historical origins and philosophical foundations of freedom of press and speech and review doctrinal themes.

**LAW 6060. Assisted Reproduction and the Family.** (3 cr.; A-F only; Every Fall)

Study of Assisted Reproduction/how laws work for family.

**LAW 6061. Financial Regulation.** (2-3 cr.; A-F only; Every Fall)

This course will be a high-level overview of several different areas of financial regulation: banking regulation, insurance regulation, and elements of securities regulation (particularly broker-dealer and investment company regulation).

**LAW 6062. Energy Law.** (3 cr.; A-F only; Every Spring)

This course provides an introduction to U.S. energy law. The first portion of the course introduces the nation?s primary sources of energy: coal, oil, biofuels, natural gas, hydropower, nuclear, wind, solar, and geothermal energy. In doing so, it explores the physical, market, and legal structures within which these energy sources are extracted, transported, and converted into energy. The second portion of the course turns to the two major sectors of our energy economy: electricity and transportation. The third portion of the course explores case studies of hot topics in energy law and policy that highlight the complex transitions taking place in the energy system. These topics include Smart Grid development, electric vehicles, risks and benefits associated with hydraulic fracturing and deepwater drilling, and the continued role of nuclear energy. In addition to traditional textbook reading and class discussion, the course will include industry, government, and nonprofit guest speaker presentations and in-class simulated exercises.

**LAW 6063. Law and Neuroscience.** (2-3 cr.; A-F only; Every Fall)

New field of "neurolaw." Neuroscience of criminal culpability, brain-based lie detection, cognitive enhancement, emotions, decision making.

**LAW 6066. Minnesota Law Public Interest Residency.** (2 cr. [max 4 cr.]; A-F only; Every Fall & Spring)

The Minnesota Law Public Interest Residency Program is a new program established by Allen (?56) and Linda Saeks that connects leading public interest and government organizations with high-achieving 3L students. Students work full-time during their third year of law school for a nonprofit or government agency and have a guaranteed, full-time, paid legal position with the same organization the year following graduation. This innovative model provides students with valuable legal training while providing the organizations with much-needed legal work. This classroom component will complement the externship. Residents will meet as a group, weekly to discuss lawyering skills, learn from public interest speakers, and gain insight into their work. prereq: 6219; concurrent enrollment in 6067 required.

**LAW 6067. Minnesota Law Public Interest Residency Externship.** (8 cr. [max 16 cr.]; P-F only; Every Fall & Spring)

The Minnesota Law Public Interest Residency Program is a new program established by Allen (?56) and Linda Saeks that connects leading public interest and government organizations with high-achieving 3L students. Students work full-time during their third year of law school for a nonprofit or government agency and have a guaranteed, full-time, paid legal position with the same organization the year following graduation. This innovative model provides students with valuable legal training while providing the organizations with much-needed legal work. prereq: 6219; concurrent enrollment in 6066 required.

**LAW 6068. Information Access Practicum.** (2 cr.; P-F only; Periodic Spring)

This course will expose students to the theory and practice of government secrecy law at the state and federal levels. The heart of the course will be practice-based. Students will be
paired with non-governmental organizations to assist those organizations with government secrecy related legal, policy, and public education work. The exact work and mix of organizations may change somewhat from year to year. The organizations most likely will include the Minnesota Coalition for Government Information and Public Record Media. Students will assist the groups on projects ranging from litigation appealing the denial of information under the Minnesota Data Practices Act or the federal Freedom of Information Act, lobbying the Minnesota state legislature regarding amendments to the Data Practices Act, and preparing white papers or other public education and advocacy materials.

**LAW 6071. International Law.** (3 cr.; A-F only; Every Spring)  
The course is an introduction to public international law. It will examine the sources and history of the law of nations and how international law is formed, interpreted, and (sometimes) enforced. It will also provide a brief introduction to the law of international organizations (specifically the United Nations), concepts of jurisdiction and conflicts of jurisdiction among nation states, international protection of human rights, the law of war, international criminal law, and the control of the use of force (including peacekeeping and related topics). prereq: Upper division students only

**LAW 6075. Civil Procedure II.** (3 cr.; A-F only; Every Spring)  
This course builds on Civil Procedure I by examining additional facets of civil litigation. Topics may include personal jurisdiction, subject matter jurisdiction, venue, preliminary injunctions and temporary restraining orders, the Erie doctrine, appeals, and class actions. prereq: Upper division students only

**LAW 6076. Essentials of Business for Lawyers.** (3 cr.; A-F only; Every Fall & Spring)  
This course will teach you how to:  
(1) Understand basic accounting principles;  
(2) Read an annual report and analyze financial statements;  
(3) Look beyond numbers to gauge the financial performance and strength of an entity;  
(4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and  
(5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques and practices related to finance, accounting and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives including organizational behavior, marketing and quantitative analysis.  
The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm’s top management team or as outside counsel.

**LAW 6078. Legislation and Regulation.** (3 cr.; A-F only; Every Spring)  
This course explores lawmaking in the administrative state. Topics include: the legislative process, delegation of legislative authority to administrative agencies, the rulemaking process, statutory interpretation by courts and agencies, and judicial review of agency decisions. The course will focus on how statutes structure and constrain judicial and administrative decisionmaking.

**LAW 6081. Constitutional Law: 14th Amendment.** (3 cr.; A-F only; Every Fall & Spring)  
This course offers an overview of civil liberties and civil rights under the United States Constitution. It will cover First Amendment freedoms, including freedom of speech and of the press, freedom of assembly and association, and religious freedoms (prohibition on establishment of religion and protection of free exercise of religion). It will also cover rights protected by the Fourteenth Amendment, including due process of law and equal protection of the laws. A few other individual rights and liberties guaranteed by the Constitution will be briefly discussed (takings, contract clause, Second Amendment gun rights, Ninth Amendment ?privacy? rights). It does not cover constitutional rights in criminal law matters, which are covered in the Criminal Procedure course.

**LAW 6082. Constitutional Law: Civil Rights and Liberties Survey.** (3 cr.; A-F only; Periodic Fall & Spring)  
This course includes coverage both of civil rights (Fourteenth Amendment protection of due process and of equal protection) and of civil liberties (First Amendment protection of speech and of religion), as well as limited coverage of other constitutionally protected rights and liberties. The First Amendment portion of this course includes an examination of freedom of speech and religion, freedom of press, as well as the Establishment Clause and Free Exercise Clause protections of freedom of religion. The Fourteenth Amendment portion deals with due process of law (procedural due process, substantive due process, the incorporation of the Bill of Rights protections to limit the powers of states and municipalities) and with equal protection of the laws (examining racial discrimination, gender discrimination, other classifications). Rights of privacy and personal autonomy will also be considered. The course will also examine other constitutional rights, including the right to keep and bear arms (Second Amendment), the protection of private property (Fifth and Fourteenth Amendments), and other provisions.

**LAW 6083. First Amendment.** (3 cr.; A-F only; Every Fall & Spring)  
An in-depth inquiry into the First Amendment, including both the doctrine and theory of free expression. Topics may include political incitement, commercial speech, hate speech, school prayer, parochial school vouchers and religious exemptions.

**LAW 6085. Criminal Procedure.** (3 cr.; A-F only; Every Fall & Spring)  
This course explores key Supreme Court cases interpreting the 4th, 5th and 6th Amendments that form our constitutional criminal procedure law defining the boundary between the individual and the state. Topics include: search and seizure, stop and frisk, self-incrimination, involuntary confessions, line-ups, the right to counsel, and the role of defense counsel and prosecutors in an adversarial system. To bring our study into the 21st Century, we will consider three important progressions that the Supreme Court is slowly acknowledging: the steady transformation of our adversarial process into an inquisitorial one focused on guilty pleas; the rapid rise in technology that has exponentially increased the possibilities for criminal law violation and detection; and the explosion of social science literature that informs the fundamentally human processes and interactions at the heart of encounters between citizens and police. The course will invite several guest speakers who, through their work in the trenches, have developed expertise in specific criminal justice areas.

**LAW 6100. Taxation I.** (3 cr.; A-F only; Every Fall, Spring & Summer)  
This basic course in federal income taxation introduces the student to the Internal Revenue Code and the income taxation of individuals through the following topics: definitions of income, relevant accounting concepts, exclusions, deductions, income splitting, sales and dispositions of property, amortization, capital losses, and current issues of tax policy.

**LAW 6102. Mergers and Acquisitions.** (3 cr.; A-F only; Periodic Spring)  
This class will cover the theory behind, the Federal and state law governing, and the practice of, mergers and acquisitions. Our main focus will be what a transactional lawyer would want and need to know as to why mergers and acquisitions might occur and how and why companies or shareholders would embrace or disfavor them, how the transactions are documented and how disclosure requirements are met, and what the present cases say.

**LAW 6103. Data Privacy Law.** (3 cr.; A-F only; Periodic Spring)  
Every single day, the newspaper contains stories?plural intended?about data privacy and security. Whether they concern the National Security Agency, Facebook, or a data breach at a small business, the handling of personal information has become a central concern of our time. In response, a complex law of data privacy has emerged and now it is a fast growing area of legal practice. This course will equip students to counsel clients about an array of federal, state, and international legal requirements?while also analyzing them critically and thinking about the societal challenges posed by new information technology. Assessment will include group projects and a take-home final.

**LAW 6104. Legal Writing II.** (1 cr.; A-F only; Every Fall)  
This course provides additional instruction in the legal analysis and legal writing concepts covered in the first-year legal research and writing course. Students will meet individually
and in groups with the instructor and will have multiple short assignments.

**LAW 6105. Advanced Statutory Interpretation.** (2-3 cr.; A-F only; Every Spring)
General principles that courts/lawyers use in interpreting statutes. Canons that refer to statutory text, legislative history, administrative agency interpretation, various sources of public policy.

**LAW 6106. Federal Tax Procedure.** (2 cr.; A-F only; Every Fall & Spring)
Overview of all major IRS functions including returns selection, examinations, administrative appeals, tax litigation, collection activities (liens and levies), bankruptcy, and criminal tax enforcement. Effective representation of clients in all phases of IRS encounters.

**LAW 6107. Bankruptcy.** (3 cr.; A-F only; Every Spring)
After surveying the rights of creditors and debtors under state law, this course will consider the impact of bankruptcy upon secured and unsecured creditors and stockholders. The bankruptcy trustee's avoiding powers will be studied. Chapters 7, 11, and 13 liquidations and reorganizations will be surveyed with selected topics considered in-depth. The negotiated settlements and workout agreements which characterize this area of practice will be emphasized.

**LAW 6109. Creditors' Remedies/Secured Transactions.** (3 cr.; A-F only; Every Fall & Spring)
This three-hour course examines the full array of state-law remedies available to secured and unsecured creditors in the collection of debts and also examines the correlative procedural and substantive rights of debtors in shielding their assets from creditors' claims. The course focuses, however, on the rights and duties of parties to secured transactions under Article 9 of the Uniform Commercial Code. Primary attention is given to the ordering of claims when the debtor has insufficient assets to satisfy all of her debts and also when she files, or is forced into, bankruptcy. Throughout the course students will practice statutory interpretation; consider the relationship among sources of law (including the law of the parties? agreement, enacted law, and common law); argue about the proper roles of the legislator and judge in making law; and debate a variety of other jurisprudential issues (and some social/policy issues, too) that transcend the substance of the law of creditors? rights.

**LAW 6111. Lawyers in Film.** (2 cr.; A-F only; Periodic Spring)
Influence Hollywood has had on how society perceives lawyers, legal profession, ethical standards of legal profession. Critically evaluate films/television programs, identify ethical issues, gain increased understanding of role in society played by lawyers/legal system.

**LAW 6113. Construction Law.** (2 cr.; A-F only; Periodic Fall)
The construction industry, comprised of owners, lenders, architects and engineers, contractors and subcontractors, material suppliers, sureties and insurers, by many measures is the largest production industry in the U.S. This industry-oriented course will address (1) the complex world of construction, (2) the climate that leads to controversies, (3) the application of legal principles to the complex factual contexts of the construction process, (4) contract formation and administration issues involved in the process, including project delivery methods, contract types, allocation of risk, implied warranties, competitive bidding and contractor selection procedures, changes and extras, differing site conditions, schedule delay and disruption, bonds and suretyship, insurance, and claims of many types, and (5) how disputes are resolved through mediation, litigation, and arbitration.

**LAW 6114. Partnership Taxation.** (3 cr.; A-F only; Every Spring)
Federal income taxation of partnerships and limited liability companies including formation, operation and management, distributions, allocations, sales and liquidations of entity interests, and terminations.

**LAW 6115. Civil Litigation: Case Development and Discovery.** (2 cr.; A-F only; Periodic Spring)
Much of what civil litigators do involves case development. Case development is a form of storytelling. The story, of course, should be persuasive, but it must also satisfy the requirements of applicable law, and it must be based upon admissible evidence. An integral part of case development is discovery. The Rules of Civil Procedure, specifically Rules 26 through 37, set forth the scope and types of discovery that may be conducted. Yet, depending upon the nature of the case, questions relating to what forms of discovery are appropriate, in what order, and for what purposes cannot be found in the rules. The goal of this course is to teach the student how to think both strategically and tactically with regard to case development and discovery. You will be introduced to basic (and some advanced) concepts and skills relating to ? designing? and ?building? the case, including through discovery practice. In addition, you will participate in a number of skills-related exercises.

**LAW 6116. Pretrial Skills.** (2 cr.; A-F only; Every Spring)
This course focuses on pre-trial advocacy skills. Practically every lawyer interviews and counsels clients and engages in negotiation of transactions or resolution of disputes. Theoretical and practical exploration of these topics and other topics including fact development and case planning, alternative dispute resolution, discovery and motion practice form the basis for this course. Each topic will be explored with readings and simulated exercises. Specific topics may vary from year to year.

**LAW 6119. Sem: Criminal Prosecution Appeals.** (2-3 cr.; A-F only; Every Fall)
Basics of appellate practice pursuant to MN Rules of Criminal/Appellate Procedure. Present oral arguments to panel of experienced appellate practitioners. Course taught by County Attorney representing state of MN in criminal appeal pending before MN Court of Appeals.

**LAW 6120. Federal and State Courts.** (3 cr.; A-F only; Periodic Spring)

**LAW 6126. Water Law.** (3 cr.; A-F only; Periodic Spring)
This course examines the legal mechanisms by which society allocates and protects its most vital natural resource: water. The primary emphasis is on current legal and policy issues, but the course also addresses the historical development of water policy and water law in the United States. Topics include: the riparian and prior appropriation doctrines and modern administrative permitting schemes governing private uses of surface water and groundwater; public rights in water resources; federal and state water resource development, allocation, and control; alternative means of responding to the growing scarcity of fresh water and adapting to changes in the hydrological cycle due to climate change; the appropriate role for market-based approaches; allocation and protection of groundwater resources; environmental limits on water development, including the Endangered Species Act, Clean Water Act, and public trust doctrine; tribal water rights; the doctrine of federal reserved water rights; mechanisms for resolving or avoiding conflicts over transboundary water resources.

**LAW 6133. Data Compliance Practicum.** (1 cr.; S-N only; Periodic Spring)
The enormous growth in the importance of data privacy law over the past ten years has created opportunities for attorneys with expertise in this fascinating and fast-moving field. The Data Privacy Practicum aims to prepare students who may wish to specialize in the area with real-world exposure to practice and credentials that demonstrate readiness for its challenges. Students will 1) study for and take an exam overseen by the International Association of Privacy Professionals that will entitle them to become Certified Information Privacy Professionals?many attorneys working in this area display the ?CISSP? credential proudly on their business cards and bios, demonstrating its reputational value; 2) shadow a privacy professional in the Twin Cities working in organizations such as Target, 3M, US Bank, Cargill, Optum Health, and major law firms; 3) attend six proseminar sessions with guest speakers practicing in the field; and 4) research and write a short paper tackling an important problem in current data privacy law.

**LAW 6151. Estate Planning.** (3 cr.; A-F only; Periodic Fall & Spring)
Planning donative transfers of wealth to achieve dispositive objectives under federal estate, gift, and generation-skipping taxes, as well as pertinent provisions of federal income tax law.
LAW 6152. Federal Jurisdiction. (3 cr.; A-F only; Periodic Fall & Spring) This three-credit course will cover approximately half of a traditional five- or six-credit course. The first half is covered in LAW 6120 Federal and State Courts. Students may take either course or both courses, in any order. This course will explore issues that were raised in Constitutional Law and Civil Procedure regarding federal courts and the interactions between the federal and state judicial systems. Topics discussed may include Congressional power over jurisdiction, legislative courts, justiciability, appellate jurisdiction, Supreme Court review over state court decisions, and general principles of federal subject matter jurisdiction. This course is important for anyone planning a judicial clerkship or a legal career that includes litigation in federal courts.

LAW 6153. Wills and Trusts. (4 cr.; A-F only; Every Fall & Spring) This course is about people, living and dead, their property, and their relationships. A more technical way to describe its content would be to say that it is about the law of gratuitous transfer at death or the law of succession. You will learn that the American law of succession is based on freedom of disposition. This is a survey course that examines the law and policy surrounding freedom of disposition. It aims to acquaint you with the pitfalls of practicing in this area with and without expertise. We will focus on drafting and professional responsibility as those issues arise throughout the course.

LAW 6159. Education Law and Policy. (3 cr.; A-F only: Periodic Fall) The Supreme Court has famously said that education is perhaps the most important function of state and local governments, and Americans consistently rank K-12 education as one of the most important issues they want policymakers to address. Yet K-12 education is also one of the nation’s most contentious policy arenas. Education law stands at the center of these policy debates, and in this seminar students will be exposed to the many ways in which K-12 education is shaped by law and policy. Topics to be covered include: the structure of education law and governance; school finance; the interplay of federal, state, and local laws; religion and public schooling; charter schools and school choice vouchers; school boards; segregation; students’ rights; and teachers’ rights and teacher unions. In addition to case law, students will consider policy perspectives. Several guest speakers are planned. Students will be required to complete a paper (minimum 25 pages), as well as be active participants in course discussions.

LAW 6200. Remedies. (3 cr.; A-F only: Periodic Fall) This is an extremely practical course. It is about what will make you, as a lawyer, valuable to your clients. Plaintiff litigates to get a remedy; defendant litigates to avoid having to provide one. Clients will consult you and pay for your services because of your ability to achieve results for them. This course tells you what a court can do for a client who wins and what the court can do to a client who loses. In it, we will explore the fundamental remedies -- damages, injunctions, restitution, and declaratory relief. The questions we will ask throughout are what can the plaintiff (or the defendant) get? Why that and not something else? Which of the available remedies or defenses is best? What are the strategic and practical ways to achieve the desired result? Remedies integrates threads from different parts of the law school curriculum and is a good vehicle for testing theories of what law is all about.

LAW 6201. Land Use Planning. (3 cr.; A-F only; Every Fall) Public control of land use and development and its constitutional limitations.

LAW 6202. Conflict of Laws. (3 cr.; A-F only; Every Fall & Spring) Suppose a company in Minnesota contracts with a company in California to do some work on a construction site in New York and the laws of the three states are different on a critical issue of contract interpretation. How would a court decide which state’s law would govern? Does it matter in which state the lawsuit is brought? Would the considerations instead be different if the underlying issue was a matter of tort? Or property? These are issues of choice of law, the primary focus of the Conflicts course. The course also considers the circumstances under which an American court is required to enforce, without questioning the merits, a judicial decision from another state or country. This is a vital course not only for prospective litigators but also for transactional lawyers. Lawyers who have not taken this course are unlikely even to be able to spot the critical issues.

LAW 6203. Labor Law. (2 cr.; A-F only; Every Fall) This course focuses on the system of federal law regulating labor-management relations. The course examines the law and strategy of labor organizing, collective bargaining, and economic action in labor disputes as well as contract enforcement. The course also considers emerging trends of labor law reform and the intersection with other bodies of law, including employment and international human rights law. The course further analyzes how a fundamental tension between collective rights and individual rights has shaped the evolution of doctrine as well as policy debates in labor law. The course includes simulations and experiential projects related to union elections, negotiations, and grievance arbitration.

LAW 6207. Antitrust I. (3 cr.; A-F only; Every Fall & Spring) The course in Antitrust will focus on competition, how that term has been defined by the court and agencies, and the role that competition plays in society. We will study the federal antitrust statutes and the case interpretation and application of those statutes. To put antitrust in perspective, the interdisciplinary nature of the subject will be emphasized, including the historical debates, enforcement trends and economic theories. The antitrust substantive law will cover horizontal restraints (between competitors), vertical restraints (franchise or distributional restrictions), monopolies (market power), mergers, and price discrimination. We will also focus on procedural issues relevant in both public and private enforcement suits. The goals and objectives of the course are to teach: 1) the substantive law of antitrust, 2) the relevant procedural and litigation issues, 3) the economic analysis of antitrust issues and 4) the historical and doctrinal development of antitrust.

LAW 6208. Local Government Law. (3 cr.; A-F only; Periodic Fall & Spring) This course will cover local government law on a national basis. Since much of local government law is on a statutory basis, we will use Minnesota statutes as a primary example. We will, however, also look at alternative approaches from other parts of the country.

LAW 6211. Federal Securities Regulations. (4 cr.; A-F only; Every Spring) This course covers concepts and problems in the regulation of securities transactions under the Securities Act of 1933, the basic federal statute governing rights, duties, and remedies in connection with the financing of business operations through the distribution of securities to the public. Topics covered will include the definition of a security and the exemptions from federal registration (crucial knowledge for the small business advisor), the registration process, the contents of the prospectus, civil liabilities, and the applicability of the 1933 Act to secondary transactions (sales of securities by persons other than the issuing entity). Because of the expansive scope of federal securities law and the draconian nature of the penalties imposed even for innocent violations, knowledge of this material is vital not only for business lawyers who advise large corporations but also those whose business clients are closely held. The course will not focus, however, on litigation strategy or technique. Classes are problem-oriented.

LAW 6212. Legal Malpractice. (2 cr. [max 3 cr.]; A-F only: Periodic Spring) Legal malpractice law is a specialized form of tort law that sometimes varies from classic negligence doctrine. This course will focus on teaching the substantive law and helping students recognize and avoid real life risks of legal malpractice exposure and liability.

LAW 6213. Real Estate Transactions. (3 cr.; A-F only; Every Fall & Summer) The course examines the acquisition and development of real property. Topics include listing agreements, purchase agreements, conveyancing, real estate finance and security instruments, foreclosure, mechanics’ liens, and forms of real estate development.

LAW 6214. Insurance. (3 cr.; A-F only; Every Spring) Basic issues of insurance the lawyer may encounter in advising clients on personal planning, commercial transactions, and casualty losses. Nature of insurance, marketing mechanisms, insurable interests, risk coverage, claims process, no-fault insurance, and regulation of insurance institutions.
LAW 6215. Environmental Law. (3 cr.; A-F only; Every Fall)
Legal aspects of major environmental problems with emphasis on issues that appear in various regulatory contexts, such as the degree to which environmental quality should be protected; who should bear the cost of enhancing environmental quality; allocation of responsibilities among courts, legislatures, and administrative agencies; the role of citizens; and environmental litigation.

LAW 6216. European Union Law. (2-3 cr.; A-F only; Periodic Spring)
International law/issues.

LAW 6217. Securities Litigation. (2 cr.; A-F only; Periodic Spring)
This course focuses on SEC enforcement of the federal securities laws and on the express and implied private rights of action under the federal securities laws, including the procedural rules for class action securities litigation. Students will read and critique federal cases, draft complaints, answers, motions to dismiss and other pleadings, and participate in a mock oral argument on a written pleading. Evaluation will be based on class participation, written pleadings, the oral argument, and a final exam.

LAW 6219. Evidence. (3 cr.; A-F only; Every Fall, Spring & Summer)
This course provides an introduction to the use of evidence in litigation, with an emphasis on the Federal Rules of Evidence. Topics may include admission and exclusion of evidence, direct and cross examination, judicial notice, hearsay, expert testimony, burdens of proof and presumptions, and privileged communications.

LAW 6220. Poverty Law. (3 cr.; A-F only; Every Fall)
This course reviews constitutional, federal, state, and municipal law as they specifically affect low income persons. Poverty Law I and II cover complementary aspects of the subject. They may be taken independently or in any order. Poverty Law I focuses on government benefits programs and landlord-tenant law, with additional topics including consumer and elder law. Poverty Law II focuses on civil juvenile and public and subsidized housing law, with additional topics including migrant farmworkers, government benefits for immigrants, third party legal custody, direct care jobs disqualifications, and expungement of criminal records, special education law, and rural practice. The course requires two papers and has no exam. This is a practice-based class with an emphasis on Minnesota law. Taking either or both courses will prepare the student for providing pro bono work while in private practice, working at a legal aid office, or serving in public law.

LAW 6224. Patents. (3 cr.; A-F only; Every Fall)
This course offers an overview of patent law for both those students intending to specialize in patent prosecution and those whose general practice may include patent litigation and licensing. Topics to be covered include the requirements for patentable subject matter; standards of novelty, utility, and non-obviousness; statutory bars; conception, priority, enablement, and written description requirements in patent procurement; direct and vicarious patent infringement; claims interpretation.

LAW 6225. Winning Patent Litigation. (2 cr.; A-F only; Every Spring)
The course focuses on practical litigation strategy in the context of patent litigation. It uses patent litigation as a vehicle for seeing how parties develop a winning strategy for a variety of complex legal issues, including choice of law, personal jurisdiction, subject matter jurisdiction, venue, and certain patent-specific issues, such as claim construction. A general understanding of patent law is helpful but not mandatory.

LAW 6226. Juvenile Justice. (3 cr.; A-F only; Every Fall)
Legal, sociological, and philosophical bases of the principal agencies responsible for the control of youthful deviance. Emphasis on the juvenile courts, delinquency jurisdiction, and the procedural and substantive limitations on the courts' authority to dispose of juvenile offenders.

LAW 6227. Products Liability. (2 cr.; A-F only; Every Spring)
This seminar will address all main areas of potential liability in the U.S. before and after the product is sold. This includes design defects, manufacturing defects, defects in warnings and instructions, and post-sale negligence. There will also be discussions about product safety regulation in the U.S. and the development of product liability and product safety regulation around the world. Lastly, there will be discussions of liability prevention techniques throughout the course.

LAW 6228. American Legal History. (3 cr.; A-F only; Periodic Spring)
This course explores the interaction between law, politics, and culture in American society, concentrating on the period from the Revolution through the New Deal. Topics include: democracy and the rule of law; slavery; the public-private distinction; Civil War and Reconstruction; industrialization; expansion of the federal administrative state; law and the human sciences; crime and punishment; legal education and the role of the lawyer in the American polity. Readings will include primary legal sources, such as treatises, statutes, constitutions, and landmark cases, as well as contemporary religious, scientific, and literary works, which will help to situate the legal materials in broader cultural context. Several secondary sources will also be considered, both for insights into the topics covered, and to illustrate various approaches to legal-historical analysis. The course will encourage critical examination of these sources with the aim of clarifying how law has figured in the history and historiography of the United States. No previous background in American history is assumed.

LAW 6229. Criminal Process: From Bail to Jail. (3 cr.; A-F only; Periodic Spring)
Criminal Process examines a variety of procedures governing the prosecution of crime. It covers, in essence, criminal procedure from the time that the police have handed a case over to the lawyers. Major topics include: prosecutorial charging discretion, judicial screening, the grand jury, discovery, speedy trial, double jeopardy, plea bargaining, jury selection, jury deliberations, sentencing, appeals, and habeas. This class is sometimes known as Criminal Procedure II? because it picks up chronologically where Criminal Procedure ends. Criminal Procedure, however, is not a prerequisite. prereq: Criminal procedure recommended.

LAW 6230. Advanced Torts. (3 cr.; A-F only; Every Fall)
Study of injuries to relational interests, including defamation, privacy (a relational interest in some contexts, not in others), misuse of legal procedure, business torts, interference with family relations, wrongful death actions, and if time permits, no-fault auto compensation system in Minnesota. prereq: Torts.

LAW 6231. Patent Prosecution Practice I. (2 cr.; A-F only; Every Fall)
This course focuses on preparation of patent applications and prosecution before the United States Patent and Trademark Office. Topics include types of patent applications, inventor interviews, analysis of prior art, preparation of the patent specification, claim drafting, inventorship determination, ownership determination, amendment practice, and argument practice, with coverage of U.S. law and regulations governing patent prosecution practice. The course is highly practical and will include a number of drafting assignments. A technical background is not required to take this course.

LAW 6232. Patent Prosecution Practice II. (3 cr.; A-F only; Every Spring)
This course builds on the foundation from Patent Prosecution Practice I. In this course, we will study advanced patent prosecution and patent practice matters including a review of prosecution-related Federal Circuit cases,
appeals practice before the USPTO, opinions, post grant challenge procedures, design patents, foreign prosecution, and more. The course is highly practical and will include take-home projects and in-class exercises.

**LAW 6234. Public Lands and Natural Resources.** (3 cr.; A-F only; Periodic Spring) Public Lands and Natural Resources studies the expansive body of federal and state constitutional provisions, statutes, rules, customs, and processes that govern the ways individuals, corporations, and federal, state, and local governments interact with federal public lands, state lands, private lands, water, air, wildlife, minerals, and other natural resources. We will study: (1) the history and statutes of U.S. federal public lands, and the past and present conflicts governing those lands; (2) the laws and regulations governing national parks, national monuments, national forests, grazing lands, energy resources, wildlife, and other natural resources; and (3) ownership interests and rights relating to public and private lands and resources. The course will help students gain an appreciation of our relationship with the natural environment from cultural, historical, and economic perspectives, in addition to a legal perspective. Students will have the opportunity to apply their growing knowledge of these issues through the use of simulated exercises and practice problems.

**LAW 6236. Indian Law.** (3 cr.; A-F only; Periodic Spring) This course examines the evolution of Indian law from colonization onward as impacted by treaties, executive orders, congressional enactments, and the development of federal common law. Students will gain an understanding and appreciation of one of the more particularized areas of the law, and acquire the necessary tools to become able practitioners within the field. The course will also focus upon the unique historical experience of the Midwest tribal nations.

**LAW 6240. Civil Liberties: Freedom of Speech.** (3 cr.; A-F only; Periodic Fall) Students register in preformed "courts" of five people each to decide and issue opinions in a series of free speech cases. Each case decided and each opinion written will become precedent for that court to use in later cases. Some problems will be based on real first amendment cases, but students are expected to decide problem cases without citation to Supreme Court precedent. In mid-semester, members of each "court" will do oral arguments on a case before another "court." Senior writing credit.

**LAW 6241. First Amendment Law.** (3 cr.; A-F only; Every Fall & Spring) In-depth inquiry into First Amendment. Focuses on doctrine and theory. Political incitement and public fora, hate speech and speech codes, obscenity and pornography, campaign finance reform and commercial speech, mass media regulation and access to government, compelled speech and associated rights, school prayer and parochial school vouchers.

**LAW 6242. Patent Application Drafting.** (1 cr.; A-F only; Every Spring) Patent Application Drafting. Students must also be enrolled in Law 6232 Patent Prosecution Practice II to take this course.

**LAW 6244. Employee Benefits.** (3 cr.; A-F only; Periodic Fall & Spring) Qualified pension and profit-sharing plans. Qualification, nondiscrimination, limitations on contributions/benefits, treatment of participants/ beneficiares. Emphasizes federal income tax aspects of qualified plans.

**LAW 6245. Interviewing, Counseling, and Negotiating.** (3 cr.; A-F only; Every Fall & Spring) This course will focus on basic skills necessary for all lawyers. We will discuss and do simulated exercises in each of the skills, focusing on skill development and self-reflection to improve skills. The course will emphasize planning, performance and reflection over a range of civil and criminal cases.

**LAW 6246. Transactional Lawyering Skills.** (3 cr.; A-F only; Every Summer) Skills necessary in practice of transactional law. Identifying negotiation styles/skills and client interests. Business ethics, negotiation skills strategy.

**LAW 6247. Depositions.** (2 cr.; A-F only; Periodic Fall & Spring) Skills necessary to prepare for, defend, and take depositions in civil litigation under federal rules of civil procedure. Learn-by-doing, skills simulation course.

**LAW 6248. Advanced Patents.** (2 cr.; A-F only; Periodic Spring) This course will be a continuation of the three-credit Patent Law course. The course will provide in-depth coverage of topics such as remedies (injunctions, lost profits and reasonable royalties, enhanced damages, declaratory judgments and issues relating to patent marking); appellate review of USPTO decisions; reissue and reexamination; inequitable conduct; inventorship and ownership; double patenting; and patent misuse and related antitrust claims.

**LAW 6249. Evidence Drafting.** (1 cr.; A-F only; Every Fall, Spring & Summer) This one-credit course is an optional supplement to the 3-credit Evidence course offered as LAW 6219. Students may enroll in this course only if concurrently enrolled in LAW 6219 with the same instructor. The course will provide an opportunity for students to write about evidence issues in various formats (e.g., motions, memos). prereq: concurrent registration in 6219

**LAW 6250. Patent Portfolio Management.** (2 cr.; A-F only; Every Fall) Patent portfolio management is the art of aligning patents with business objectives. In general, the successful portfolio manager must have the ability to transform complex patent information into actionable insights that provide decision-making value to a wide variety of stakeholders. This course introduces students to the various practices and skills that go into building, implementing, and managing a patent portfolio whether from the point of view of a small, innovative, start-up company or a Fortune 500 company in a highly competitive market space.

**LAW 6400. International Environmental Law.** (2 cr.; A-F only; Every Spring) This seminar will examine issues of international environmental law. Although there is a limited body of older law, most of the topic has emerged during the past half century.

**LAW 6401. Sports Law.** (3 cr.; A-F only; Periodic Spring) Application of different bodies of law to sports industry. Contract, torts, antitrust, labor, agency, tax, public finance, criminal law, civil rights/anti-discrimination law, international sports governance, and gambling and ticket-scalping legislation.

**LAW 6402. Food and Drug Law.** (3 cr.; A-F only; Periodic Fall) The primary focus of the class will be on the Food, Drug and Cosmetic Act and the FDA. In addition, time will be spent on specific food and drug aspects of other areas of the law. For example, the class will review the special rules and cases in the product liability field relating to food and drugs and the interface between food and drug regulation and subjects such as environmental law, the practice of medicine, and free choice in medical care.

**LAW 6403. Environmental Law Capstone: Brownfields Redevelopment and Litigation.** (4 cr.; A-F only; Periodic Spring) Legal/practical issues surrounding redevelopment of and litigation over underutilized real property that has been subject to environmental contamination.

**LAW 6404. Health Law Compliance Capstone.** (4-5 cr.; A-F only; Periodic Spring) Experience working with real-life situations in simulation context that emulates the practice of health law.

**LAW 6405. Labor and Employment Law Capstone.** (5 cr.; A-F only; Periodic Spring) The course is largely simulation-based. It will provide students with experience integrating diverse areas of workplace law with practice skills and professional ethics. Students will work in teams representing a particular client. The roles of clients and witnesses will be played by a combination of actors and volunteers. Real arbitrators and mediators will play those roles. Claims may include unfair labor practice proceedings before the National Labor Relations Board, employment discrimination and sexual harassment charges before the EEOC, arbitration of employee discipline under a collective bargaining agreement, arbitration under non-union employment contracts, defamation, and claims under FMLA and ERISA. Students may experience interviewing and counseling clients, filing claims with administrative agencies, conducting research, drafting pleadings and legal memoranda, negotiations, discovery, and representing clients in arbitration, mediation and litigation motion practice.
LAW 6406. Energy Policy Sustainability Capstone. (2-6 cr.; A-F only; Periodic Spring) Study of energy policies and sustainability.

LAW 6407. Land Use Sustainability Capstone. (2-6 cr.; A-F only; Periodic Spring) Study of land use and laws pertaining to government and state agencies.


LAW 6409. Twin Cities Regional Planning Capstone. (4-5 cr.; A-F only; Periodic Spring) Regional development challenges/legal regional regulatory frameworks in areas of housing, transportation, water, air, parks, airports.

LAW 6410. Corporate Compliance Capstone. (4-5 cr.; A-F only; Periodic Spring) Review corporations/compliances.

LAW 6411. Legislative Process Capstone. (5 cr.; A-F only; Periodic Spring) Field work course designed to teach law students about how the state legislature operates and makes law. It is good preparation for careers in government as legislative staff, agency lawyers, or as elected officials or for work in the private sector in fields where legislative relations are relevant.

LAW 6412. Environmental and Energy Justice Capstone. (4 cr.; A-F only; Periodic Spring) Course focuses on the complex justice issues surrounding (1) environmental harms and benefits and (2) the production and use of energy. These two topics are considered individually, and how they are interrelated.

LAW 6413. Family Law Capstone. (3 cr.; A-F only; Periodic Spring) This capstone course is designed to expose students to the ways in which family law concepts are implemented practically and procedurally. The course will touch on traditional family law topics?such as premarital agreements, custody, and property divisions?in the contexts that practicing attorneys are likely to encounter these topics. The course will accordingly focus on interviewing potential clients, retaining and using experts, incorporating financial planners and therapists in family dispute resolution, conducting a mediation, and drafting documents such as cohabitation agreements, divorce petitions, settlement decrees, and parenting plans. Assignments will be designed both to prepare students for practice and to capture the way that family law practice is changing to deal with the realities of modern families. The course will offer rigorous practical experience and advanced theoretical and policy discussion.

LAW 6414. Civil Rights and Social Justice Capstone. (4 cr.; A-F only; Periodic Spring) The United States has made significant progress in addressing de jure discrimination, but persistent de facto discrimination and inequality remain. This class focuses on the role of law in making progress against both subtle and overt forms of discrimination in a variety of spheres and settings based on race, ethnicity, class, national origin, gender, sexual orientation, age, disability, and religion. Topics may include the segregation of neighborhoods and schools by race and class; encounters with the police and criminal justice system; how poverty limits access to crucial social goods; the location of environmental hazards near low-income communities and communities of color; unequal pay and opportunities for advancement for women in the workplace; access to adequate child care for working parents; barriers to marriage; and treatment of migrants.

LAW 6490. Patent Law Capstone: Innovation. (3 cr.; A-F only; Every Spring) This capstone course introduces students to the principles of successful innovation and the integral role of patents in this process. This is a course in innovation. There are no right or wrong answers. Large companies with very smart people often launch products that fail. Venture capitalists seeking to invest in winners more-often-than-not end up investing in losers. Innovation is an art not a science. There is no "secret formula" that guarantees success. There are simply different tools, skills, methods of analysis and approaches that may or may not work better than others. We will explore the art of innovation and the integral role that patents play in turning an idea into an innovation. Goals: Students will learn how to research complex subject matter across the intersecting domains of business, finance, marketing, science, technology and intellectual property. Students will then develop the ability to present their findings in a clear and concise manner that is understandable to and can be acted upon by a cross-functional audience of high-level decision makers.

LAW 6601. International Business Transactions. (3 cr.; A-F only; Periodic Fall & Spring) International Business Transactions is a three-credit course whose main focus of discussion and study is the private law aspects pertaining to international business transactions, rather than issues of national and international trade regulation. Thus, the course is primarily concerned with private international business law. We examine three basic methods of doing business abroad, namely, the sales of goods, franchising, and foreign direct investment. The course materials touch upon substantive law in areas as diverse as commercial transactions and the uniform commercial code, antitrust, intellectual property, conflict of laws, civil procedure, contracts, bankruptcy, taxation, and international law. While knowledge or background in these areas is certainly helpful it is not necessary for success in the course and for dealing with the issues raised in the readings or in class.

LAW 6602. International Law. (3 cr.; A-F only; Every Fall) Sources of international law, jurisdiction of nations and conflicts of jurisdiction, treaties, sovereign immunity, Act of State doctrine, human rights, international economic relations, international organizations, and control of use of force.

LAW 6603. Intellectual Property. (3 cr.; A-F only; Every Fall) The intellectual property survey course presents an overview of patent, copyright, and trademark law. At the professor’s discretion, the course also may include some coverage of trade secrets, unfair competition, or federal preemption of state intellectual property laws. The course provides an opportunity for students to acquaint themselves with the major branches of intellectual property law, and may be most useful for students who (1) intend to pursue careers in general business law or civil litigation; (2) intend to specialize in one of the major branches of intellectual property law, such as patents, but who want to develop a basic understanding of the other branches as well; or (3) are interested in learning something about the field before committing to further in-depth study of one or more of its branches.

LAW 6604. Family Law. (3 cr.; A-F only; Every Fall, Spring & Summer) This course examines how the law creates family relationships, regulates their dissolution, and defines the rights and responsibilities of family members. Topics include: limits on who may marry and who may adopt children, divorce and its economic consequences, dissolution of nonmarital relationships, termination of parental rights, child custody and support, surrogate motherhood, domestic violence, and child abuse.

LAW 6605. Health Law. (3 cr.; A-F only; Periodic Fall) This course is a comprehensive introduction to health law. We will investigate the organization of health care delivery in the United States; the nature of the physician-patient relationship; methods of quality control; responses to harm and error, including through medical malpractice litigation; problems of access to health care; and approaches to cost control. We will also analyze proposals for health care reform.

LAW 6606. Administrative Law. (3 cr.; A-F only; Every Fall & Spring) Law governing judicial review of the decisions of government officials and agencies. Decisions of federal and state officials subject to various kinds of judicial review range from regulatory decisions by public service commissions governing the rates of suppliers of electricity and local telephone service to decisions governing entitlement to benefits under welfare programs. Some decisions have wide-ranging social and economic effects such as rulemaking decisions under the Clean Air Act while the impact of other decisions may
required, to have taken or be in the process of taking, either antitrust or an intellectual property course, before enrolling in this course.

**LAW 6613. Copyright.** (3 cr.; A-F only; Periodic Spring)
This course provides a detailed introduction to the basic law of copyright?traditional copyright subject matter, the concept of originality and authorship, copyright transfers (and terminations of transfers), infringement, and fair use. Copyright law is now important well beyond the entertainment industry, although many of the decisions we study derive from that genre (Humphrey Bogart, George Harrison, J.D. Salinger, Superman, Mickey Mouse, and many other luminaries make cameo appearances in our cases). Copyright has increasingly become a necessary tool of the general practitioner due to the explosive growth in economic value of information-based products, such as computer software, digital networks, and databases. A lawyer ignorant of basic copyright principles will be increasingly handicapped in many areas of practice, such as negotiating technology transfers, drafting contractual rights, developing schemes of protection and privacy, distinguishing criminal from non-criminal behavior, and in litigation. But more important than all that, the cases and materials are lots of fun!

**LAW 6614. American Legal Profession.** (2-3 cr.; A-F only; Periodic Fall)
Study of American legal profession compared to legal profession in other countries.

**LAW 6615. Jurisprudence.** (3 cr.; A-F only; Every Fall & Spring)
This course will be a general survey course of the most important ideas, concepts, theorists, and schools of law in contemporary legal philosophy. The course will examine foundational legal questions relating to the nature of law, rights, justice, and punishment; questions relating to the connections between law and morality; and the proper understanding of legal reasoning, legal interpretation, and the role of judges. We will examine different schools of legal thought, including Natural Law Theory, Legal Positivism, Legal Realism, Feminist Legal Theory, and Critical Race Theory.

**LAW 6616. Law and Entrepreneurship.** (3 cr.; A-F only; Periodic Spring)
Life cycle of entrepreneurial start up business. Legal issues involved. Theoretical, statutory, common law elements. Case/statutory analysis, case studies, presentations, group exercises.

**LAW 6617. Antitrust Mergers.** (3 cr.; A-F only; Periodic Spring)
Antitrust merger analysis. 2010 Horizontal Merger Guidelines. Recent cases. Supermarkets, pharmaceuticals, health care, telecommunications, standard essential patents, software, insurance, airlines, financial institutions, internet.

**LAW 6618. Trial Practice.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Selected problems in litigation. Exercises in jury selection, introduction of evidence, expert testimony, direct and cross examination and impeachment of witnesses, opening statements, and closing arguments.

**LAW 6619. International Trade.** (3 cr.; A-F only; Every Spring)
This course is designed to familiarize the students with the regulatory system of international trade. Through the materials discussed in the course, focusing on the case law and jurisprudence of the WTO/GATT, the course is aimed at understanding the institutional framework of that system and the ways in which it functions. In addition the course deals with a large number of substantive issues to be found on the agenda of international trade scholars and lawyers. While the course is focused on legal theory and doctrine of international trade, we will approach each and every topic from economic and social perspectives. Thus, the course is designed to follow a truly interdisciplinary tour of the relevant subject-matter.

**LAW 6620. Community Policy Development.** (2 cr.; A-F or Audit; Periodic Spring)
Role of lawyers in community. Complex interactions among legal service providers, nonprofit community-based organizations, community activists in addressing systemic problems.

**LAW 6621. Civil Rights: Citizenship and Human Rights.** (3 cr.; A-F only; Every Spring)
This course explores an emerging, interdisciplinary field of inquiry that focuses on the relationships between Civil Rights Law in the United States and International Human Rights Law in the global context. Although the two areas represent distinct bodies of law, they also share many important features, objectives, and impediments. By examining the historical emergence of (1) Civil Rights Law in the United States, and (2) International Human Rights Law in the global context, students will gain a better understanding of the critical relationships and intersections between these two important areas of public law. Through an examination of the seminal cases and controversies in these areas, this course will explore the differences between various categories of rights; America? s ?exceptionalism? why the United States pursues a strong human rights agenda abroad that is rarely applied in the domestic context; the gains (and losses) that the domestic civil rights movement has experienced in recent decades, among other topics.

**LAW 6622. International Business Operation and Negotiation.** (3 cr.; A-F only; Periodic Spring)
The course surveys foundational concepts, analytical techniques and practices related to organization and strategic management of multinational firms and cross-border transactions they negotiate with host-country governments, firms and non-governmental organizations. The overall aim of the course is to give law students basic proficiency in theories, practices and analytical techniques for understanding why and how multinational firms emerge and organize operations differently, negotiate cross-border transactions.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
The course examines U.S. taxation of foreign individuals and corporations earning U.S. source income from activities in this country, taxation of U.S. citizens and residents abroad, taxation of business and investment activities of U.S. persons, companies and subsidiaries operating abroad, foreign tax credits, transfer pricing issues, the use and applicability of tax treaties, and the obligations under U.S. law for U.S. persons to report interests in and transactions with foreign accounts.

LAW 6628. Advanced Trial Practice. (3 cr.; A-F only; Every Spring)
This course will be to help students learn to recognize and anticipate a large number of important evidentiary issues which can arise during a trial and to help them learn how to deal with the issues when they arise. Students will perform direct and cross examinations, opening and closing statements, and voir dire. Students will be expected to write brief motions in limine and short memoranda on evidentiary issues to learn to present concise persuasive memoranda to a court before and during trial.

LAW 6629. Judicial Process and Administration. (2 cr.; A-F only; Every Spring)
Study of judicial process, administration.

LAW 6630. Health Care Decision-Making: Markets, Regulation and Bioethics. (2 cr. [max 3 cr.; A-F only; Periodic Spring])
This class will focus on health-care decision-making at the beginning and end of life, the role of informed consent, the influence of potential tort liability, the framework for the introduction of new technologies, and the growing impact of medical tourism. It explores the role of lawyers in shaping health care decisions and policy discussions.

LAW 6631. Employment Discrimination. (3 cr.; A-F only; Every Fall)
Employment Discrimination. This course considers the principal statutory and constitutional prohibitions on employment discrimination. It focuses most prominently on Title VII of the 1964 Civil Rights Act, which prohibits employment discrimination based on ?race, color, religion, sex, or national origin.? The course considers the basic frameworks for proving discrimination under Title VII and the jurisprudence defining Title VII?s protected classes. The course also investigates newer Title VII fields, such as the law of sexual harassment and pregnancy discrimination. Using Title VII as a basis for comparison, the course then examines the constitutional law of employment discrimination. Title I of the Americans with Disabilities Act (ADA), the Age Discrimination in Employment Act (ADEA), and various state and local statutes addressing emerging issues in employment discrimination law, such as employment discrimination based on weight or attractiveness.

LAW 6632. Employment Law. (3 cr.; A-F only; Periodic Fall & Spring)
This course explores the rapidly expanding body of law governing the workplace. The Employment Law course goes beyond the traditional employment fields of Labor Law (union-management relations) and Employment Discrimination to focus on a number of recurring workplace issues. Topics include medical and drug screening, workplace privacy, and the emerging exceptions to the employment-at-will doctrine, wage and hour regulation, and occupational safety and health.

LAW 6633. Public Health Law & Ethics: From Prevention & Emergencies to Bioterrorism. (3 cr.; A-F only; Periodic Fall)
Intensive/interdisciplinary examination of wide range of issues in public health law/ethics, including prevention strategies, emergency preparedness/response, averting/cop ing with bioterrorism.

LAW 6634. Regulated Industries. (2-3 cr.; A-F only; Periodic Fall)

LAW 6635. Seminar: European Union Environmental Law. (2 cr.; A-F only; Periodic Fall)
An examination of environmental law in the European Union.

LAW 6636. European Human Rights. (2-3 cr.; A-F only; Every Fall & Spring)
Introduction to international human rights. Law, policy, process.

LAW 6637. Environmental Justice and the BP Deepwater Horizon Oil Spill. (2 cr.; A-F only; Periodic Fall)
Introduction to environmental justice law. Class assists the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling on its report on the spill. Class supplies to the commission, by end of Oct 2010, background factual/legal memos on environmental justice issues arising from spill. Grades based on students’ final drafts of their work product for class project (90%), oral presentations (5%), and class participation (5%).

LAW 6638. Trial Objections. (2 cr.; A-F only; Periodic Spring)
Objections to testimony at trial. Students present and make objections to simulated testimony and participate in exercises involving objecting to depositions, examining a witness in an unobjectionable fashion, and arguing a motion in limine.

LAW 6639. Internet Law. (3 cr.; A-F only; Periodic Spring)
Legal issues raised by networked digital technology. Likely topics include jurisdiction, intellectual property, privacy, hacking, telecommunications regulation.

LAW 6642. Consumer Protection Law. (3 cr.; A-F only; Periodic Spring)
This course examines a wide variety of consumer protection laws. Topics include consumer privacy, credit reporting, credit discrimination, consumer product warranties, abusive debt collection practices, and predatory lending.
LAW 6643. Business Strategy for Legal Professionals. (3 cr.; A-F only; Periodic Spring)
This course introduces the concept of strategy in a business context and applies it to diverse situations legal professionals face, whether as lawyers in private practice advising external clients, as in-house counsel advising internal clients within a firm, or as government lawyers advising agency clients about the conduct of private individuals and firms in the agency’s regulatory or other investigative scope. We will consider how lawyers can think like their non-lawyer clients. The overall aim of the Business Strategy for Legal Professionals (BSLP) course is to provide students with an opportunity to observe and develop business generalship skills relevant to legal professionals through readings, case discussion, class exercises and occasional examination.

LAW 6644. Economic Analysis of Law. (2 cr.; max 6 cr.; A-F only; Periodic Fall)
After an introduction to the methodology of law and economics, this course utilizes the standard tools of economic analysis for the study of law and legal institutions. After a review of some of the basic methods and concepts of economic analysis, the course will consider applications with special focus on: (i) sources of law and models of legal evolution; (ii) economics of property; (iii) economics of contracts; and (iv) economics of tort law.

LAW 6645. Feminist Legal Theory. (2-3 cr.; A-F only; Periodic Fall)
Feminist theories, critiques, and models for application. Feminist history. Legal issues of relevance to women. Impact of law upon women. Means by which law can be used to redress inequity in larger social arena.

LAW 6646. Law, Technology, Inequality and Opportunity. (3 cr.; A-F only; Periodic Spring)
Examine competing arguments followed by examination of particular technological developments/their impact on inequality.

LAW 6648. International Criminal Law. (3 cr.; A-F only; Periodic Spring)
This course will cover developments in the prosecution of mass atrocity by international and hybrid criminal tribunals. It will discuss the history and development of the field of international criminal law from Nuremberg to the ICC; the sources of international criminal law; and jurisdiction over the investigation and prosecution of international crimes. The course will examine the elements of the international crimes of genocide, war crimes, crimes against humanity, and aggression. It will also analyze recent developments in international criminal justice, including victim participation, sentencing, and reparations.

LAW 6661. Professional Responsibility - General. (3 cr.; A-F only; Periodic Fall, Spring & Summer)
This course examines the ethical issues that lawyers confront in diverse areas of practice. The primary focus will be on the Model Rules of Professional Conduct and state law. Students will also explore a broader set of ethical questions including how attorney ethics are defined, how they are depicted in pop culture, and what type of conduct lawyers should aspire to in their practice. The course will also consider strategies for reconciling personal values, the law, and the rules of lawyering.

LAW 6662. Professional Responsibility - Business. (3 cr.; A-F only; Periodic Fall)
This course is a survey of rules of professional responsibility for lawyers with an emphasis on the rules that apply to lawyers in corporate and transactional practice. Issues covered include client conflicts, representing close corporations and partnerships, representing venture capitalists and entrepreneurs in start ups, taking stock in lieu of legal fees, representing public companies, Securities Exchange Commission rules of professional responsibility for lawyers under the Sarbanes-Oxley Act, representing banks and other regulated companies, the role of in-house counsel, the responsibility of lawyers for client conduct, and malpractice liability for business lawyers.

LAW 6663. Professional Responsibility - Civil Trial Lawyer. (3 cr.; A-F only; Periodic Fall & Spring)
The goal of this class is to learn the Model Rules of Professional Conduct and be able to apply them to situations involving ethical issues, with an emphasis on (but not completely limited to) civil litigation situations.

LAW 6664. Professional Responsibility - Criminal Law Ethics. (3 cr.; A-F only; Periodic Fall)
The primary objective of this course is to educate you about the ethical problems facing lawyers and judges in criminal investigations and lawsuits. You will study the lawyer’s morality, the adversary system and the duties of the criminal defense lawyer, client autonomy, the duty and limits of zealous representation, lawyer-client trust and confidence, perjury and the search for the truth, counseling and preparing witnesses, the ethics of cross-examination, judges? ethics, conflicts of interest, and prosecutors? ethics.

LAW 6665. Professional Responsibility - Government. (3 cr.; A-F only; Periodic Fall)
Students in this course should become familiar with the ABA Model Code of Professional Conduct and other aspects of the law governing lawyers, as well as with selected statutes and regulations governing conflicts of interest and ethical obligations of United States government employees. Throughout the course, there will be an emphasis on ethics rules, other laws, and practical considerations of importance to government lawyers.

LAW 6700. Consortium Study. (0-12 cr.; A-F or Audit; Every Spring & Summer)
Study at another law school. prereq: dept consent

LAW 6701. Criminal Law and Literature: Examining Criminal Practice & Theory through Didactic Fiction. (3 cr.; A-F only; Periodic Spring)
The aim of this seminar is to examine classic issues in criminal law practice, theory and jurisprudence through the prism of didactic fiction. Class readings are works of fiction and the primary work product is a short story.

LAW 6702. Legal History Workshop. (2 cr.; A-F only; Periodic Fall)
This seminar brings in leading scholars engaged in projects at the intersection of law and history. The goal of the seminar is to provide students with an introduction to the field of legal history and an opportunity to engage with scholars working on innovative projects that span from the ancient to the modern world, covering a range of geographical regions as well. Workshop sessions will be devoted to the presentation and discussion of works-in-progress of the guest scholars. Collectively, their works will encourage students to think comparatively about the role of law in defining the nature and limits of state power, and more broadly about the historical dynamics of law and society, with particular attention to the ways in which law has served not only as a mode of governance, but also as a cultural resource, enabling individuals to contest conventional ideas about race, class, and gender difference, and the very meaning of social justice.

LAW 6703. Seminar: Local Economic Development. (2 cr.; A-F only; Every Spring)
Tools that local government entities use to spur/control economic development.

LAW 6704. Seminar: Mass Torts: What They Are and How To Resolve Them. (2 cr.; A-F only; Periodic Fall)
Legal dilemma of finding ways to compensate the truly injured while protecting legitimate business concerns.

LAW 6705. Information Governance. (2 cr.; A-F only; Every Fall)
Students will explore the values placed on information in the modern corporate enterprise, as well as the risks, costs and challenges associated with governing various forms of information, given the innumerable laws and regulations that apply to information. The purpose of the broad survey is to expose students to multiple disciplines that will undoubtedly affect their careers, and help them to develop a real-world sense of options to enhance risk avoidance, cost containment, and compliance. Students will be exposed to various disciplines related to the management of information, which have traditionally been siloed? or separate? including e-discovery, privacy, records and information management, and security? but which increasingly are seen as parts of a greater, integrated whole.

LAW 6706. Punishing Corporations and Governments. (3 cr.; A-F or Audit; Periodic Spring)
To what extent we can be punished or be made to pay compensation, for actions other than our own, but in which we are deemed complicit.

LAW 6707. Intellectual Property Transactions. (2 cr.; A-F only; Every Spring)
Intellectual property rights have been described as a ?sword and shield.? Rights holders
are thought to act offensively by suing or threatening to sue infringers and seeking money damages, irrespective of the holders? marketing and product sales programs. Or they act defensively to protect their current or future market positions by having federal courts enjoin competitors. This course considers a third way: intellectual property rights are also valuable intangible assets that may be bought and sold. In this course, we will explore the principal theories and practices of intellectual property transactions. We will be considering closely the doctrines regulating the assigning and licensing of patent, copyright, trademark, and other intellectual property rights, and we will be questioning critically whether these laws and practices encourage or inhibit commercial activity and innovation. While studying specific transactions in the course, we will be examining the practical uses of intellectual property law to meet commercial objectives.

LAW 6708. Seminar: Law and Terrorism. (2 cr.; A-F only; Every Fall) How the U.S. legal system has faced/should face the challenge of balancing rule of law and civil liberty principles with unique law enforcement needs of terrorism cases.

LAW 6709. Agriculture & the Environment. (2 cr.; A-F only; Periodic Spring) Land based food and fiber production and processing is the largest segment of the global and national economy. These activities raise increasingly fundamental environmental questions for every level of government and sector of society. This seminar will address selected environmental issues related to agriculture, including: crop production and conservation, irrigation, drainage, pesticides, and nutrients; livestock operations and soil/water/air quality; open space/habitat preservation; design of federal farm programs; biofuel initiatives; public land utilization; biodiversity; and water. Attorneys, scholars, and public officials will be invited classroom guests. Students will prepare papers and may present their topics to the class. Readings will be selected portions of texts, articles, and cases.

LAW 6710. Sem: Federalism, the Intersection of Law and History. (2 cr.; A-F only; Spring Even Year) Issues surrounding sovereignty. Nature of relationship between sovereign states and United States. Federalism decisions. Students assigned Supreme Court case or legislative enactment to research, write, present.

LAW 6711. National Security Cases in Federal Courts. (2 cr.; A-F only; Periodic Spring) This seminar will impart to students an understanding of the investigative and legal tools and concerns that come up in the investigation and trial of national security cases in federal district court. At our first session we will discuss the dynamics of terrorism, or, what do terrorists want and why do they believe terrorism is the way to obtain it? The seminar will then move sequentially through the investigative, pre-trial, and trial stages of a national security case, with each session devoted to a specific topic, including the Foreign Intelligence Act, the Classified Information Procedures Act, custodial interrogation in the national security context, and the operations of US law enforcement agents and prosecutors in foreign countries. The last two sessions will be devoted to an in-class simulation. Students will consider a rapidly-unfolding terrorist incident from the perspectives of investigators, prosecutors, defense attorneys, and judges, and will bring together everything they have learned in the seminar to accurately analyze and act upon the facts as they come in.

LAW 6712. Complex Criminal Investigations. (2 cr.; A-F only; Periodic Spring) This course examines through experiential learning the law and conduct of modern criminal investigations. In a highly-technological and globalized world, we explore how today's criminal investigations utilize cutting edge investigative techniques, adapt to the huge storage footprint of individuals and corporations, and accommodate our competing interests in personal autonomy and effective law enforcement. We will use as our lens a series of high-profile, complex investigations in the news, including, for example, the internal and criminal investigations of alleged bribery at FIFA, alleged child-endangerment at the Arch Diocese of Minneapolis and St. Paul, insider trading on Wall Street, and the alleged recruitment of teenagers to join ISIS.

LAW 6713. Comparative Legal Professions. (2 cr.; A-F only; Periodic Spring) Globalization has increasingly brought American lawyers in contact with legal professionals in other countries. Most American lawyers have little understanding of how legal training in other countries differs from their own experience as law students nor how much variation in how legal professions are organized from country to country. The purpose of this course is to equip future practitioners with the knowledge and understanding that will facilitate their interactions with legal professionals from other countries. The course will involve a combination of lectures by the instructor, visits by current LLM students who have practice experience in their home countries, and readings about lawyers in other countries.

LAW 6714. E-Discovery. (2 cr.; A-F only; Periodic Spring) Familiarity with all aspects of e-discovery is no longer optional for new attorneys and courts are increasingly penalizing attorneys who fail to satisfy their e-discovery obligations. The outcomes of many cases turn on a few key electronic documents that can be missed if the e-discovery process is not carefully pursued. This seminar will follow the life cycle of a case, covering topics such as document preservation, collection, search, review, and production. Students will participate in mock client interviews and meet and confers, receive lectures on important topics such as spoliation, and observe demonstrations of available document search and review technologies. The seminar will also include guest speakers on topics such as an in-house counsel's perspective on gathering electronic documents.

LAW 6715. Student Speech: Rights and Regulations. (2 cr.; P-F only; Periodic Spring) Legal/policy issues around student expression. Hands-on development of course.

LAW 6716. Magna Carta and the Evolution of Anglo-American Law. (2 cr.; A-F only; Periodic Fall) This seminar will examine the origins of Magna Carta in historical context, and study its influence and legacy in English and American law. The seminar will cover the underpinnings of Magna Carta and analyze the contents of the Great Charter, ? before studying its status as ?fundamental? statutory law in early modern England, the role it played in conflicts between monarchy and Parliament, and its formative influence on documents like the English Bill of Rights. We will proceed to analyze the significance of Magna Carta in colonial and Revolutionary America, particularly in early state constitutions, the US Constitution and the development of federalism. Students will study English and American case law relevant to Magna Carta and work with key historical sources in original published form. A unique aspect of the course will be the integration of material from the Law Library's Arthur C. Pulling Rare Books Collection. LLM students may request instructor permission to enroll.

LAW 6717. U.S. Citizenship: A Legal History. (2 cr.; A-F only; Periodic Spring) This two-credit seminar is intended to provide students with a broad historical foundation in U.S. citizenship. We will focus on five broad questions: (1) how war, economic transformation, and territorial expansion have reshaped citizenship; (2) how the relationship between state and federal citizenship has changed over the course of U.S. history; (3) how the rights and obligations of citizenship have changed over the course of U.S. history; (3) how race, gender, sexuality, disability, marital status, birthplace, religion, and poverty have shaped access to or enjoyment of citizenship; and (4) how refugees and guest workers fit into a nation in which rights rest largely on citizenship.

LAW 6718. Immigration and Criminal Law: Immigration Consequences of Crimes and Criminalizing Migration. (2 cr.; A-F only; Periodic Spring) In the last decade, there has been an increased emphasis on using the criminal justice system to help determine who is and who is not suitable to live and work in the United States. This phenomenon has had some increasingly interesting effects as the immigration apparatus has been for most of the history of the United States a civil and agency system. The increased reliance on the criminal justice system has caused some overlap of criminal justice norms- including concepts of right to counsel, detention and detainers and warrants. At the same time, the prosecution of federal migration crimes has skyrocketed in the...
same period to the point where the majority of all federal prisoners are imprisoned because of migration crimes.

**LAW 6790. Sem: Topics in Law.** (2 cr. [max 4 cr.]; A-F only; Periodic Fall & Spring) Various topics in law will be explored in a seminar setting.

**LAW 6800. International Contracts.** (3 cr.; A-F only; Every Spring) Simulated negotiation of complex international sale-of-goods contract, requiring mastery of issues such as choice of law, dispute settlement, payment terms and devices, quality control terms and devices, and shipment terms.

**LAW 6801. Death Penalty.** (2 cr.; A-F only; Every Spring) This seminar focuses on the substantive law of capital punishment and on the procedural aspects of post-conviction proceedings. The course will include an examination of the history of death penalty jurisprudence, the Antiterrorism and Effective Death Penalty Act of 1996, habeas corpus, and state and federal death penalty statutes.

**LAW 6802. Seminar: Working as a Lawyer.** (2 cr.; A-F only; Periodic Spring) Areas of working as a lawyer.

**LAW 6803. Health Insurance and Health Care Reform.** (2 cr.; A-F only; Periodic Spring) This seminar explores the role that private and social insurance play in managing and responding to health-related problems. It focuses on these issues through the lens of the Patient Protection and Affordable Care Act (ACA). The seminar is split into three units. The first unit aims to appreciate the centrality of insurance to health care. It examines how insurance underpins issues regarding access to health care, the increasing cost of health care, and responsibility for one’s health. The second, and most substantial, unit then focuses attention on the ACA. It explores the ACA’s use of public and private insurance mechanisms to attempt to alter health care in the United States. Finally, the third unit of the seminar considers alternative approaches to health insurance reform, and their costs and benefits relative to the approach embodied in the ACA.

**LAW 6804. Government Secrecy.** (2 cr.; A-F only; Periodic Fall) This course introduces students to major mechanisms by which the executive branch of the federal government keeps secrets, including the classification system, the doctrines of executive privilege and state secrets privilege, and prosecuting information leakers. The course also introduces students to some of the major means by which secrecy is challenged, including the Freedom of Information Act, first amendment access and newsgathering claims, and whistleblower protection laws. Throughout the semester, we will discuss a number of recurring themes including the connection between government secrecy and constitutional theories of presidential power, the politics of secrecy and transparency and the role of constitutional discourse in the same, and the costs and benefits of secrecy and transparency.

**LAW 6805. Community Banking.** (2 cr.; A-F or Audit; Periodic Fall) Learn how community banks work and regulations.

**LAW 6806. Seminar: International Humanitarian Law.** (2 cr.; A-F only; Periodic Fall) Study of humanitarian laws.

**LAW 6807. Seminar: Cooperatives and Collective Entrepreneurship: Law, Policy and Practice.** (2 cr.; A-F only; Periodic Fall) Cooperative and mutual business forms have been widely used for purposes of economic development, workforce development, and social innovation.

**LAW 6808. Street Law.** (2 cr.; A-F only; Every Spring) This seminar engages law students in service to the community through teaching law to students in local schools. It also increases law student knowledge of the areas of law that are of interest to high school students such as criminal law and procedure, constitutional law, and practical law (landlord tenant law, consumer law, family law & employment law) increases law student skills in explaining law to non lawyers and builds professionalism.

**LAW 6809. Seminar: Advanced Intellectual Property: Special Projects.** (2 cr.; A-F or Audit; Periodic Fall) Special projects in intellectual property for students with prior IP coursework.

**LAW 6811. Seminar: Complex Litigation.** (2-3 cr.; A-F only; Periodic Spring) Key concepts/tools required for managing large, complex litigation.

**LAW 6812. Statistics for Legal Practice.** (2 cr. [max 3 cr.]; A-F only; Periodic Fall) The goal of this course is to prepare students to be knowledgeable consumers of statistics as practicing lawyers. The course will draw on a wide range of cases and other legal issues as examples of where statistics have played a role. The course will cover most core statistical methods, but it does assume some prior familiarity with basic statistics. While the emphasis will not be on the mathematics underlying the various statistical methods covered, the course does presume a willingness to deal with basic algebra. After completing this course, students will be familiar with the broad range of areas of the law and legal process where statistics have played a role, and should be able (1) to understand the kinds of issues that arise in the use of statistics, (2) to read and understand expert reports using statistics, and (3) to ask intelligent questions of their own and opposing experts.

**LAW 6813. Seminar: Social Science in Law.** (2-3 cr.; A-F only; Periodic Spring) Relationship of social science to law.

**LAW 6814. Racketeering and the RICO Act: Criminal & Civil Liability.** (2 cr.; A-F only; Periodic Spring) This course will consider the Racketeer Influenced and Corrupt Organizations Act (RICO), which grabs more headlines and is more sweeping in its application than practically any other federal statute. Originally intended as a weapon against the Mafia, RICO has evolved into a statute used to fight a wide variety of corrupt practices. RICO is also increasingly becoming an important aspect of international business. In 2014, Chevron brought RICO claims against a U.S. lawyer who allegedly bribed foreign officials in order to obtain a multi-billion dollar judgment in a foreign tribunal. RICO, however, has its limits. Courts are beginning to weigh in heavily against RICO’s application to extraterritorial disputes. When RICO claims were alleged in the sex abuse cases against the Catholic Church, courts struck down the claims on the basis that the plaintiffs sought compensation for personal injuries, which are not within the scope of the statute. Enterprise, pattern and causation issues under RICO present some of the most complicated legal questions that any lawyer will ever confront.

**LAW 6815. Seminar: Inter-American Human Rights System.** (2 cr.; A-F only; Periodic Fall) International disputes, use of national courts to resolve them.

**LAW 6816. State Constitutional Law.** (2 cr.; A-F only; Periodic Fall) Explores the important field of state constitutions and constitutional law in the United States. Topics addressed will include the politics of state supreme court systems and the role of these courts in protection of individual rights and the definition of the American political process. Of importance will be examination of the ways state courts and constitutions adjudicate differently from the United States Supreme Court on a variety of important issues including abortion and privacy, criminal due process, education, taxation, as well as the issues of state power and governmental organization. Please note that this class is taught in very few law schools. This means that this class is a unique experience in learning more about a body of law that will have a dramatic and direct impact upon a lawyer’s daily practice of law.

**LAW 6817. Practical Estate Planning.** (2 cr.; A-F only; Every Spring) This course will focus on the day to day life of the estate planning lawyer, from the initial client interview and analysis of financial data to the implementation of appropriate planning techniques based upon a client’s situation and assets. Subjects addressed will include: ethical considerations; probate and methods for avoiding it; use of trusts; gift, estate and generation-skipping transfer tax planning; planning with life insurance; planning with retirement assets; planning for charitable gifts and bequests; planning for lifetime gifting to individuals; post-mortem planning and premarital agreements.

**LAW 6818. White Collar/Corporate Crime.** (2 cr.; A-F only; Periodic Spring) This class will consider the theory and practice of white collar litigation in the criminal arena. We will begin with a survey of basic
principles and theories and then turn to the main substantive areas of white collar criminal liability, examining the most common regulatory schemes encountered in the interface between corporations and criminal law: mail and wire fraud, money laundering, RICO, and obstruction of justice. Next, we will discuss practice in white collar defense and prosecution, looking at discovery, plea negotiation and trial challenges unique to allegations of criminal malfeasance in corporate settings. We will examine federal laws, sentencing regulations, and Supreme Court pronouncements that control punishment for common white collar offenses. Finally, we will return to overarching policy questions, considering the role of federal courts in the imposition of criminal liability, and the consequences of overlapping state and federal jurisdiction over white collar offenses, particularly as revealed in the investigation and prosecution of public corruption cases.

LAW 6819. Seminar: Taxation of Subchapter S Corporations. (2 cr.; A-F only; Periodic Spring)
Federal income taxation of Subchapter S corporations. General overview of S corporations; eligibility; organization and capitalization; income, losses, and deductions; distributions, liquidations, and sales; conversion from C corporations to S corporations.

LAW 6820. Seminar: Estate Planning & Drafting. (2 cr.; A-F only; Every Spring)
Estate planning/drafting documents.

LAW 6821. Seminar: Food and Drug Law. (2 cr.; A-F only; Every Fall & Spring)
Introduction to legal structures applicable to food, food additives, drugs, devices. Focuses on Food, Drug, and Cosmetic Act and on FDA.

LAW 6822. Legislative Process. (2 cr.; A-F or Audit; Periodic Fall & Spring)
Examines and tests academic and judicial assumptions and theories about the legislative process.

LAW 6823. Investment Banking. (2 cr.; A-F only; Periodic Spring)
The objective of this seminar is to provide an introduction to investment banking and private equity. We will discuss the players, the industry, and how investment banking and private equity provide capital to public and private companies. Using case studies and examples of recent transactions, we will discuss the background, process and art? of deals involving investment bankers and private equity professionals. We will spend time discussing the intersection of investment banking, private equity, and corporate law in the context of transactions. What are the respective roles of the lawyers and bankers? How do lawyers and bankers work together with mutual clients on deals on issues like fiduciary duty, valuation, disclosure, and regulation? The seminar will require some interest ? though not necessarily a background ? in basic finance. We will spend time on financing, accounting, and valuation concepts that are helpful for both bankers and lawyers to know in the context of a transactional practice.

LAW 6824. Genetics and Assisted Reproduction: Law and Ethics. (2 cr.; A-F only; Periodic Spring)
This interdisciplinary seminar will examine the legal, ethical, medical, and scientific issues posed at the cutting edge of biomedical science, focusing on genetics, genomics, and assisted reproductive technologies (ART) in human beings. Topics will include the human genome project; history of eugenics; issues posed by genetic and genomic research; commercialization of genetic research, including issues raised by gene patents; genetic testing, counseling, and screening; prenatal screening and preimplantation genetic diagnosis; the use of genetics in ART; human gene therapy; pharmacogenetics; the privacy of genetic information; and issues of discrimination. Together, the class will work through the scientific, medical, legal, and ethical issues. In each instance, we will evaluate the legal, ethical, and policy challenges posed, critique current approaches, and explore alternative recommendations.

LAW 6825. Seminar: Advanced Administrative Law. (2 cr.; A-F only; Every Fall & Spring)
Issues not covered in basic administrative law.

LAW 6826. Seminar: Women's International Human Rights. (2 cr.; A-F only; Every Fall & Spring)
This seminar addresses the history and legal context of women's human rights; the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and its impact; gender and human rights in the international system; specific topics such as property and other economic rights, reproductive rights, and violence against women; and the role of nongovernmental organizations in making CEDAW work for women.

LAW 6827. Law and Cultural Property Seminar. (2 cr.; A-F only; Every Fall & Spring)
Collectors, museums, countries, native cultures, religious groups. New stakeholders' uneasy fit with traditional, scholarly caretakers. Archaeologists/historians.

LAW 6828. Law and Cultural Property Seminar. (2 cr.; A-F only; Every Fall & Spring)
Health Care Transactions. (2 cr.; A-F only; Periodic Fall & Spring)
European health laws, U.S. laws.

LAW 6829. Corporate Counsel. (2 cr.; A-F only; Every Fall & Spring)
Participants will learn the unique challenges of working in-house as corporate counsel with public, private, or nonprofit organizations, developing perspectives and skills to think like and be effective business lawyers and leaders. Students will work individually and in teams to address simulations of problems regularly encountered by corporate counsel, including in areas of risk, compliance and ethics management, governance and the board of directors, leading in crisis, business strategy and planning, international transactions, investigations, litigation management, employment, and intellectual property.

LAW 6830. Contract Drafting. (2 cr.; A-F only; Every Fall & Spring)
Trademark law and related unfair competition; trademark protection; acquisition of trademark rights, including trademark availability determinations; trademark registration process, including inter partes matters; trademark infringement; remedies for infringement. Survey of trademark law from identification of marks to protection to assertion. Recognition and handling of trademark issues emphasized.

LAW 6831. Seminar: Cyber-Security - Spies, Lies and Praying Eyes. (2 cr.; A-F only; Periodic Spring)
This course will focus on mitigation strategies as part of a simple, yet comprehensive risk-based analytical framework that a lawyer can utilize in assisting clients navigate challenges in the area of cyber security. Students will learn to evaluate cyber security risk including threat, vulnerability, impact and likelihood.

LAW 6832. Seminar: American Indian Law. (2 cr.; A-F only; Every Fall & Spring)
This course will study the evolution of habeas corpus and how the habeas remedy is utilized in the federal court system today. This study provide students an opportunity to observe how constitutional law, criminal law and procedure, civil procedure, and even trial and appellate practice all bear upon the courts? struggle to apply habeas corpus law to individual cases.

LAW 6833. Seminar: Supreme Courts in Comparative Perspectives. (2 cr.; A-F only; Periodic Fall)
(Forthcoming)

LAW 6834. Seminar: Law Faculty Research. (2 cr.; A-F only; Periodic Fall)
Trademark law and related unfair competition; trademark protection; acquisition of trademark rights, including trademark availability determinations; trademark registration process, including inter partes matters; trademark infringement; remedies for infringement. Survey of trademark law from identification of marks to protection to assertion. Recognition and handling of trademark issues emphasized.

LAW 6835. Seminar: Contract Drafting. (2 cr.; A-F only; Every Fall & Spring)
This seminar will take the contract principles that students learned in their first year and build upon them in a practical way. Students will review and revise contracts, draft sample provisions, draft contracts from scratch, and discuss options for managing risk through effective drafting.

LAW 6836. American Indian Law. (2 cr.; A-F only; Every Fall & Spring)
American Indian history through the early 20th century from legal perspective. Social and
economic factors that influenced developments within American Indian legal history.

**LAW 6839. Seminar: Supreme Court.** (2-3 cr. : A-F only; Every Fall)
Current opinions of the Supreme Court. Each student is assigned to be a Supreme Court justice and represents that justice’s views throughout the semester.

**LAW 6840. Comparative Antitrust.** (2 cr. ; A-F only; Every Spring)
The seminar explores the similarities and differences between U.S. and EU antitrust law (usually called ?competition law? in Europe), with a focus on the differences. Topics include: 1) An overview of the U.S. and EU antitrust systems. 2) Review of microeconomics. 3) Vertical restraints. 4) Monopolization in the U.S.; abuse of dominant position in the EU. 5) Merger law. 6) Efficiencies as a merger justification. 7) Predatory pricing. 8) Price discrimination. 9) Exclusive distributors. 10) Loyalty discounts and rebates. 11) Bundled discounts and rebates. 12) Intellectual property related antitrust issues. 13) Microsoft related issues. 14) Dynamic competition (and the new economy?). 15) Other matters, including judicial review and ordo-liberalism. The seminar is designed to assist students in: (a) developing an ability to analyze court decisions involving economic issues; (b) developing an ability to anticipate when EU authorities will substitute non-economic values for economic ones; and (c) improving their ability to articulate complex issues involving both law and economics.

**LAW 6841. Presidential Powers.** (2-3 cr. ; A-F only; Periodic Fall)
Presidential authority in conflict with prerogatives of coordinate branches of government.

**LAW 6842. Advanced Criminal Procedure.** (2 cr. ; A-F only; Spring Even Year)
This course will allow students to experience the practical realities of practicing in the field of criminal law. Simulated proceedings each week will explore issues that typically arise during the course of a criminal prosecution. Each class session will simulate a different stage of a federal criminal prosecution, progressing chronologically from the preliminary/detention hearing through grand jury presentation, a variety of pretrial motions, a handful of trial related issues, sentencing, and ending with a supervised release violation hearing.

**LAW 6843. Seminar: Structured Finance.** (2 cr. ; A-F only; Every Spring)
Introduces concept of securitizing assets. Reviews legal/accounting issues related to securitization, structured finance.

**LAW 6844. Advanced Real Estate Transactions.** (2 cr. ; A-F only; Periodic Fall)
This course emphasizes the theory behind the provisions that are contained in various transaction documents as well as the realistic results of negotiation and their effect upon actual transactions. Students draft real estate documents, participate in negotiation sessions with follow up discussion regarding the results of those negotiations, and prepare case studies evaluating real estate investments. The course provides a well-rounded understanding of basic commercial real estate documentation and transactions. The class also provides a foundation for all transactional lawyers, whether or not they will practice in the real estate field. Major topics include the following: real property contracts and conveyance documents; mortgages, deeds of trust and other loan documents; leasing documentation; title insurance surveys; real estate markets, securitization and development; and real estate investments and analysis.

**LAW 6845. Seminar: Securities, Liens.** (2 cr. ; A-F only; Periodic Spring)
Covers the different types of securities, liens, and personal records.

**LAW 6846. Philosophy of Punishment.** (3 cr. ; A-F only; Every Spring)
This seminar concerns normative justifications for the substantive criminal law and for systems of punishment for crime. It examines literatures in the philosophy of punishment from the early 19th century (e.g., Kant, Hegel, Bentham) onwards, in contemporary criminal law and punishment theory (many writers), and in social theory (e.g., Durkheim, Weber, Marx, Foucault, Wacquant), concerning justifications for punishing at all, and whom, and how much, and functional questions about the larger social purposes that punishment serves. A focus is on the usefulness of existing paradigms for understanding and justifying such recent developments as restorative justice, community justice, therapeutic jurisprudence, and specialized drug and domestic violence courts.

**LAW 6847. Seminar: Corporate Investigations.** (2 cr. ; A-F only; Periodic Spring)
Study of corporate investigations.

**LAW 6848. Seminar: Art and Science of Appellate Advocacy.** (2 cr. ; A-F only; Every Fall)
Practical experience in making an effective appellate argument, both orally and in writing; analysis of the appellate decision-making process; the basis of perfecting an appeal.

**LAW 6849. Comparative Theories of Ownership.** (2 cr. ; A-F only; Every Spring)
This seminar will examine different philosophies concerning property ownership and the property laws of different countries.

**LAW 6850. Seminar: Criminal Punishment.** (2-3 cr. ; A-F only; Periodic Spring)
Advanced criminal law/juvenile justice policy issues. Responsibility, insanity, automatism, punishment, plea bargaining. Readings include legal opinions, social science materials, philosophy of law, five novels, dozen short stories. Grades based on class participation and major paper, which with instructor approval may be didactic fiction.

**LAW 6851. Practice-Ready Legal Research.** (2 cr. ; A-F only; Every Fall & Spring)
Limited enrollment seminar emphasizing efficient and cost-effective legal research strategies and practical use of secondary source materials, administrative law materials, legislative materials, and legal/non-legal databases. Students will be expected to complete short research problems and produce a final course project describing their research strategies on a complex legal issue of their choosing.

**LAW 6852. Seminar: Financial Institutions.** (2 cr. ; A-F only; Every Spring)
Various aspects of financial institutions law. Issues that banking lawyers see in regulatory practice.

**LAW 6853. Law, Biomedicine and Bioethics.** (3 cr. ; A-F only; Periodic Fall)

**LAW 6854. Seminar: Biotechnology and Law.** (2-3 cr. ; A-F or Audit; Every Fall & Spring)
Private law aspects of the biotechnology industry. Legal/regulatory issues faced by commercial start-ups.

**LAW 6855. Seminar: Environmental Remediation and Redevelopment.** (2-3 cr. ; A-F only; Periodic Spring)
Issues surrounding litigation, resolution, and redevelopment of real property that has been subject to environmental contamination.

**LAW 6856. Seminar: Native American Law and Literature.** (2 cr. ; A-F only; Periodic Spring)

**LAW 6857. Corporate Tax.** (3 cr. ; A-F only; Every Fall)
An introduction to Subchapter C of the Internal Revenue Code, the ?crown jewel? of the Tax Code, and the taxation of shareholders and corporations. The class will include an indepth study of Section 351 and corporate formations; the capital structure of a corporation; nonliquidating distributions including dividends and Section 301; redecompositions of corporate stock including Section 302; both taxable and tax free acquisitions, including Section 368 reorganizations; and, corporate divisions such as spin-offs under Section 355. The course will not address international transactions, but will attempt to emphasize real world, current corporate tax problems.

**LAW 6858. Seminar: Closely Held Corporations.** (2 cr. ; A-F only; Periodic Fall)
Particular problems of the closely held business, including alternatives to
incorporation, formation, control devices, distribution and accumulation of corporate earnings, squeeze outs, dissolution, deadlock, dissolution, and sale.

**LAW 6859. Seminar: Jurisprudence and Critical Legal System.** (2 cr.; A-F only; Periodic Fall & Spring)

Current schools of thought/debate in legal theory. Focus on liberalism, critical legal studies, cr. critical race theory, law/economics.

**LAW 6860. Advanced Topics in Labor and Employment Law.** (2 cr.; A-F only; Periodic Fall & Spring)

During the first two months of the semester, the class will simulate the role of a new presidentially-appointed commission (The Solis Commission) charged with first examining the current state of U.S. labor and employment law and then considering recommendations for reform. During each class session, two students will act as experts or lobbyists making presentations to the commission on designated topics. The remaining class members will act in the role of commission members and pose questions and comments to the presenters. On the last day of class, the commission will vote on a reform agenda to be sent to the president.

**LAW 6861. International Law Workshop.** (2 cr.; A-F only; Periodic Fall & Spring)

This seminar brings in nationally recognized scholars to the law school to present their current work and provide students with the opportunity to engage with cutting edge scholarship in international law. Workshop sessions will be devoted to the presentation and discussion of works-in-progress of the guest scholars on various topics in international law. The seminar is aimed at exposing students to the world of international legal scholarship and the nature of scholarly debate. Students will be encouraged to develop a thoughtful and critical approach to scholarly work through guided discussions, so as to assist them in developing skills that are necessary to produce high quality scholarship with a view to publication. The course will be assessed on the basis of short reaction papers examining the work to be presented.

**LAW 6862. Seminar: Sexual Orientation.** (2 cr.; A-F only; Every Fall)

Broad range of areas where law recognizes/ regulates, either explicitly or not, sexual orientation. Regulation of gay sexuality, speech, freedom of association, employment, personal relationships, adoption, military.

**LAW 6863. Seminar: Voting Rights.** (2 cr.; A-F only; Every Fall)

Law governing right to vote in the United States. How the law has shaped the structure of American political participation. Alternative directions American democracy might take. Overview of restrictions on franchise-residency requirements, discrimination on basis of sex/race, registration practices.

**LAW 6864. Seminar: Law of Lobbying.** (2 cr.; A-F only; Periodic Spring)

This class is intended to provide students with an understanding of the legal regulations on federal and state lobbying, as well as provide them with practical experience with the profession of lobbying.

**LAW 6865. Law and Economics Workshop.** (2 cr. [max 4 cr.]; A-F only; Periodic Fall & Spring)

Law of economics in business world.

**LAW 6866. Sex Discrimination.** (2 cr.; A-F only; Periodic Fall)


**LAW 6867. Seminar: International and Foreign Legal Research.** (2 cr.; A-F or Audit; Every Spring)

Manual and on-line research techniques for public international law sources (e.g., treaties, decisions of international tribunals, materials issued by international organizations such as the EU), private international law sources from foreign countries, as well as research on selected topics of international interest such as GATT/trade law, human rights, environmental law, and intellectual property.

**LAW 6868. Seminar: Business/Environmental Law.** (2 cr.; A-F only; Every Spring)

Problems that affect businesses under environmental laws. Examines typical business transactions (formation and realignment of business entities, buying and selling properties, lending and borrowing, employing people, producing products, dealing with insolvency) and identifies environmental problems that affect them. Legislative, administrative, and judicial rules that allocate liability for damage to the environment and the lawyer’s role in minimizing clients’ liabilities through creative deal structuring and contract writing. At least two problem-solving memos and two short contracts required. prereq: familiarity with CERCLA, corporate law, and personal property security recommended.

**LAW 6869. Critical Race Theory.** (2-3 cr.; A-F or Audit; Every Fall)

Elements of claims brought under federal civil rights statutes: 42 U.S.C. @ 1981, 1982, 1938, 1986. Issues encountered in litigation of federal civil rights cases. Municipal liability, qualified immunity, exhaustion of administrative remedies, abstention, standing, ripeness, mootness, standards of proof with respect to various constitutional torts. prereq: dept consent

**LAW 6870. Seminar: Negotiations.** (2 cr.; A-F only; Every Fall)

Negotiations and procedures.

**LAW 6871. Seminar: American Constitutional History.** (2 cr.; A-F only; Periodic Fall)

The writing and ratification of the Constitution. Intellectual and ideological currents of the time, contemporaneous writings. Each student writes and presents a paper on any topic relevant to the subject.

**LAW 6872. Immigration Law.** (3 cr.; A-F only; Every Spring)

This course deals with the history of immigration to the United States, the role of the federal government in regulating immigration, visas for non-immigrants and immigrants, procedures and grounds for removal, asylum refugee status, citizenship, discrimination against aliens, the intersection between criminal law and immigration law, and ethical issues facing immigration lawyers. The course includes in-class lawyering skill exercises such as client interviewing and counseling, participating in an immigration court hearing, and legislative advocacy on immigration reform measures. These exercises are designed to train students in the skills necessary to become successful immigration lawyers.

**LAW 6873. Nonprofit Law.** (3 cr.; A-F only; Periodic Spring)

This seminar covers the legal requirements and policy implications for nonprofit organizations. Course topics include state law issues related to the formation of nonprofit organizations, nonprofit governance models, director fiduciary responsibilities, liability concerns for directors and volunteers, dissolution, state attorney general oversight, and regulation of fundraising. We will also study federal tax law governing nonprofit organizations, including tax exempt status, classification of charities as private foundations or public charities, deductibility of contributions, challenges and opportunities for charitable organizations to partner with for profit entities and otherwise engage in commercial activities, limits on compensation for executives, and the ability of nonprofit organizations to engage in advocacy. Students will consider best practices for operation and governance of nonprofit organizations and ways to demonstrate accountability to donors and other stakeholders. Prerequisite or Corequisite: Law 6012/6072 Corporations or Law 6051 BA/Corps or Law 6100 Tax I

**LAW 6874. Politics of Legal Policy.** (2 cr.; A-F only; Periodic Fall)

This seminar has three goals. First, and most important, the seminar allows students to write a research paper on a subject of their choice. Second, the seminar aims to introduce students to selected tools used for policy analysis such as cost-benefit analysis. Third, the seminar introduces students to selected issues concerning education. As to the paper, students may pick any topic which provides them with professionally relevant intellectual capital that they wish to acquire. The topic must be sufficiently narrow that they can make an intellectual contribution to the subject they present. A broad subject which might require a book-length treatment for the author to make a contribution would not be appropriate. During the last third of the semester, each student will present their research topic to the class. Most often the presentation is of a draft, not a final version, of their papers.

**LAW 6875. Joint Degree Program in Law, Science & Technology Proseminar.** (0.5 cr. [max 4 cr.]; S-N only; Every Fall & Spring)
Many of the most challenging issues of the 21st century will be those at the intersection of law and the life sciences. How do we govern research, assess the safety and potential impact of new technologies, and regulate or even ban them? This seminar will explore those questions, examining a wide range of developments in health, environment, and the life sciences, such as genomics, gene therapy, genetically modified organisms, genetic patents, ecosystems change, environmental health, managed care, and challenges to public health. Weekly presentation will be made by faculty drawn from graduate programs affiliated with the Joint Degree Program in Law, Science & Technology. Faculty will lead discussion of articles on topics that may range from science policy and regulation of genetic engineering to natural resource conservation and international harmonization of pharmaceutical patents. The seminar is required each year for Joint Degree Program students and open to other students by consent of the instructor.

LAW 6876. Digital Evidence. (2 cr.; A-F only; Every Spring) This seminar will cover the fast growing area of digital evidence and the legal issues that arise when digital evidence is investigated and used in criminal law and civil practice.

LAW 6877. Seminar: Energy Project Development and Finance. (2 cr.; A-F only; Periodic Fall) This course is intended to focus largely on the practical aspects of how energy projects are developed, financed, and ultimately put into operation.

LAW 6878. Regulating Personal Health Information. (2 cr.; A-F only; Periodic Spring) Students will explore the legal frameworks that regulate how personal health information may or may not be shared and the competing policy goals that often underlie these frameworks: protecting individual privacy enhancing the quality of care. The seminar has three components. It will survey the myriad laws, regulations, and contractual arrangements that govern the sharing of personal health information: the evolving body of federal rules and regulations relating to the Health Insurance Portability and Accountability Act (HIPAA/HITECH) and recent Medicare and Medicaid Incentive Programs promoting meaningful use of Electronic Health Record systems, as well as state-specific disclosure rules. It will also expose students to diverse, real-world experiences with health information-sharing needs and risks. Finally, building on this legal grounding and these contextual focus sessions, students will have the opportunity to define specific questions related to sharing personal health information, reflect on the impact of applicable rules, and propose changes or additions to them.

LAW 6879. Seminar: Mental Health Law. (2 cr.; A-F only; Periodic Spring) Issues involved in the legal systems handling of mental illness disabilities, including involuntary civil commitment, hospitalization, disposition of the mentally ill criminal offender, rights under the discrimination laws, and government services and funding mechanisms for those with mental illness.


LAW 6881. Seminar: Comparative Laws. (2 cr.; A-F only; Every Spring) Different legal traditions studied by country, religion, and "native" population communities. Each student chooses a legal tradition to represent throughout term.


LAW 6883. Contemporary Issues Facing Courts. (2 cr.; A-F only; Periodic Fall) This seminar, led by a former Chief Judge of the 4th Judicial District of Minnesota, will address a broad range of challenges facing courts and the innovations in judicial administration and judging that seek to advance the cause of justice. Topics include: courts as organizations; therapeutic justice; understanding case management and its impact on judging and lawyering; court funding and its impact on the delivery of justice; judicial selection and retention; wrongful conviction and other court mistakes; and public satisfaction and dissatisfaction with the courts. Students will explore the topics in class discussion and write papers analyzing one or more court challenges or innovations.

LAW 6884. Seminar: Comparative Constitutional Law. (2 cr.; A-F only; Every Fall & Spring) Historical background/changes of rule of law, democracy, human rights, market economy. Role that legal profession can play in development of these concepts.


LAW 6886. International Human Rights Law. (3 cr.; A-F only; Every Fall) Role of lawyers using procedures of the United Nations, Organization of American States, State Department, Congress, U.S. Courts, and nongovernmental organizations to address international human rights problems. Is there a law of international human rights? How is that law made, changed, and invoked? Problem method used.

LAW 6887. Seminar: Law of International Organizations. (2 cr.; A-F only; Periodic Spring) This course will examine the principal issues regarding organizations whose membership is that of states. This examination will scrutinize the legal personality and powers of such institutions; the manner in which they may call upon states parts as members participate; enforce decisions through mechanisms; dispute settlement; peace and security undertakings.

LAW 6888. Creative Legal Reasoning. (1 cr.; P-F only; Periodic Spring) This is a discussion based seminar in which the students decide from the facts of actual cases what the law should be. They use logic, instinct, experience, common sense, and all other mental and emotional processes that are the substance of the law and very much involved in its making. The only forbidden ingredient in the discussions is known or suspected law.

LAW 6889. Laws of War. (3 cr.; A-F only; Every Spring) This course focuses on two interrelated bodies of law: rules pertaining to the use of force in international law (known as the jus ad bellum) and rules regulating the conduct of hostilities under the laws of international and non-international armed conflict (known as international humanitarian law, the laws of armed conflict, or the jus in bello). The course will cover such issues as the ?Just War? theory, its history and its relevance in the modern world; the general prohibition on the use of force under Article 2(4) of the UN Charter; use of force by the UN: collective security and law enforcement actions; individual and collective self-defense; humanitarian intervention; and nuclear weapons in international law. The course will also consider regulation of the means and methods of warfare focusing on the Geneva and Hague laws: the four Geneva conventions protecting the wounded, sick, and shipwrecked, prisoners of war, and civilians; the means and methods of war, including lawful and unlawful weapons and targets; the law of internal armed conflicts; and asymmetric warfare.

LAW 6890. Rule by Law in China: An Advanced Seminar. (2 cr.; A-F only; Periodic Fall) This course will take a comparative law approach in discussing the development of legal discourse, and the ever increasing influence of Western jurisprudence, in modern and contemporary China. We will discuss at length the formation of ?Rule by Law? as a grand narrative? in its historical context, the controversy around different interpretations of ? Human Rights,? and the burgeoning civil rights movements in the Mainland.

LAW 6891. Seminar: Tax Policy. (2 cr.; A-F only; Periodic Spring) Tools of economic analysis as applied to tax/expenditure decisions of government. Developing economic literacy. Applying economic concepts to an expenditure issue and to current U.S. tax issues. Developing opinions about choices the United States should make with respect to tax/fiscal policy.

LAW 6892. Comparative Criminal Procedure. (3 cr.; A-F only; Periodic Spring)
This course will study systems in several foreign countries for the investigation, adjudication, and punishment of criminal violations. Primary emphasis will be on civil law? systems in Germany and France, but some attention will also be given to requirements imposed under the European human rights convention. The seminar will analyze the major similarities and differences between American and foreign systems, with emphasis on differing procedures which might be adaptable to the American context, to address some of the perceived shortcomings of our system of criminal justice. Reading knowledge of a foreign language is helpful, but is not required; all course materials will be in English.


LAW 6904. Legal Scholarship for Equal Justice. (. 3 cr.; A-F only; Every Spring) The Minnesota Justice Foundation (MJF) offers this seminar on applied research designed to address broad legal issues and problems of current importance to poverty lawyers and clients.

LAW 6905. Seminar: Public Employment Law. (. 2 cr.; A-F only; Periodic Fall) Labor/employment law issues arising in public sector workplace.

LAW 6906. Seminar: Public Law Workshop. (. 2 cr.; A-F only; Periodic Fall) Public law workshop issues. Focuses on many different areas of public law.

LAW 6907. Seminar: Congress and President. (. 2 cr.; A-F only; Periodic Fall) Congress and the president.

LAW 6908. Seminar: Regulation of Non-Banking Financial Services Entities. (. 2 cr.; A-F only; Periodic Fall) Regulatory environment and legal framework surrounding insurance companies, broker-dealers, investment advisers, and pooled investments in manufacture/distribution of investment/insurance products/services.


LAW 6910. Seminar: Islamic Law. (. 2-3 cr.; A-F only; Periodic Fall) Islamic law if one of the oldest system in the contemporary age. This course introduces the students to Islamic law. The origins of Islamic law, its sources, and major schools of jurisprudence.

LAW 6911. International Commercial Arbitration. (. 2 cr.; A-F only; Periodic Fall) International commercial arbitration is an increasingly important and common means of resolving disputes arising from contracts between citizens or companies from different countries. This course introduces students to the history, philosophy, advantages, process, and ethics of international commercial arbitration, with an emphasis on real cases and practical applications. The course covers differences between international arbitration and domestic arbitration/litigation, national arbitration statutes, agreements to arbitrate, arbitral jurisdiction, procedural rules, discovery/disclosure, hearings, evidence, arbitral awards, enforcement of awards, and ethical issues arising for both arbitrators and advocates in international commercial arbitration.

LAW 6912. Law Firm Practice and Management. (. 2 cr.; A-F only; Periodic Fall) The practice of law is a business as well as a profession. This seminar course provides an introduction to some of the important and developing issues in the business of practicing law, whether as a solo practitioner or in a larger law firm. The topics of study will include developing and retaining clients, finances and financial controls, trends in the legal profession, conflicts of interest and ethical compliance, case handling and administration, insurance and risk management, hiring and supervision of employees, business formation, and law firm governance. Prominent lawyers and law firm managers will serve as guest lecturers and panelists in presenting certain topics.

LAW 6913. Seminar: Tribal Courts in the United States, an Introduction to Indigenous Peoples Law. (. 2 cr.; A-F only; Periodic Summer) Facets of tribal courts in the United States, including their use of diverse legal justifications/sources.

LAW 6914. Seminar: Reproductive Technology. (. 2 cr.; A-F only; Periodic Spring) Issues regarding reproductive technology.

LAW 6915. Seminar on Race in Litigation: The Anatomy of the Race Card. (. 2 cr.; A-F only; Every Fall) Race litigation.

LAW 6916. Seminar: Biblical Law and Jewish Ethics. (. 2-3 cr.; A-F only; Periodic Spring) Original meaning/significance of religious law/ethics within Judaism.

LAW 6917. Seminar: Climate Change, the Clean Air Act, and Energy Law. (. 2 cr.; A-F only; Periodic Spring) Prominent legal issues involved in attempts to address greenhouse gas emissions to mitigate climate change.

LAW 6918. Rule of Law. (. 2 cr.; A-F only; Periodic Spring) This seminar will examine the concepts and core principles of the Rule of Law. Seminar sessions will be devoted to identifying the meaning of the terms ?rule of law? and ?independence of the judiciary.? The importance of a strong and independent legal profession to the rule of law will be discussed. Seminar sessions will focus on such issues as the problem of corruption and the rule of law, the relationship between human rights law and the rule of law, and the challenges of war crimes and genocide. The seminar will explore the relationship between the rule of law and economic development and alleviation of poverty. The seminar will include a discussion of the responsibility of lawyers to support and promote the rule of law within their own country and in other developing countries.

LAW 6919. Health Care Fraud and Abuse. (. 2 cr.; A-F only; Periodic Spring)
Federal, state and local governments are projected to spend $2.4 trillion on health care in 2021. Total public and private healthcare expenditures currently represent approximately 17% of the US GDP. With such high spending levels, opportunities and concerns about health care fraud and abuse are understandably rampant. This course brings practitioner and academic perspectives together to focus on the major civil, administrative and criminal laws that have been used to contain health care fraud and abuse, broadly defined as actions by healthcare providers (e.g., physicians and physician practices, medical device and pharmaceutical manufacturers, and clinical laboratories) that are inconsistent with accepted business and medical practices. These laws include the federal civil False Claims Act, the Stark Act, the federal Anti-kickback Statute and the remedies and civil and criminal penalties available to governmental entities and civil litigants. The seminar will also will also consider related compliance strategies and the practical compliance issues faced by healthcare providers.

LAW 6920. Seminar: Concept of the Person. (2 cr.; A-F only; Periodic Fall)

LAW 6921. Seminar: Topics in Islamic Law. (2 cr.; A-F only; Every Spring)

LAW 6922. Business Law Concentration. (1 cr.; P-F only; Every Fall)
This seminar is intended as an introduction and overview for students interested in completing the Business Law Concentration; students in the concentration are encouraged to take the seminar. The course will explore the careers, social roles, and professional obligations of business lawyers through case studies, readings, and judicial opinions. Students will develop a broad understanding of the boundaries of business, technology, and law. In this course, students will be introduced to current topics and compelling issues in patent law presented by leading patent and intellectual property law professionals. Students will gain real-world insights from in-house and private practice attorneys and agents, with a focus on patent prosecution and patent litigation.

LAW 6926. Intellectual Property and Technology Proseminar. (1 cr.; A-F only; Every Spring)
The field of intellectual property extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to a broad range of IP related topics presented by leading practitioners working at the intersection of law and technology. Students will gain real-world insights into the challenges that new technologies are creating in the fields of patent law, biotechnology, 3D printing, international IP, trade secrets, privacy law, copyrights, and trademarks.

LAW 6927. New Developments in Trust Law. (2 cr.; A-F only; Periodic Spring)
The traditional area of trust law has experienced a number of new and major developments in the last couple of years and the changes are continuing. The seminar will examine and analyze the effect of these new developments in traditional trust law, including the law of Minnesota Trust Code: the Uniform Trust Decanting Act; a Uniform Divided Trusteeships Act; the Uniform Fiduciary Access to Digital Assets Act; and the Interjurisdictional Recognition of Substitute Decision-Making Documents. This Seminar will enable students who intend to have an estate planning practice or a general practice that includes the drafting of wills and trusts to have an in-depth understanding of these new developments.

LAW 6928. Cooperative Lawyering and Problem Solving Courts: Lawyers as Peacemakers. (2 cr.; P-F only; Periodic Spring)
This is a new seminar for students who are interested in exploring a manner of practicing law broader than the win/lose paradigm of the adversary system. The instructor is one of the two Hennepin County problem-solving court judges. The course will provide an introduction to mindfulness for law students, which is a fundamental tool for peace of mind and peacemaking. Class sessions will feature presentations by lawyers engaged in peacemaking activities such as restorative justice, collaborative law, and problem solving courts. In addition to background reading to prepare for class sessions, students in this seminar should be prepared to spend 10-15 minutes each day in mindfulness exercises, to observe two out-of-class peacemaking activities, and to participate in experiential exercises in class. Short written assignments are designed to promote growth of the student’s peacemaking skills. The class requires an open mind and a willingness to share personal thoughts and experiences.

LAW 6929. Social Enterprises. (2 cr.; A-F only; Periodic Spring)
Social enterprise? is a relatively new concept to describe organizations that sit somewhere between the extremes on a continuum between non-profit organizations and for-profit business corporations. The founders of and investors in social enterprises seek both to earn financial returns and also to advance particular social purposes. Many have argued that traditional legal forms of association, especially the business corporation and the non-profit corporation, do not provide good fits for the purpose of this emerging form. A variety of new legal forms are being developed, including the low-profit limited liability company (L3C), the benefit corporation, and the social purpose corporation. This course explores the challenges facing social enterprises, and how both traditional and new forms of legal associations respond to those challenges.

LAW 6949. Biotechnology & Patent Law. (2 cr.; A-F only; Periodic Spring)
This course emphasizes patent law principles and doctrines as applied to biotechnology, including pharmaceutical, patents. Although there will be some coverage of United States Patent and Trademark Office policies as well as biotechnology patent principles in non-U.S. jurisdictions, the focus will be on U.S. Federal Circuit and Supreme Court case law developments. Topics include patent eligibility of biotechnological inventions including diagnostics and ?natural? products such as genes, claim strategies, written description, enablement, utility, best mode including requirements for biological deposits, inventorship, inherent anticipation, obviousness, infringement, and the intersection of patent and FDA regimes for small molecules and biologics.
LAW 6950. Introduction to Chinese Law. (1-2 cr.; A-F only; Periodic Summer)
Course taught in Beijing China. Legal system of China. Institutions that create/administer laws.

LAW 6951. Comparative Corporations. (2 cr.; A-F only; Periodic Summer)
Taught in Beijing, China. Corporate law across jurisdictions, including at least the United States and China and one or two other jurisdictions, probably Germany and Japan.

LAW 6952. Comparative Land Use. (2 cr.; A-F only; Periodic Summer)
Course taught in Beijing, China. Chinese and American law concerning real estate topics, including landlord-tenant law, real estate finance, and preservation of cultural resources.

LAW 6953. Chinese Civil Law. (1-2 cr.; A-F only; Periodic Summer)
Course taught in China. Structure/rules of Chinese civil law dealing with civil relationships, including contract law, law of obligations, and family law issues.

LAW 6954. Comparative Labor and Employment Law. (2 cr.; A-F only; Periodic Summer)
Compares three contemporary labor/employment law systems: the United States, China, and a European model. Focuses on Germany, Sweden.

LAW 6955. Discovery Techniques and Strategies. (1 cr.; A-F only; Periodic Summer)
Variety of discovery techniques/strategies at disposal of litigators in the United States.

LAW 6956. Chinese Intellectual Property Rights. (1 cr.; A-F only; Periodic Summer)
Chinese law relating to protection/enforcement of intellectual property rights, its relationships to international conventions/standards.

LAW 6957. Chinese Criminal Procedure and Judicial Systems. (1 cr.; A-F only; Periodic Summer)
Chinese approach to criminal procedure. Structure/operation of judicial system.

LAW 6958. Comparative Consumer Protection. (2 cr.; A-F only; Periodic Summer)
Offered in Beijing, China. How various nations, especially the United States and Europe, regulate market transactions to protect consumers from unfair and deceptive trade practices. Statutory fraud, false advertising laws, and regulation of consumer credit.

LAW 6959. Financial Institutions Law. (1 cr.; A-F only; Periodic Summer)

LAW 6960. Judicial Writing. (2 cr.; A-F only; Every Spring)
This course focuses on developing the writing abilities and practical knowledge of prospective judicial law clerks. The class will center around six writing assignments, which will include a bench memo, jury instructions, trial court order, and several appellate opinions. Only one writing assignment will require a work product exceeding 7 double-spaced pages. Most of the reading for the class will consist of materials relating to these six writing assignments, including attorneys’ briefs, relevant portions of the record, key precedents, and samples of past materials. Class will also provide students with practical information about how to be an effective law clerk, drawing heavily on guest talks from local federal and state judges and law clerks. Topics will include how to rely on the case record, the importance of understanding local procedural rules, and the centrality of the standard of review.

LAW 6999. Transfer. (1-50 cr. [max 100 cr.]; P-F only; Every Fall, Spring & Summer)
Credits received from another law school.

LAW 7000. CL: Civil Practice. (3 cr. [max 8 cr.]; A-F only; Every Fall & Spring)
The Civil Practice Clinic offers second and third year students an opportunity to gain both practical lawyering experience and the satisfaction of representing real clients. The clinic introduces students to the practice of lawyering through a combination of instructional methods. Classroom sessions explore topics such as interviewing, negotiation, counseling, and motion practice. Simulated exercises allow students to apply classroom learning in a life-like setting. Each student handles approximately three cases involving topics such as family, employment, consumer, and administrative law. These cases provide student attorneys with the opportunity to participate in almost all aspects of the lawyering process, including court and administrative hearing appearances. The clinic course is a two semester program. The classroom portion is completed during the first semester. Students earn a total of seven credits allocated between the two semesters.

LAW 7001. CL: Civil Practice Director. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)
Director for civil practice clinic. Prereq: dept consent

LAW 7003. Seminar: Student Legal Writing Instructor. (2 cr. [max 8 cr.]; A-F only; Every Fall & Spring)
Legal writing instructors for the first-year legal writing students.

LAW 7004. Seminar: Structured Study Group Instructors. (2 cr. [max 8 cr.]; S-N only; Every Fall & Spring)
Instructors are assigned to work with single student handles approximately three cases involving topics such as family, employment, consumer, and administrative law. These cases provide student attorneys with the opportunity to participate in almost all aspects of the lawyering process, including court and administrative hearing appearances. The clinic course is a two semester program. The classroom portion is completed during the first semester. Students earn a total of seven credits allocated between the two semesters.

LAW 7005. Practice and Professionalism Student Instructors. (1-2 cr. [max 4 cr.]; P-F only; Every Fall & Spring)
Students as mentors/liaisons and are engaged in research/discussion of doctrinal/pedagogical issues.

LAW 7006. ABA Negotiation Competition Team. (1-2 cr.; P-F only; Every Fall)
ABA Negotiation team participants receive credit for participation in regional competition and one more credit if they advance to national competition.

LAW 7007. International Humphrey Student Instructors. (1 cr.; A-F only; Every Fall)
Student instructors help with Law School Humphrey Fellows.

LAW 7008. CL: Insurance Law Clinic. (3 cr. [max 6 cr.]; A-F only; Every Fall)
The Insurance Law Clinic offers students an excellent opportunity to learn litigation skills and insurance basics while effectively and confidently representing individuals during all stages of an insurance claim and/or dispute with an insurer. Work includes investigating, preparing and tendering an insurance claim, writing demand letters to insurers, drafting litigation pleadings, including complaints, discovery documents, motions, briefs, settlement agreements and other court documents, dealing with clients and opposing counsel, and courtroom litigation and ADR. The clinic's coverage cases deal with many types of insurance, including: auto liability, homeowner's property, health and disability, life, and commercial general liability (CGL). Through classroom instruction and case supervision, students learn the basic concepts and legal principles involved in property and liability insurance, and they will gain experience in a broad range of practice skills, such as negotiation, legal writing, case investigation, mediation, client counseling, and state court practice.

LAW 7009. CL: Insurance Law Directors. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)
Students work with Insurance Law Clinic.

LAW 7010. CL: Innocence. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)
Students in the Innocence Clinic work in conjunction with the Minnesota Innocence Project of Minnesota. In the clinic, students investigate claims of actual innocence being made by inmates in Minnesota, North Dakota, and South Dakota. Students start working a case by obtaining primary source material? police reports, forensic reports, court pleadings, transcripts, appellate briefs, and opinions. At that point, many students have the opportunity to talk to the trial and appellate attorneys who had previously worked on the case. After reviewing all of the source material, if the case still appears to be a viable one, the students often visit the inmate in prison and question them about their claim. Students also search for new evidence, may visit crime scenes, and interview witnesses. Students are expected to prepare written summaries of what they do, and to present and discuss those experiences during class. If a case proceeds to litigation, students also prepare necessary affidavits, motions, and briefs.

LAW 7011. CL: Innocence Project Director. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall)
Student director for Innocence Clinic.

LAW 7012. CL: Environmental Law. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)
The Environmental Law Clinic is a client-driven course based on representation of nongovernmental organizations. This clinic
will improve students’ skills in analyzing problems in environmental law and policy, and allow them to work directly with advocates on environmental issues. This clinic engages in projects related to achieving environmental and energy sustainability through the management of land, water, and energy resources. Typically the clinic takes on two to four year-long projects that require the students to work in small groups with clients. Projects often include the following: (1) providing advice to local NGOs; (2) representation of NGOs before an administrative state body; (3) production of legal research reports; (4) support organizations participating in regulatory decision-making processes, such as the Public Utilities Commission; and (5) education or advocacy presentations to citizens and elected or appointed decision-makers. Client management skills and legal research methods are honed throughout the projects.

**LAW 7013. CL: Environmental Sustainability Policy Directors.** (3 cr. [max 6 cr.]; A-F only; Periodic Fall) Directors for environmental sustainability.

**LAW 7015. CL: Workers’ Rights.** (2 cr. [max 4 cr.]; A-F only; Periodic Spring) This course provides an introduction to practice in employment law with an emphasis on unemployment compensation and wage claims. The clinic has a weekly class component. Class work will include training in the core lawyering skills, such as evaluating cases, interviewing clients, counseling, negotiation, administrative hearing skills, and ethics.

The clinic provides free legal representation to low-income clients in unemployment compensation. We also handle wage claim cases if they arise. Students work in pairs to analyze client cases, identify legal issues, advise clients about possible remedies, and determine whether to proceed to a hearing or take other action. Students also learn about unemployment compensation, wage claims, EEOC investigations, and other aspects of employment law and practice skills with mock exercises and examples. Each student will represent at least three clients in unemployment compensation hearings. Students conduct client interviews, identify legal issues, develop a case theory, conduct direct and cross-examination, and deliver closing statements.

**LAW 7016. CL: Workers Rights Directors.** (2 cr. [max 4 cr.]; A-F only; Every Fall) Student directors with Worker Rights Clinic and their cases.

**LAW 7017. International Humphrey Fellow Student Instructor.** (2 cr.; A-F only; Every Fall & Spring) Facilitate collaboration between international human rights professionals/U.S. law students. Provide students with human rights research, writing, networking. Humphrey Research Fellows assist twelve Hubert H. Humphrey Fellows hosted by University of Minnesota Law School/Human Rights Center.

**LAW 7018. Intercollegiate Trial Team.** (2 cr.; A-F only; Every Spring) Students compete in trial teams. prerequisite: Trial practice

**LAW 7025. ABA Moot Court Competition Team.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Competition team for ABA moot court. prerequisite: dept consent

**LAW 7026. ABA Moot Court Competition Director.** (1 cr. [max 3 cr.]; A-F only; Every Fall & Spring) Director for ABA moot court competition. prerequisite: dept consent

**LAW 7027. ABA Moot Court Competition Managing Director.** (1 cr. [max 3 cr.]; A-F only; Every Fall & Spring) Managing director for ABA moot court. prerequisite: dept consent

**LAW 7030. CL: Consumer Protection.** (4 cr. [max 8 cr.]; A-F only; Every Fall) The Consumer Protection Clinic represents individuals who are victims of marketplace fraud or who have disputes regarding consumer credit, debt collection, motor vehicle fraud, predatory lending, or similar matters.

The clinic also assists legislators, regulators, and advocacy groups in policy matters, such as drafting consumer protection legislation.

**LAW 7031. CL: Consumer Protection Directors.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Student instructors for consumer protection clinic.

**LAW 7035. Environmental Law Moot Court.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Introduction to appellate advocacy. Current topics in environmental law. Intramural competition leads to selection of team to represent University in intercollegiate environmental law moot court competition. prerequisite: dept consent

**LAW 7036. Environmental Law Moot Court Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director for environmental law moot court. prerequisite: dept consent

**LAW 7037. Environmental Law Moot Court Competition Team.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Environmental law moot court competition team member. prerequisite: dept consent

**LAW 7038. Environmental Law Moot Court Managing Director.** (1-2 cr. [max 3 cr.]; A-F only; Every Fall & Spring) Environmental law moot court managing director. prerequisite: dept consent

**LAW 7040. CL: Community Mediation.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) This clinic offers students the opportunity to learn from mediation practitioners and participate as mediators in community cases, to serve as facilitators in restorative justice conferences and to present trainings in community conflict resolution education programs. Students who successfully complete the fall course will be eligible to be listed on the Minnesota Rule 114 Roster of Qualified Neutrals. This course features classroom instruction and interactive exercises. Students observe and then participate in community and court mediations, restorative justice conferences and community outreach programs. This course emphasizes the facilitative model of mediation and provides a survey of other mediation styles. Topics covered include conflict theory; restorative justice theories and practice; statutes and rules governing mediation; ethical considerations; cultural considerations in mediation; and the applicability of facilitative mediation in housing, family, juvenile and criminal courts, as well as in schools, businesses, and elder and employment work.

**LAW 7041. CL: Community Mediation Directors.** (2 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Student directors for Mediation Clinic. Fall 3 cr; Spring 2 cr.

**LAW 7042. CL: Federal Immigration Litigation.** (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) This clinic is part of the Center for New Americans and teaches students to represent clients in federal impact immigration litigation. Cases may include appellate litigation before the U.S. Circuit Courts of Appeals, U.S. Supreme Court and Board of Immigration Appeals, as well as before U.S. District Courts and immigration courts, and may deal with asylum and related issues, and the intersection of immigration and criminal law. Students will also learn about the substance and process of immigration policy-making and may engage in immigration policy outreach and advocacy projects. Students will learn substantive immigration law, administrative and federal rules of procedure, and skills important to the representation of clients in federal immigration litigation including client contact and communication, case management, legal writing and drafting, oral advocacy, courtroom skills, legal ethics, communications and negotiations with opposing counsel, case analysis/vehicle selection, and case strategy/coordination with co-counsel, allies, amici, and media.

**LAW 7043. CL: Federal Immigration Litigation Director.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Director for Federal Immigration Litigation Clinic.

**LAW 7045. ABA Journal of Labor and Employment Law Editors.** (2 cr. [max 4 cr.]; S-N only; Every Fall & Spring) Intensive instruction in brief writing, appellate advocacy in context of labor/employment law. Students direct work of second-year students and participate in national competition held annually in New York. prerequisite: 3rd yr, dept consent

**LAW 7046. ABA Journal of Labor & Employment Law: Research & Writing.** (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring) This course provides an opportunity to research and write a journal note under faculty
supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of ABA Journal of Labor & Employment Law.

**LAW 7047. Wagner Moot Court Competition Team.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) National Wagner Moot Court competition in New York Law School.

**LAW 7055. Maynard Pirsig Moot Court.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Students prepare memoranda, briefs, and arguments in a moot court case. Tutorial instruction in legal analysis, legal writing, and oral argument. Intramural moot court competition judged by prominent members of bench/bar. Team of students selected to represent the University in ABA Moot Court Competition. prereq: dept consent

**LAW 7056. Maynard Pirsig Moot Court Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director for Maynard Pirsig moot court. prereq: dept consent

**LAW 7057. Maynard Pirsig Moot Court Research Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Research director for Maynard Pirsig moot court. prereq: dept consent

**LAW 7058. Maynard Pirsig Moot Court Managing Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director of Maynard Pirsig Moot Court team.

**LAW 7065. National Moot Court.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Preparatory, substantial editing, and rewriting of appellate brief. Oral advocacy training with coaches. Intramural oral competition leads to selection of team to represent the University in National Moot Court Competition. prereq: dept consent

**LAW 7066. National Moot Court Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director for national moot court. prereq: dept consent

**LAW 7067. National Moot Court Administrative Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Administrative director for national moot court. prereq: dept consent

**LAW 7068. National Moot Court Competition Team.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) National Moot Court Competition team.

**LAW 7075. International Moot Court.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) International law/policies. Preparation of brief in moot court case before International Court of Justice. Substantial editing/rewriting, Oral advocacy training with coaches. Intramural oral argument competition leads to selection of team to represent the University in the Jessup International Law Moot Court Competition of the American Society of International Law. prereq: dept consent

**LAW 7076. International Moot Court Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director for international moot court.

**LAW 7077. International Moot Court Administrative Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Administrative director for international moot court. prereq: dept consent

**LAW 7078. International Moot Court Competition Team.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Students compete on international moot court team.

**LAW 7085. Intellectual Property Moot Court.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Preparation, substantial editing, and rewriting of an appellate brief on a case involving patents, copyrights, or trademarks. Preparation of oral arguments. Leads to participation on a University team in the Giles Sutherland Rich Intellectual Property Moot Court Competition. prereq: dept consent

**LAW 7086. Intellectual Property Moot Court Competition Team.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Competition team member for intellectual property moot court.

**LAW 7087. Intellectual Property Moot Court Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director for intellectual property moot court. prereq: dept consent

**LAW 7088. CL: Intellectual Property and Entrepreneurship.** (2 cr.; A-F only; Every Fall) The Intellectual Property and Entrepreneurship Clinic is a perfect complement to the IP concentration at the law school. It adds a practical skills component to existing courses, exposing students to a wide variety of issues encountered by technology entrepreneurs. Students attend a weekly and the syllabus outlines potential topics. Each class session involves a mixture of lecture and interviewing and counseling exercises, including writing exercises where appropriate. At least three classes consist of drop-in workshops where student attorneys interview limited-representation clients, and engage in problem solving and counseling during the course of each workshop; each workshop will be followed by roundtable discussions of issues encountered. Evaluation of student performance turns on classroom engagement, participation and performance in exercises, and attendance at workshops. prereq: previous or concurrent registration in 6224, or 6603, or 6608, or 6613; 6224, 6608, 6613, and 6603 may be taken concurrently

**LAW 7092. CL: Bankruptcy Clinic.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) The Bankruptcy Clinic offers students the opportunity to advise and represent individuals in serious financial difficulty. This course includes a classroom component, which prepares the students to counsel clients about consumer bankruptcy, introduces important portions of the Bankruptcy Code and Rules and discusses the students' cases in a group setting. This classroom component also features guest speakers, such as bankruptcy judges, panel trustees, and local practitioners. Students will receive training from Bankruptcy Court staff in electronic filing. The majority of the course will be actually representing clients in financial difficulty. This includes advising them of their options, communicating with their creditors, filing Chapter 7 bankruptcy cases, and representing clients at the meeting of creditors. Students may also have the opportunity to represent clients in adversary proceedings, including discovery and trial, as well as settlement negotiations with both creditors and the US Trustee. Occasionally, students represent individual creditors as well.

**LAW 7093. CL: Bankruptcy Clinic Director.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Director for bankruptcy clinic. prereq: dept consent

**LAW 7094. Civil Rights Moot Court Administrative Director.** (1-2 cr.; A-F only; Every Fall & Spring) Administrative director for civil rights moot court program.

**LAW 7095. Civil Rights Moot Court.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Intensive supervised experience in research, brief writing, and oral advocacy. Students work under supervision of third-year directors participating in the national Civil Rights Moot Court Competition. prereq: dept consent

**LAW 7096. Civil Rights Moot Court Director.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Director for civil rights moot court.

**LAW 7097. Civil Rights Moot Court Competition Team.** (1 cr. [max 4 cr.]; A-F only; Every Fall & Spring) Civil rights moot court competition team. prereq: dept consent

**LAW 7098. CL: Indian Child Welfare Act.** (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) This clinic focuses specifically on issues under the federal Indian Child Welfare Act (ICWA). Each student will handle two to three Indian Child Welfare cases during the two semesters. Cases involve representation of Indian parents in juvenile CHIPS cases (children in need of protection or services) and third-party custody/ adoption cases involving Indian children. Cases are referred through the Indian Child Welfare Law Center.

**LAW 7099. CL: Indian Child Welfare Clinic Director.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Director for Indian child welfare clinic. prereq: dept consent

**LAW 7100. Law Review Editors.** (2 cr. [max 12 cr.]; S-N only; Every Fall & Spring) Credit given without grade for satisfactory participation. prereq: instr consent

**LAW 7101. Law Review Associate Editors.** (3 cr. [max 6 cr.]; S-N only; Every Fall & Spring)
Associate editor for Minnesota Law Review.

LAW 7102. Law Review: Research & Writing. (1 cr. [max 2 cr.]; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Minnesota Law Review.

LAW 7117. CL: Civil Rights Enforcement. (3 cr.; A-F only; Every Fall & Spring)
The Civil Rights Enforcement Clinic offers students the opportunity to enforce the civil rights laws of the U.S. by assisting in the investigation and litigation of cases in the U.S. Attorney's Office for the District of Minnesota in Minneapolis. The clinic includes both classroom seminars and fieldwork. Classroom instruction focuses on the Civil Rights Act, the Fair Housing Act, the Americans with Disabilities Act, the Equal Educational Opportunities Act, the Uniformed Service Members Employment and Reemployment Rights Act and the Matthew Shepard and James Byrd, Jr. Hate Crimes Prevention Act, along with statutory interpretation and federal investigation techniques and procedure. Following the initial class instruction in the fall, students will be assigned in the spring pending federal civil rights investigations and cases. They will work closely with assistant U.S. attorneys, investigators and paralegals on investigation tactics, evidence gathering, pleading drafting, deposition preparation, document review, legal research, litigation strategy, and settlement negotiations.

LAW 7200. Law and Inequality Journal Editor. (2 cr. [max 8 cr.]; S-N only; Every Fall & Spring)
Credit given without grade for satisfactory participation. prereq: instr consent

LAW 7201. Law and Inequality Journal Associate Editor. (2 cr. [max 4 cr.]; S-N only; Every Fall & Spring)
Associate editor for Law and Inequality Journal.

LAW 7202. Law & Inequality Journal: Research & Writing. (1 cr. [max 2 cr.]; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Law and Inequality: A Journal of Theory and Practice.

LAW 7246. CL: Housing Law. (3 cr.; A-F only; Every Fall & Spring)
The Housing Law Clinic is a one-semester clinic on landlord-tenant law. Housing attorneys from Mid-Minnesota Legal Aid supervise students in representing tenants facing housing repair problems, utility shutoff and lockouts, and eviction cases in their rental history in Hennepin County Housing Court. The clinic provides an opportunity to handle cases from beginning to end. The cases may include interviewing, investigation, drafting pleadings, discovery, motion and trial practice, and appeals. Some cases may involve the delicate act of advising a client that does not have a good case. Each student may handle two to five cases during the semester. The classroom component includes interviewing, clinic computer network training, professional responsibility, housing law topics concerning the types of actions handled in the clinic, and case simulations patterned after real housing cases. Students convene for staff meetings and round table discussions to discuss issues and cases, as well as for meetings with student directors and the supervising attorneys in preparation for cases.

LAW 7247. CL: Housing Clinic Director. (1-4 cr.; A-F only; Every Fall & Spring)
Director for housing clinic. prereq: dept consent

LAW 7300. Minnesota Journal of International Law Editor. (2 cr. [max 8 cr.]; S-N only; Every Fall & Spring)
By selection only. Credit given without grade for satisfactory participation.

LAW 7302. Journal of International Law: Research & Writing. (1 cr. [max 2 cr.]; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Minnesota Journal of International Law.

LAW 7400. CL: Human Rights Litigation and International Legal Advocacy. (4 cr.; A-F only; Every Spring)
This clinic provides students with experience in human rights advocacy which may include litigation in federal or state courts and advocacy before the United Nations, the federal and state legislative and executive branches, and working in coalitions of nongovernmental organizations. The clinic provides participation in clinical projects and skill-building exercises. The process will facilitate discussion of the pros and cons of various advocacy mechanisms, possible conflicting strategies among stakeholders, and how particular strategies are chosen and implemented. The clinic's class component includes core lawyering skills such as interviewing, counseling, negotiation, and legal ethics in practice, and subjects such as how to practice before federal and state courts, how to use international law sources in legal arguments before U.S. courts, working with clients with Post-Traumatic Stress Syndrome, the different types of oral advocacy and writing in human rights advocacy, and the use of education, outreach, and the media in advancing a strategy.

LAW 7420. CL: Family Law. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring)
The Family Law Clinic is a two-semester course. This clinic is grounded in the development of practical skills necessary to effectively develop and move family law cases from initial client interview to Judgment and Decree. Of the twelve classes in fall semester, two classes consist of simulated learning and the other ten consist of lecture with in-class exercises, such as calculating child support. The two simulations include a client interview and a default hearing. The simulations are grounded in one fictional family law case file. Each student enrolled in the Family Law Clinic will also assist at the Anoka County Family Law Clinic on two Friday afternoons throughout the academic year. There is no class in spring semester, but student attorneys' dockets increase to three cases and they are required to attend weekly meetings with their case team to discuss case planning, client counseling, review documents, and prepare for court appearances. Court preparation often requires time, in addition to weekly meetings, to moot and prepare for appearances.

LAW 7421. CL: Family Law Directors. (3 cr.; max 6 cr.); A-F only; Every Fall & Spring)
Family Law clinic student directors.

LAW 7500. CL: Misdemeanor Defense. (2-3 cr.; A-F only; Every Fall & Spring)
Criminal law clinic. Students participate from defense perspective in arraignments, pretrial proceedings, and jury trials in Hennepin County District Court. Integrating substantive/procedural law and lawyering skills through classroom work, simulations, and actual client representation.

LAW 7501. CL: Criminal Justice Directors. (2 cr. [max 4 cr.]; A-F only; Every Fall & Spring)
Director for criminal justice clinic. prereq: dept consent

LAW 7550. CL: Misdemeanor Prosecution. (3 cr.; A-F only; Every Fall)
The primary goal of the Prosecution Clinic is to provide students with the opportunity to develop the substantive and practical skills to function as an effective and ethical prosecutor in the criminal justice system. The prosecution clinic course will involve a combination of classroom work and supervised student prosecution of individuals charged with petty misdemeanor, misdemeanor, and gross misdemeanor offenses in Hennepin, Ramsey, and Anoka County District Courts. Students handle cases at all stages of the criminal process including arraignments, pretrial conferences, and court trials. There is also a seminar component that includes lectures on substantive criminal law and procedure, criminal justice policy issues, simulation exercises, role playing, skills training exercises, and self-evaluation.

LAW 7551. CL: Criminal Justice. (3 cr.; max 6 cr.); A-F only; Every Fall & Spring)
The Criminal Justice Clinic is a year-long clinic in which students will have the unique opportunity to prosecute criminal cases during
the fall semester and serve as a criminal defense attorney during the spring semester. Students in the Criminal Justice Clinic will have a challenging and rewarding experience working as student-attorneys practicing law in courts throughout the metro area. Through classroom and courtroom work, students will develop the fundamental litigation and legal skills that will serve them well as they embark on their careers as practicing attorneys. They also will be challenged to think critically and creatively about the criminal justice system, the role of prosecutors and defense attorneys, legal ethics, and criminal law and procedure.

**LAW 7570. CL: Federal Prosecution.** (2-3 cr. ; A-F only; Periodic Fall & Spring)

Students assist in prosecution of federal criminal cases under supervision of assistant U.S. attorneys and faculty supervisor.

**LAW 7571. CL: Federal Prosecution Clinic Director.** (2-3 cr. ; A-F only; Periodic Spring) Director for federal prosecution clinic.

**LAW 7572. CL: Federal Defense.** (3 cr. ; A-F only; Every Spring)

In this clinical seminar, students assist in the defense of indigent persons charged with federal crimes, under the supervision of the Federal Public Defender for the District of Minnesota and assistant federal public defenders. Fieldwork includes assignments such as research and writing of Eighth Circuit appeal briefs, memoranda in support of or response to motions, and legal research on a wide variety of topics. When cases are available, students may also be given various second-chair assignments in the preparation for and conduct of court and jury trials. If consistent with assignment deadlines, students are encouraged to observe other trials and federal criminal court proceedings. In addition to regular conferences, students work about twelve hours per week on clinic assignments. Each student will arrange a regular weekly schedule for their clinic work at the Federal Public Defenders Office in Minneapolis.

**LAW 7600. Minnesota Journal of Law, Science, and Technology Editor.** (2 cr. ; [max 8 cr. ] ; S-N only; Every Fall & Spring)

Scholarly publication addressing legal issues that arise from emerging technologies in areas such as copyrights, trademarks, patents.

**LAW 7602. Journal of Law, Science & Technology: Research & Writing.** (1 cr. ; [max 2 cr. ] ; P-F only; Every Fall & Spring)

This course provides opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Minnesota Journal of Law, Science & Technology.

**LAW 7606. Independent Research and Writing.** (1-2 cr. ; [max 8 cr. ] ; A-F only; Every Fall, Spring & Summer)

Note: Law 7606 and 7608 both provide credit for independent writing projects; the difference is that 7606 satisfies the J.D. Upper Division Writing Requirement, while 7608 does not (except on a case-by-case basis before fall 2016). The registrar will assign students to 7606 or 7608 based on whether the student seeks, and the supervisor approves, upper division writing credit. Students may earn 1 or 2 credits (and in exceptional circumstances, 3 credits) for researching and writing a note, article, memo, or other paper on a legal topic. At least 5,000 words are required for one credit, at least 7,500 for two credits, and at least 11,250 for three credits. Students must consult with their faculty supervisor on their topic and research plan and receive feedback from their supervisor on the drafting process. To register, the student should confer with a supervising faculty member, draft a description of the proposed project, and complete the online Independent Research form. prereq: Law student. Non-law students may enroll in LAW 5908 or LAW 7608.

**LAW 7607. Independent Field Placement - Experiential.** (1-3 cr. ; P-F only; Every Fall, Spring & Summer)

Note: Law 7607 and 7609 both provide credit for independent field placements; the difference is that 7607 satisfies the Experiential Learning Requirement, while 7609 does not. The registrar will assign students to 7607 or 7609 based on whether the student seeks and the advisor approves experiential learning credit. Students may earn up to three credits in a semester for unpaid work in a legal practice setting under the supervision of a qualified field supervisor and a faculty advisor. At least 50 hours of law-related activities are required per credit. The student is responsible for identifying a field placement setting and supervisor, finding a faculty advisor, and completing the Independent Field Placement Enrollment and Independent Field Placement Supervisor Forms. The signed forms must be submitted by email to lawcurr@umn.edu for approval by the Associate Dean of Academic Affairs prior to enrollment.

**LAW 7608. Independent Research and Writing.** (1-2 cr. ; [max 8 cr. ] ; A-F only; Every Fall, Spring & Summer)

Law 7606 and 7608 provide credit for independent writing projects; the difference is that 7606 satisfies the J.D. upper division writing requirement, while 7608 does not (except on a case-by-case basis before fall 2016). The registrar will assign students to 7606 or 7608 based on whether the student seeks and the supervisor approves upper division writing credit. Students may earn 1 or 2 credits (and in exceptional circumstances 3 credits) for researching and writing a note, article, memo, or other paper on a legal topic. At least 3,750 words are required for one credit, at least 7,500 for two credits, and at least 11,250 for three credits. To register, the student should confer with a supervising faculty member, draft a description of the proposed project, and complete the online Independent Research form.

**LAW 7609. Independent Field Placement.** (1-3 cr. ; S-N only; Every Fall, Spring & Summer)

Note: Law 7607 and 7609 both provide credit for independent field placements; the difference is that 7607 satisfies the Experiential Learning Requirement, while 7609 does not. The registrar will assign students to 7607 or 7609 based on whether the student seeks and the advisor approves experiential learning credit. Students may earn up to three credits in a semester for unpaid work in a legal practice setting under the supervision of a qualified field supervisor and a faculty advisor. At least 50 hours of law-related activities are required per credit. The student is responsible for identifying a field placement setting and supervisor, finding a faculty advisor, and completing the Independent Field Placement Enrollment and Independent Field Placement Supervisor Forms. The signed forms must be submitted by email to lawcurr@umn.edu for approval by the Associate Dean of Academic Affairs prior to enrollment.

**LAW 7620. Field Work: Clemency Project.** (2-3 cr. ; P-F only; Periodic Fall, Spring & Summer)

In early 2014, President Obama announced an initiative to grant clemency to long-term federal inmates meeting certain criteria: they had served at least 10 years in prison, their offense was low-level and non-violent, they had no history of violence or ties to organized crime, their conduct in prison was good, and their sentence would be lower today by operation of law or policy. He called on lawyers and law students across the country to volunteer to represent these inmates in preparing their applications under this tailored program. In this class, students will visit individual inmates, determine their eligibility for the program, obtain all necessary documents and records, develop the inmate's release plan, collect letters of support, and write up memoranda detailing how the inmate meets the criteria. The class is taught by Professor JaneAnne Murray, who is counsel of record for the inmate clients and a member of the steering committee of Clemency Project 2014 - a consortium of defense organizations which coordinates the recruitment and training of volunteer clemency lawyers.

**LAW 7621. Immigration Law Field Placement.** (1-3 cr. ; P-F only; Periodic Fall & Spring)

This course provides an opportunity for students interested in Immigration Law to work alongside practitioners. The instructor and student will work together to find an appropriate placement that matches the student's interests and host's needs. Due to the limited number of placements available and the need to match students with available hosts, enrollment will occur through an application outside of the lottery process. If you are interested in applying, please contact the instructor.

**LAW 7675. CL: Child Advocacy and Juvenile Justice.** (4 cr. ; [max 8 cr. ] ; A-F only; Every Fall & Spring)

The Child Advocacy and Juvenile Justice Clinic (the "CACJ") is a full academic year, seven-credit program beginning in the fall semester in which students represent indigent clients in
Students in this clinic will work with various Partnership for Health Directors. Students will develop skills that can be used in any number of practice settings, including interviewing and counseling, case management, problem-solving, persuasive fact analysis, legal drafting, negotiation, effective oral communication, and interdisciplinary collaboration. Through participation in this course, students will be given the opportunity to change clients' lives by helping them assert their rights and obtain necessary benefits and services. Students will learn about legal issues that affect people with health issues, the complex intersection of law and health, the medical-legal partnership (MLP) model of legal services delivery, and client-centered and holistic approaches to the lawyer-client relationship. Students will learn their own style of lawyering and ways to improve time management, client management, and communication and advocacy skills.

LAW 7842. CL: Immigration and Human Rights. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring)

This clinic, which is a part of the Center for New Americans, represents persons seeking asylum in the United States as well as immigrant detainees at removal hearings in U.S. It provides students with extensive client contact, legal writing, and courtroom advocacy experience. As part of their representation of asylum-seekers, students interview and counsel their clients, research conditions in the countries where their clients suffered persecution, write briefs and represent their clients in hearings at U.S. Immigration Court. Students may write appellate briefs to the Board of Immigration Appeals and the 8th Circuit Court of Appeals. Students also represent immigrant detainees at hearings in Immigration Court to determine if they have defenses to deportation, and work on public policy and community outreach projects which bring them into contact with immigrant rights groups.

LAW 7843. CL: Immigration Clinic Director. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)

Director for immigration clinic. prereq: dept consent

LAW 7844. CL: Detainee Rights. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring)

The Detainee Rights Clinic is part of the Center for New Americans and will provide students multifaceted opportunities to represent non-citizens facing removal from the United States who are detained at Immigration and Customs Enforcement (?)ICE?) facilities in the Twin Cities area. Students will learn substantive immigration law through the seminar component, with a particular focus on removal defense and immigration detention. Due to the intertwining of criminal and immigration law, or ?criminalization?, students will gain knowledge of Minnesota criminal law and criminal procedure. Students will learn about administrative legal remedies and relief that are available to those facing removal as well as the procedures and mechanisms in place to decide whether a person can remain in the United States.

LAW 7845. CL: Detainee Rights Clinic Director. (3 cr. [max 9 cr.]; A-F only; Every Fall & Spring)

Student director for Detainee Rights Clinic.

LAW 7860. CL: Business Law. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring)

The Business Law Clinic is a two-semester 6-credit experience for 3Ls who have taken Business Associations/Corps. Students enrolled in the clinic gain broad experience working with startup businesses and entrepreneurial clients. Through the Business Law Clinic, law students provide for legal assistance in non-litigation matters to small businesses, nonprofits and entrepreneurs. Clients will work with pairs of law students, meeting at the Law School who team up with experienced, licensed business law and corporate attorneys from area law firms and corporations who provide supervision. Our clinic practice closely replicates the practice of business law.

LAW 7861. CL: Business Law Directors. (2 cr. [max 4 cr.]; A-F only; Every Summer)

Directors for multi-professional business law clinic.

LAW 7875. CL: Criminal Appeals. (2 cr. [max 8 cr.]; A-F only; Every Fall & Spring)

Students prepare an appellate brief on behalf of a criminal defendant in a felony case supervised by an assistant state public defender. Emphasizes quality of legal research, writing, and argument. Advanced research/ writing clinic. prereq: Courses in [criminal law, criminal procedure, professional responsibility]

LAW 7900. CL: Domestic Abuse Prosecution. (2-3 cr.; A-F only; Every Fall & Spring)

Students participate in supervised prosecution of misdemeanor domestic assault cases. Students handle cases at all stages of criminal process: arraignments, pretrial conferences, trials.

LAW 7950. CL: Tax. (3 cr. [max 8 cr.]; A-F only; Every Fall & Spring)

Enrollment in this clinic provides an opportunity for students to represent low income taxpayers who have a tax controversy. Tax Clinic cases generally involve audits of tax returns, filing and trying cases in Tax Court, and bringing taxpayers into collection compliance. Students in the clinic also participate in community education and outreach during the spring semester. In addition, clinic students participate in a seminar during the fall semester. The seminar provides training in clinic office procedures, lawyering skills and professional responsibility, and tax procedure and law. Guest speakers from the IRS, MN Department of Revenue, and practicing bar provide useful information about the practice of tax law. Students who would benefit from enrollment include those who have an interest in: 1) tax, business or bankruptcy practice; 2) pursuing a career in public interest law; 3) administrative and statutory law practice; 4) assisting immigrants meet the tax requirements
Learning and Academic Skills (LASK)

LASK 1001. Mastering Skills for College Success. (2 cr.; Student Option; Every Fall & Spring)
Practical assistance to develop efficient, effective learning/academic performance skills. Improve reading, memorization, test-taking, critical thinking; identify academic and career Learning styles, motivation, life skills, and their relation to successful academic performance.

LASK 1102. Academic Success. (2 cr.; max 4 cr.; S-N only; Every Fall & Spring)
Identifying factors interfering with academic performance, selecting strategies, and establishing a plan to promote academic success. Learning-style, educational goals, life management skills, motivation, attitude. preq: instr consent

Liberal Studies (LS)

LS 5100. Liberal Studies Seminar. (1-4 cr.; max 24 cr.; A-F or Audit; Every Fall, Spring & Summer)
Interdisciplinary topics. preq: dept consent

LS 5125. Field Experience. (1-8 cr.; A-F or Audit; Every Fall, Spring & Summer)
Off-campus observation, experience, and evaluation in interdisciplinary field of study. preq: SLS student or instr consent

LS 5950. Special Topics. (1-4 cr.; max 12 cr.; A-F or Audit; Every Fall, Spring & Summer)
Interdisciplinary topics. preq: dept consent

LS 5993. Directed Studies. (1-4 cr.; max 15 cr.; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. preq: Grad student, dept consent

LS 5994. Directed Research. (1-4 cr.; max 15 cr.; Student Option; Every Fall & Spring)
Tutorial for qualified graduate students. preq: instr consent

LING 1701. Language and Society. (DSJ; 4 cr.; Student Option; Every Fall & Spring)
Role of language in human social interaction; linguistic indicators of social status and attitudes; language and sex roles; sociolinguistic theory/methods in study of bilingualism. Language ecology; language planning for multilingual communities; implications for education and public policy.

LING 1905. Freshman Seminar. (3 cr.; max 6 cr.; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

LING 1910W. Freshman Seminar. (WI; 3 cr.; max 6 cr.; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule. preq: Freshman

LING 3001. Introduction to Linguistics. (SOCs; 4 cr.; Student Option; Every Fall, Spring & Summer)
Scientific study of human language. Methods, questions, findings, and perspectives of modern linguistics. Components of the language system (phonetics/phonology, syntax, semantics/pragmatics); language acquisition; language/social variables; language/cognition; language change; language processing; language/public policy.

LING 3001H. Honors: Introduction to Linguistics. (SOCs; 4 cr.; A-F only; Every Spring)
Scientific study of human language. Methods, questions, findings, and perspectives of modern linguistics. Components of the language system (phonetics/phonology, syntax, semantics/pragmatics); language acquisition; language/social variables; language/cognition; language change; language processing; language/public policy.

LING 3002. Final Project for Graduate Liberal Studies. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Students synthesize/compose final project. preq: MLS; all MLS coursework must be completed by end of sem, dept consent

LING 8001. Introduction to Interdisciplinary Inquiry. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Required course. Emphasizes what students need to know or be able to do to successfully complete their individually crafted program, including critical thinking, clear writing, and interdisciplinary research. preq: MLS student, dept consent

LING 8002. Final Project for Graduate Liberal Studies. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Students synthesize/compose final project. preq: MLS; all MLS coursework must be completed by end of sem, dept consent

LING 8100. Advanced Interdisciplinary Inquiry. (1-3 cr.; max 5 cr.; A-F or Audit; Every Spring)
Readings/discussion to shape/focus final project. Workshop format. Key ideas of various disciplines, influential thinkers. Emphasizes developing critical themes. preq: MLS student, dept consent

LING 8101. Final Project Proposal Prep: Pulling the Pieces Together. (1 cr.; A-F only; Every Fall & Spring)
Course assists Master of Liberal Studies students as they develop a functional Final Project Proposal and secure an adviser. In addition to writing a Draft Final Project Proposal and securing an adviser, students will have created a short Summary Statement that articulates the focus of their MLS Program. The course will reflect each student's individual needs and can be shaped to emphasize the area the student and the instructor determine to be the highest priority identifying and building a relationship with a faculty adviser and/or drafting the Final Project Proposal. preq: Master of Liberal Studies Student and dept consent

LING 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall & Summer)
(No description) preq: Master's student, adviser and DGS consent

LING 2001. Introduction to Linguistics. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Required course. Emphasizes what students need to know or be able to do to successfully complete their individually crafted program, including critical thinking, clear writing, and interdisciplinary research. preq: MLS student, dept consent

LING 2002. Final Project for Graduate Liberal Studies. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Students synthesize/compose final project. preq: MLS; all MLS coursework must be completed by end of sem, dept consent

LING 3001H. Honors: Introduction to Linguistics. (SOCs; 4 cr.; A-F only; Every Spring)
Scientific study of human language. Methods, questions, findings, and perspectives of modern linguistics. Components of the language system (phonetics/phonology, syntax, semantics/pragmatics); language acquisition; language/social variables; language/cognition; language change; language processing; language/public policy.

LING 3002V. Honors: Thesis. (WI; 3 cr.; A-F only; Every Spring)
Supervised research, writing, and revision for honors thesis begun in 3052. preq: Linguistics honors candidate, instr consent

LING 3003H. Honors: Thesis. (WI; 3 cr.; A-F only; Every Spring)
Supervised research, writing, and revision for honors thesis begun in 3051. preq: 3051

LING 3010W. Languages of the World. (WI; 3 cr.; Student Option; Every Fall)
Survey of language families of the world. Classifying languages genetically/hypotypically. Historical relationships among languages. preq: 3001 or 3001H or 5001 or instr consent

LING 3601. Historical Linguistics. (3 cr.; Student Option; Every Spring)
Historical change in phonology, syntax, semantics, and lexicon. Linguistic reconstruction. Genetic relationship among languages. preq: 3001 or instr consent

LING 3721. Bilingualism. (3 cr.; Student Option; Periodic Fall)
Sociolinguistic theory/methods in study of bilingualism. Language ecology in multilingual societies. Language and language behavior in bilingual individuals. Language in ethnic conflict. Implications for public policy/planning. preq: 1701 or 3001 or 3001H or 5001

LING 4201. Syntax I. (3 cr.; Student Option; Every Spring)
How words are organized into phrases/sentences. Basic units of a sentence. How these units are structured. How languages may be the same, or different, in syntax. preq: 3001 or 3001H or 5001 or instr consent

LING 4202. Syntax II. (3 cr.; Student Option; Every Fall)
Syntactic theory. Principles and Parameters (P&P) approach to grammar. Focuses on Minimalist Program (MP). preq: 4201 or 5201

LING 4302W. Phonology I. (WI; 3 cr.; Student Option; Every Spring)
How sounds are organized/patterned in human languages. Foundation in phonological theory/problem-solving for advanced work
in phonology and other fields in linguistics. Analyzing data, presenting written solutions. prereq: 3001 or 3001H or 5001 or instr consent

LING 4303. Phonology II. (3 cr.; Student Option; Every Fall) Continues work of LING 4302W with emphasis on critical reading of current phonological literature. Phonological phenomena in the context of new developments in the field. Optimality Theory and the phonology-morphology interface. prereq: LING 4302W

LING 4901W. Major Project Seminar. (WI; 3 cr.; S-N only; Every Fall & Spring) Revision/expansion of a paper completed for a linguistics course. prereq: Ling major, [or cr]

LING 5001. Introduction to Linguistics. (SOCS; 4 cr.; Student Option; Every Fall, Spring & Summer) Scientific study of human language. Methods, questions, findings, and perspectives of modern linguistics. Components of the language system (phonetics/phonology, syntax, semantics/pragmatics); language acquisition; language and social variables; language and cognition; language change; language processing; language and public policy; language and cognition.

LING 5105. Field Methods in Linguistics I. (4 cr.; Student Option; Every Fall) Techniques for obtaining/analyzing linguistic data from unfamiliar languages through direct interaction with native speaker. prereq: [4201 or 5201], [4302W or 5302] or instr consent

LING 5106. Field Methods in Linguistics II. (4 cr.; Student Option; Every Spring) Techniques for obtaining/analyzing linguistic data from unfamiliar languages through direct interaction with a native speaker. prereq: [5105, grad major] or instr consent

LING 5201. Syntactic Theory I. (3 cr.; Student Option; Every Fall) Concepts/issues in current syntactic theory. prereq: 3001 or 3001H or 5001 or instr consent

LING 5202. Syntactic Theory II. (3 cr.; Student Option; Every Spring) Modern syntactic theory. Syntactic phenomena in various languages. Syntactic argumentation, development of constraints on grammar formalisms. prereq: 4201 or 5201

LING 5205. Semantics. (3 cr.; Student Option; Every Fall & Spring) Analysis of sentence meaning. Semantic properties. Relations such as analyticity, entailment, quantification, and genericity. Philosophical background, formal techniques of semantic analysis, how sentence meaning depends on word meaning, syntax, and context. The role of semantics in grammatical theory. prereq: [4201 or 5201] or instr consent

LING 5206. Linguistic Pragmatics. (3 cr.; Student Option; Every Spring) Analysis of linguistic phenomena in relation to beliefs and intentions of language users; speech act theory, conversational implicature, presupposition, information structure, relevance theory, discourse coherence. prereq: [4201 or 5201] or instr consent

LING 5302. Phonological Theory I. (3 cr.; Student Option; Every Fall) How sounds are organized/patterned in human languages. Phonological theory/problem-solving for advanced work in linguistics. Analyzing data. Presenting written solutions to problem sets. prereq: 3001 or 3001H or 5001 or instr consent

LING 5303. Phonological Theory II. (3 cr.; Student Option; Every Spring) Phonology of human languages. Reading papers in the literature. Doing research in phonology. prereq: 4302W or 5302 or instr consent

LING 5461. Conversation Analysis. (3 cr.; Student Option; Periodic Fall) Discourse processes. Application of concepts through conversation analysis. prereq: 3001 or 3001H or 5001 or instr consent

LING 5462. Field Research in Spoken Language. (3 cr.; Student Option; Periodic Spring) Transcribing/analyzing talk and movement related to talk. Applying concepts to recorded conversations. prereq: 3001 or 3001H or 5001 or instr consent

LING 5601. Historical Linguistics. (3 cr.; Student Option; Every Spring) Historical change in phonology, syntax, semantics, and lexicon. Linguistic reconstruction. Genetic relationship among languages. prereq: 3001 or 3011H or 5001

LING 5801. Introduction to Computational Linguistics. (3 cr.; Student Option; Spring Odd Year) Methods/issues in computer understanding of natural language. Programming languages, their linguistic applications. Lab projects. prereq: [4201 or 5201] or programming experience or instr consent

LING 5900. Topics in Linguistics. (1-4 cr.; [max 12 cr.]; Student Option; Every Fall & Spring) Topics vary. See Class Schedule.

LING 5931. Morphology and Syntax of Contemporary English. (3 cr.; Student Option; Periodic Fall & Spring) Linguistic analysis of word/sentence structure of contemporary English. Focuses on data from recorded/written texts. prereq: 3001 or 3001H or 5001 or instr consent

LING 5993. Directed Study. (1-3 cr.; [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Directed study for Linguistics. Prereq instr consent, dept consent, college consent.

LING 8005. Research Paper Workshop. (3 cr.; [max 12 cr.]; S-N or Audit; Every Spring) Workshop on research methodology/writing in linguistics. prereq: [5105, 5202, 5205, [4302W or 5302]] or [instr consent, grad ling major]

LING 8105. Field Methods in Linguistics I. (4 cr.; [max 8 cr.]; Student Option; Every Fall) Techniques and practice in obtaining/analyzing linguistic data from an unfamiliar language through direct interaction with a native speaker. Study of a language by elicitation of speech samples/analysis of patterns that emerge. prereq: [5001, 5201, 5302, grad linguistics major] or instr consent

LING 8106. Field Methods in Linguistics II. (4 cr.; [max 8 cr.]; Student Option; Every Spring) Continued analysis through work with a native speaker of language begun in 8105. Greater emphasis on analysis of recorded texts of various kinds. Some grammars of the language/contents compared with field notes from previous semester. prereq: 8105 (taken in same academic yr)

LING 8200. Topics in Syntax and Semantics. (3 cr.; [max 9 cr.]; Student Option; Periodic Fall) Syntax and semantics of natural language, with particular emphasis on the interface between the two. prereq: 5202, 5205 or instr consent

LING 8210. Seminar in Syntax. (3 cr.; [max 9 cr.]; Student Option; Periodic Fall) Current issues in syntactic theory. Topics vary. prereq: 5202, 5205 or instr consent

LING 8300. Topics in Phonetics and Phonology. (3 cr.; [max 9 cr.]; Student Option; Periodic Fall) N/A prereq: 5303 or instr consent

LING 8333. FTE: Master's. (1 cr.; [no grade]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

LING 8444. FTE: Doctoral. (1 cr.; [no grade]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

LING 8500. Topics in Second Language Acquisition. (3 cr.; [max 9 cr.]; Student Option; Periodic Fall & Spring) tdbr prereq: 5001, 5505

LING 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

LING 8777. Thesis Credits: Master's. (1-18 cr.; [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

LING 8888. Thesis Credit: Doctoral. (1-24 cr.; [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

LING 8888W. Thesis Credit Dissertation Seminar. (1-3 cr.; [max 24 cr.]; No Grade Associated; Every Fall & Spring) A means for students to make progress on the dissertation in a structured setting. Brings
Together students writing on related topics. Credits are applied to doctoral thesis credits. Contact instructor for description. Prereq: Doctoral student who has passed oral prelims.

LING 8900. Seminar: Topics in Linguistics. (3 cr. [max 9 cr.]; Student Option; Every Spring) Topics vary. See Class Schedule. Prereq: instr consent.

LING 8920. Topics in Language and Cognition. (3 cr. [max 6 cr.]; Student Option; Every Fall) Language-related issues in cognitive science from a linguistic perspective. Serves as elective for cognitive science minor, but only for linguistics nonmajors. Prereq: 5001 or instr consent.

LING 8991. Independent Study. (1-4 cr. [max 15 cr.]; Student Option; Every Fall & Spring) Independent Study Prereq: instr consent.

Logistics Management (LM)

LM 8892. Readings in Logistics Management. (1-3 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Readings useful to student's individual program or objectives that are not available in regular courses. Prereq: Adviser consent or instr consent.

LM 8894. Graduate Research in Logistics Management. (1-3 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Individual research on an approved topic appropriate to student's program and objectives. Prereq: Adviser consent or instr consent.

MN Studies in Intl Devel Prog (MSID)

MSID 1001. Beginning Hindi. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 1004. Intermediate French. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 1221. Beginning Swahili I. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Study abroad course.

MSID 1222. Beginning Swahili II. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Study abroad course.

MSID 3001. Beginning Hindi. (4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Study abroad course.

MSID 3008. Advanced Hindi. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 3015. MSID Intensive Spanish Language Pre-Session. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 3021. Advanced Spanish. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 3025. Intensive French Language. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 3225. Intermediate Swahili I. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 3226. Intermediate Swahili II. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 3231. Advanced Swahili. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MSID 4001. International Development: Critical Perspectives on Theory and Practice. (4 cr.; Student Option; Every Fall & Spring) Explore a wide variety of perspectives on international development, with the host country as a case study. This course begins with 20 hours of common discussion on international development. The remaining course is divided into sections, and you select from the following sections in order to prepare for your internship or research project: (see track descriptions in syllabus for more information).

MSID 4002. MSID Country Analysis. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 4003. Community Engagement in the Global South. (4 cr.; Student Option; Every Fall & Spring) An internship or research project with a host-country development agency or project provides an unparalleled opportunity to study community characteristics, development strategies and problems, organizational structure and culture, and cross-cultural communication issues. The length of the internship or research project is 6 weeks during the first semester. You typically spend approximately 25 to 30 hours each week at your internship or research site, although this may vary depending on the specific site and project. A list of sample past internships and research projects is available. Written assignments help link experiences to theories and issues raised in the classroom. A program faculty member or the on-site director visits you at least once at your internship or research site during the internship/research period. At the end of each semester, you gather in the host city or a retreat site for a seminar, which helps integrate your experiences and newly acquired knowledge. 12 contact hours of this course are incorporated into the classroom phase and provide specific training on research methodology to prepare students for their research or internship project.

MSID 4004. Case Studies in International Development. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 4005. Advanced International Development Internship. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 4006. Applied Field Methods. (4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 4007. MSID Directed Research. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5001. International Development: Critical Perspectives on Theory and Practice. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5002. MSID Country Analysis. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5003. Community Engagement in the Global South. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5004. Case Studies in International Development. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5005. Advanced International Development Internship. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5006. Applied Field Methods. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID 5007. MSID Directed Research. (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

MSID Program in Thailand (THAI)

THAI 1001. Beginning Thai I. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

THAI 1002. Beginning Thai II. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

THAI 3001. Intermediate Thai I. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
THAI 3002. Intermediate Thai II. (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 1002. Beginning Spanish. (5 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 1003. Intermediate Spanish III. (5 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 1004. Intermediate Spanish IV. (5 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3001. Financial Management. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3002. Ecology of Spain. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3003. Philosophy of Religion. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3004. Management and Organizational Behavior. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3005. Management and Ethics in a Cross-Cultural Context. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3006. World Religions. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3007. Contemporary Moral Problems: Ethics. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3008. Fundamentals of Marketing. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3009. Political History of Contemporary Spain. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3010. Paintings at the Prado Museum. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3011. International Media. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3012. Internships in Spain. (3-6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3013. Spanish Civilization. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3014. Corporate Social Responsibility. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3015. Modern Masters: Goya, Picasso, Miro and Dali. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3016. Topics in International Marketing. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3017. Spanish Conversation. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 3018. Introduction to Biological Psychology. (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

MADR 4901. Research Laboratory in Psychology. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

Management (MGMT)

MGMT 1001. Contemporary Management. (; 3 cr.; A-F only; Every Fall & Spring) How/why organizations differ in form/purpose in complex environments/technologies. Managerial challenges related to international management, social responsibility. Models of effective leadership/teambwork. prereq: Carlson School fr or soph.

MGMT 1001H. Honors: Contemporary Management. (; 3 cr.; A-F only; Every Fall & Spring) How/why organizations differ in their forms/purposes in relation to complex/changing environments/technologies. Challenges related to international management and social responsibility. Models of effective leadership/teambwork. prereq: [Fr or soph] honors.

MGMT 1005. Corporate Responsibility and Ethics. (CIV; 3 cr.; A-F only; Every Fall & Spring) Identify/apply ethical principles to resolution of moral challenges in management. Understanding place of business/corporation in society. prereq: Carlson School student.

MGMT 1005H. Corporate Responsibility and Ethics. (CIV; 3 cr.; A-F only; Every Spring) Identify/apply ethical principles to resolution of moral challenges in management. Understanding place of business/corporation in society. prereq: Honors student.

MGMT 3001. Fundamentals of Management. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Aspects/characteristics of organizations, their members. Why people/groups feel/behave as they do. Processes/methods that improve behavior/attitudes/effectiveness of members. Member/manager skills. Guest speakers, group presentations, films.

MGMT 3004. Business Strategy. (; 3 cr.; A-F only; Every Fall & Spring) Business strategy. How business firms set and pursue their goals. Key categories of strategic issues and concepts/frameworks managers use to analyze and address those issues. Attention to specific firms and situations. prereq: CSOM, soph or jr.

MGMT 3010. Introduction to Entrepreneurship. (; 4 cr.; A-F or Audit; Every Fall & Spring) Fundamentals of entrepreneurship. Career paths, including new business start-ups, franchising, acquisitions (including family business succession), corporate venturing, and entre-preneurial services. Legal structures for new business formation. Aspects of business law/ethics.

MGMT 3033W. Business Communication. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Written/oral communication skills for effective participation in contemporary organizations. From basic principles to communication strategy. Communication technology. Cases, simulations of “real-world” situations. Student small groups meet with instructor three times for presentation coaching/feedback. Recitation times are arranged with instructor at start of semester. prereq: Fr composition, CSOM upper-div, at least 60 cr.

MGMT 3040. Understanding the International Environment of Firms: International Business. (; 2 cr.; A-F or Audit; Every Fall & Spring) Theories, frameworks, tools, and facts for understanding the environment of firms in international competition. Main world-level economic flows (trade, investment, finance). How country-industry-level economic, political, and sociocultural factors influence behavior/ functions of firms in international competition. prereq: 1001 or 1001H or 3001.

MGMT 3603. Topics: Environmental Issues. (; 3 cr.; A-F only; Every Fall) Concepts/issues relating to inventory, subsequent analysis of production systems. Production system from holistic point of view, using term commonly used in industrial ecology: “metabolic system.” prereq: [MATH 1142 or [MATH 1271, MATH 1272], [APEC 1101 or ECON 1101 or 3261W.

MGMT 3900. International Business Communication. (GP; 3 cr.; A-F only; Every Spring) Course will help students understand the impact of culture and communication on business interactions around the world. Cultural studies and cross-cultural communication is a complex, multidisciplinary field. Students will be asked to reflect on the meaning of ethics and corruption in a multicultural environment and to consider how our understanding of other cultures influences best business practices. This course should help students to develop an empathetic understanding of other cultures, see through the eyes of others, understand how different cultural values can impact business practices, and think ethically about...
important global societal change and engage in difficult debates around moral, legal, and ethical issues.

MGMT 4000. Issues in Nonprofit Management. (4 cr.; A-F only; Every Spring) Capstone course. Students choose project with nonprofit organizations in local community. Readings/discussions tie managerial theory to experiences. Issues that involve intersection of for-profit/not-for-profit economies. Primarily undergraduate class. Opportunities for selected grad students. prereq: Sr nonprofit major or instr consent

MGMT 4002. Managerial Psychology. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Behavioral principles, methods, and skills that underlie and compose dimensions of managerial competence and contribute to managers' effectiveness in preventing and solving problems within and between individuals and groups; development of human resource skills management needs based partially on experiential exercises.

MGMT 4008. Entrepreneurial Management. (4 cr.; A-F only; Every Fall & Spring) Management of a new venture after founding. Internal/external challenges of managing a startup organization. Working with resource constraints and understanding how business models may change over time. prereq: concurrent registration is required (or allowed) in [3010 or IBUS 3010]

MGMT 4040. Negotiation Strategies. (4 cr.; A-F only; Every Spring) Securing agreements between two or more parties who are interdependent and seeking to maximize their own outcomes. Behavior of individuals, groups, and organizations in competitive situations.

MGMT 4050. Management of Innovation and Change. (2 cr.; A-F or Audit; Periodic Fall & Spring) Applying theories/research on how new organizational programs, products, technologies are developed/implemented. Diagnostic skills. How innovation unfolds. prereq: 1001, [3000 or 3010]

MGMT 4080W. Applied Technology Entrepreneurship. (WI; 4 cr.; Student Option; Every Spring) Team projects based on commercializable technologies or innovations. Teams present their ideas to investors and industry professionals. Students are encouraged to submit their business plans to Minnesota Cup. MGMT 4100. Topics in Management. (2-4 cr. [max 8 cr.]; A-F only; Periodic Fall & Spring) Topics vary. prereq: instr consent

MGMT 4101. Independent Study in Strategic Management and Organization. (1-4 cr.; A-F or Audit; Periodic Fall & Spring) Students contract with faculty on independent studies. prereq: instr consent or dept consent

MGMT 4170W. New Business Feasibility and Planning. (WI; 4 cr.; A-F only; Every Fall & Spring) New-business-opportunity identification/development. Students conduct feasibility analysis, create formal business plan, gather feasibility data, and contact potential customers, suppliers, and other primary sources. prereq: 3010

MGMT 4171W. Entrepreneurship in Action I. (WI; 4 cr.; A-F only; Every Fall) Two-semester course. In fall, students identify a business opportunity, develop concept, determine resources required, and launch the business. In spring, students implement business plan, manage business, and determine exit strategy. prereq: 3010; [4008 or concurrent registration is required (or allowed) in 4008], completed coursework in business core, COSM upper division, approved application

MGMT 4172. Entrepreneurship in Action II. (4 cr.; A-F only; Every Spring) Second of two-semester sequence. In fall, students identify business opportunity, develop concept, determine resources required, and launch business. In spring, students implement business plan, manage business, and determine exit strategy. prereq: 4171

MGMT 4500. Senior Seminar in International Business. (2 cr.; A-F only; Every Fall & Spring) International business capstone. Topics related to doing business globally. Opportunity to integrate study abroad/coursework experiences. prereq: COSM sr., completed semester abroad, IB major or minor

MGMT 5480. Topics in Natural Resources. (3 cr.; A-F only; Periodic Spring) Specific topic for each offering.

MGMT 6004. Negotiation Strategies. (2 cr.; A-F only; Every Fall & Spring) Art/science of securing agreements between two or more parties who are interdependent and seek to maximize their own outcomes. Individual, group, organizational behavior. Theory/process of negotiations applied to problems faced by managers/professionals. prereq: MBA student

MGMT 6031. Industry Analysis and Competitive Strategy. (4 cr.; A-F only; Every Fall, Spring & Summer) Processes by which firms maximize long-term returns in face of competition, uncertainty, changing market/technological conditions. Resource commitments to gain sustainable advantage. Choices to leverage resources. prereq: MBA 6300, MBA student


MGMT 6033. Managing the Strategy Process. (2 cr.; A-F only; Periodic Fall & Spring) How successful strategy is shaped/implemented throughout organization. Leadership challenge of continually renewing strategy/leading change to meet competitive challenges. prereq: MBA student

MGMT 6034. Strategic Leadership. (2 cr.; A-F or Audit; Periodic Spring) Role of leadership in making strategy a reality while maintaining learning/adaptive organization capable of meeting competitive challenges. Students prepare project set in an organization. Advanced materials, complex cases. prereq: 6033, MBA student

MGMT 6035. Complex and Cross-Cultural Negotiations. (2 cr.; A-F or Audit; Periodic Fall & Spring) Principles, role play of multi-party-issue, team-based negotiations/conflicts. How to structure ambiguous situations, bridge national/organizational cultures (e.g., alliances, mergers), functions (R&D, finance), and institutional contexts (regulators, interest groups). prereq: [6004, MBA student] or instr consent

MGMT 6040. International Strategy and Organization. (2 cr.; A-F only; Every Fall & Spring) Dealing with enormous complexity in competitive environment, in strategy, and in organizations. Focuses on strategic/organizational issues in managing across borders. prereq: MBA student

MGMT 6050. Management of Innovation and Change. (2 cr.; A-F only; Periodic Fall & Spring) How organizations innovate/change. Focuses on innovation in wide variety of new technologies, products, programs, and services. What paths likely to lead to success/failure. Diagnostic skills/principles. prereq: Credit will not be granted if credit has been received for: 5051, 6050

MGMT 6070. Technology Strategy. (2 cr.; A-F only; Periodic Spring) Evaluating short/long term competitive effects of e-business models using frameworks drawn from strategy, information economics. Strategies to establish, grow, manage e-business. Evaluating strategies of different firms. Lectures, cases, hands-on learning from Web. Grade based on written analyses of two cases, class participation, group project evaluating an existing or new e-business idea.

MGMT 6082. New Business Development. (4 cr.; A-F only) Understanding how to develop a new business; analyzing the opportunities and managing the constraints; structuring the venture, obtaining the resources, and writing the business plan; course covers main factors needed to start a successful business—the key operations,

MGMT 6804. Management of Groups. (2 cr.; A-F only; Every Fall, Spring & Summer) Factors that influence performance and well-being of groups in organizations. Group dynamics, norms, culture, structure, leadership, decision-making, and problem-solving. Managing dynamics, learning, performance, and creativity of groups. Intergroup relations, incentives, and effect of environment.


MGMT 6100. Topics in Management. (2-4 cr.; max 8 cr.; A-F only; Periodic Fall & Spring) Topics vary. prerequisite: CSOM grad student or instr consent.

MGMT 6101. Independent Study in Strategic Management and Organization. (1-8 cr.; max 16 cr.; A-F or Audit; Every Fall, Spring & Summer) Students contract with faculty on independent studies. prerequisite: instr consent or dept consent.

MGMT 6110. Managing People and Organizations. (2 cr.; A-F only; Every Fall & Spring) Behavioral science theory of employee behavior in organizations. Theory applied to practical situations. Motivation, cultural differences in management, ethical dilemmas, decision-making, leadership, timing. prerequisite: MBA student.

MGMT 6305. The International Environment of Business. (4 cr.; A-F only; Every Fall, Spring & Summer) Introduction to international trade/finance theory and political economy. Institutional governance of international trade/monetary policy, differences in political-economic/sociocultural systems, implications for managerial decision-making. prerequisite: MBA student.

MGMT 6402. Integrative Leadership: From Theory to Practice. (3 cr.; A-F only; Every Spring) Seminar. Strategic challenges linking business, government, and society locally/globally. Co-led by faculty from Carlson and Humphrey Schools. International network of leaders/organizations participate. Case studies as part of capstone projects. prerequisite: MBA student.

MGMT 6410. Corporate Responsibility. (2 cr.; A-F only; Every Fall) Managing with appreciation for corporate responsibility. Corporate responsibility/how executives think about it. Factors that make assessing corporate responsibility complex. Need for business leaders to understand/make choices with respect to corporate responsibility issues. prerequisite: MBA 6300, CSOM grad student.

MGMT 8101. Theory Building and Research Design. (4 cr.; Student Option; Periodic Spring) Problem formulation, conceptual modeling, theory building, and research design in the social and behavioral sciences. prerequisite: Business admin PhD student or instr consent.

MGMT 8201. Foundations of Business, Government, and Society. (4 cr.; Student Option; Periodic Fall) Considers works in political and legal philosophy, ethics, and economics. prerequisite: Business admin PhD student or instr consent.

MGMT 8202. Seminar in International Management. (4 cr.; Student Option; Periodic Fall & Spring) Overview of the field of international management research. prerequisite: Business admin PhD student or instr consent.

MGMT 8204. Topics in BGS - I. (2 cr.; A-F or Audit; Periodic Fall) Topics vary. prerequisite: PhD student or instr consent.

MGMT 8205. Topics in Business, Government, and Society II. (2 cr.; A-F or Audit; Periodic Fall) Topics vary. prerequisite: PhD student or instr consent.

MGMT 8301. Seminar in Organizational Behavior. (4 cr.; Student Option; Periodic Fall & Spring) Major theories and current research on individual behavior and group processes in organizations from a micro perspective. prerequisite: Business admin PhD student or instr consent.

MGMT 8302. Seminar in Organizations Theory. (4 cr.; Student Option; Periodic Fall & Spring) Major theories and current research on organizational and interorganizational topics from a macro perspective. prerequisite: Business admin PhD student or instr consent.

MGMT 8304. Topics in Organizations I. (2 cr.; A-F or Audit; Periodic Fall & Spring) Topics vary. prerequisite: PhD student or instr consent.

MGMT 8305. Topics in Organizations II. (2 cr.; A-F or Audit; Periodic Fall & Spring) Topics vary. prerequisite: PhD student or instr consent.

MGMT 8401. Seminar in Strategy Content. (2-4 cr.; Student Option; Periodic Fall & Spring) Review of research in strategy formulation. prerequisite: Business admin PhD student or instr consent.

MGMT 8402. Seminar in Strategy Process. (4 cr.; Student Option; Periodic Fall & Spring) Examines research on process by which strategy is formulated and implemented in firms. prerequisite: Business admin PhD student or instr consent.

MGMT 8403. Strategy Seminar. (4 cr.; Student Option; Every Fall & Spring) Strategic management. Topics vary. prerequisite: Business admin PhD student or instr consent.

MGMT 8404. Topics in Strategy I. (2-4 cr.; max 8 cr.; A-F or Audit; Spring Even Year) Topics vary. prerequisite: PhD student or instr consent.

MGMT 8405. Topics in Strategy II. (2-4 cr.; max 8 cr.; A-F or Audit; Spring Even Year) Topics vary. prerequisite: PhD student or instr consent.

MGMT 8501. Seminar in Entrepreneurship. (4 cr.; A-F only; Every Fall) This seminar provides a broad introduction to the field of entrepreneurship. It helps students develop the skills and knowledge needed to conduct their own research within this domain. It introduces them to the theoretical and empirical foundations of the field of entrepreneurship as a scholarly discipline. It will familiarize students with key debates in the field. It will also sharpen students' conceptual and analytical skills, and help them develop their research agenda.

MGMT 8892. Readings in Management Theory and Administration. (1-8 cr.; max 16 cr.; A-F only; Every Fall & Spring) Intensive research on a management topic; major term paper. prerequisite: Business admin PhD student or instr consent, adviser consent.

MGMT 8894. Graduate Research in Management Theory and Administration. (1-8 cr.; max 16 cr.; A-F only; Every Fall, Spring & Summer) Research project on a management problem of interest to student; may be completed in cooperation with a business firm. prerequisite: Business admin PhD student or instr consent, adviser consent.

Management of Technology (MOT)

MOT 4001. Leadership, Professionalism and Business Basics for Engineers. (2 cr.; A-F only; Every Fall & Spring) Elements of business, environment in which technology/business operate. Classes of 15 to 20 students.

MOT 4010. Management of Science and Technology in the Middle East, Global Seminar. (GP; 3 cr.; A-F only; Every Spring)
MOT 5001. Technological Business Fundamentals. (2 cr.; A-F only; Every Fall) Basics of operations, strategy, decision-making in technology-driven business. Market opportunity assessment, finance/financial decision-making, organizational roles. Work in teams to analyze aspects of business opportunity. PreReq: Degree seeking or non-degree graduate students.

MOT 5002. Creating Technological Innovation. (2 cr.; A-F only; Every Spring) Course provides students with techniques to create new ideas, and lead an organization to bring them successfully to market. It will include examples of the dynamics of technological industries, and technology strategy. Topics include effective practices to generate ideas, processes to move idea to market, and intellectual property. Students will work in teams to develop a strategy to commercialize a new technology. PreReq: Degree seeking or non-degree graduate students.

MOT 5003. Technological Business Planning Workshop. (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Applies lessons of 5001 or 5002 directly to technology of the student’s choosing, possibly thesis topic. Aspects of strategic technology plan or business plan, culminating in presentation of plan. Must be taken in parallel with 5001 or 5002. PreReq: Degree seeking or non-degree graduate students. Student must also enroll for MOT 5001 or MOT 5002.

MOT 5224. Introduction to Technological Leadership and Management: Assessing Emerging and Pivotal Technologies. (1 cr.; A-F only; Every Fall) Selected emerging technologies expected to play key roles in future industrial development.

MOT 5991. MOT Independent Study. (1-3 cr. [max 1 cr.; S-N or Audit; Periodic Fall] Independent study in MOT-related topic. PreReq: Grad MOT student.

MOT 8111. Operations Management for Competitive Advantage. (1.5 cr. [max 2 cr.; A-F or Audit; Every Spring]) Overview of operations functions. Impact of operation management on a firm’s competitiveness and network of trading partners. Key relationships between operations and other value chain functions. Integrating operations decisions to achieve objectives.

MOT 8112. Management Accounting. (1.5 cr. [max 2 cr.; A-F or Audit; Every Fall]) Introduction to methods for estimating/analyzing product costs and for using cost information to make product mix and pricing decisions. Cases from technology-oriented firms illustrate principles of activity-based costing. Uses of cost data in managerial decision making, budgeting/control, and financial statement analysis. PreReq: Grad MOT major.

MOT 8113. Operations Management for Competitive Advantage. (1.5 cr. [max 2 cr.; A-F or Audit; Every Spring]) Overview of operations functions. Impact of operation management on a firm’s competitiveness and network of trading partners. Key relationships between operations and other value chain functions. Integrating operations decisions to achieve objectives.

MOT 8114. Strategic Technology Analysis. (2 cr.; A-F only; Every Fall) Technology, its creation, history, and dynamics/interaction with economics, industry, and society. Role of technology in business and management. Tools/techniques for analysis of technologies. Emerging technologies, their significance. PreReq: Grad MOT major.

MOT 8121. Managing Organizations in a Technological Environment. (2 cr.; A-F or Audit; Every Fall & Spring) General management principles for organizations, people, and business systems in technology-intensive industries. Application of managerial approaches to project, business, and corporate levels of organizations and to demands entrepreneurial/established technology firms. PreReq: Grad MOT major.


MOT 8183. Communication in a Technical Environment. (2 cr.; A-F or Audit; Every Fall & Spring) Oral and written communication. Introductory and specialized workshops on topics such as presentation skills, memo and report writing, listening skills, and visual aid design and integration. PreReq: Grad MOT major.


MOT 8213. Macroevironment of Technology. (2 cr.; A-F or Audit; Every Fall & Spring) Development of scenarios of anticipated social, political, governmental, and economic forces affecting technological change. Use of scenarios to respond to industry threats, opportunities, and uncertainties. Corporate strategies, including building alliances for global competitiveness. PreReq: Grad MOT major.

MOT 8214. Technology Foresight and Forecasting. (2 cr.; A-F only; Every Fall) Tools/techniques for technology forecasting, assessment, and strategic foresight for decision making in business/government. Technology dynamics, R&D strategy, portfolio management, resource allocation. PreReq: Grad MOT major.


MOT 8224. Pivotal Technologies. (2 cr.; A-F or Audit; Every Fall) Technologies expected to play pivotal roles in future industrial development. State-of-the-art for each technology. Barriers/opportunities for commercialization. Guest expert lectures. Students analyze potential applications of technologies to industry. PreReq: Grad MOT major.

MOT 8231. Managing Information Resources in Technology-based Organizations. (1 cr.; A-F or Audit; Every Fall & Spring) Managing information resources/technology in an organization where technology is a critical part of value chain. Database management systems, electronic commerce. Managerial issues: strategic planning for IT/IS, infrastructure, outsourcing, competitive value, implementation. PreReq: Grad MOT major.

MOT 8232. Managing Technological Innovation. (2 cr.; A-F or Audit; Every Spring) How technological innovation is important to business success, can be managed, and may drive business strategy. Organizational dynamics of innovation, how it may be enhanced. Bringing innovations to marketplace in existing businesses and new ventures.


MOT 8234. Capstone Project. (0.5-2 cr.; A-F or Audit; Every Fall, Spring & Summer) Applied research activity, specifically related to management of technology, in cooperation with participant’s home organization. Working with a faculty adviser and work mentor, students address an industry-based management of technology project, venture, process, or challenge. Formal presentation to capstone committee is required. PreReq: Completion of two semesters, grad MOT major.
MOT 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall & Summer) (No description) prereq: Master's student, adviser and DGS consent

MOT 8500. Innovation Leadership and Organizational Effectiveness. (; 0.5-2 cr.; A-F only; Every Fall & Spring)
Made up of four credit units that unfold over four semesters of MOT program. Building talent, organizational capability, culture needed to execute innovation strategy. prereq: MOT major

MOT 8501. Leading Individual & Teach Performance. (1 cr.; A-F only; Every Fall) MOT grad student

MOT 8502. Innovation Leadership and Organizational Effectiveness. (1 cr.; A-F only; Every Fall) The MOT 8501 and 8502 sequence provides emerging and mid-career technology professionals with the leadership mindset, tool set, and skill set needed to focus, align, and engage multi-disciplinary individuals and teams in translating technology assets and foresight into customer solutions that generate profitable growth. MOT 8502 explores the role of outstanding leaders as developers of innovation strategy and architects of the organizational capability and team commitment needed to execute strategic choices. Emphasis is placed on principles and practices that help leaders focus on the right strategies, build the organizational capability required to execute a strategy, foster continuous improvement in individual and business performance, and lead change initiatives to sustain commitment versus compliance across diverse stakeholders. Students will practice improving their team effectiveness and develop a change leadership plan to support implementation of a key business initiative.

MOT 8900. Conflict Management. (; 0.5 cr.; Student Option; Every Fall) Theory and methods for applying conflict management techniques in organizations. Cooperative and competitive models of conflict, basics of bargaining, conflict strategies, communication styles, listening skills, dispute resolution, third-party mediation, and use of computers for conflict mediation. prereq: Grad MOT major

MOT 8910. Corporate Responsibility. (; 1 cr.; A-F or Audit; Every Fall & Spring) Principles of stakeholder management. Ethical framework for responsible management of investors, employees, suppliers, customers, and external community. Moral leadership, trust in organizations, and quality control. New metaphors and techniques for managing the socially responsible organization. prereq: Grad MOT major

MOT 8920. Science and Technology Policy. (; 1.5 cr.; A-F or Audit; Every Fall) Role of government in science/technology. Impact of policy on economy/society. Ways companies/individuals may influence science/technology policy. Technology-related public policy in the United States, elsewhere. prereq: MOT grad student

MOT 8921. Global Management of Technology. (0.5 cr.; A-F only; Every Spring) Global management of technology. prereq: MOT student

MOT 8930. Topics in Emerging Technologies. (; 0.5 cr.; S-N or Audit; Every Spring) Invited speakers give half- or full-day seminars on special topics in emerging technologies (e.g., energy systems, tissue engineering, thermal spray coating technology). prereq: MOT grad student

MOT 8940. Managing Intellectual Property. (0.5 cr.; S-N only; Every Spring) Characteristics of Intellectual Property (IP), its role in technology enterprises. Law of patents, trade secrets, trademarks, copyrights, know-how and other IP. Effect of IP rights acquisition and asset valuation on company competitiveness. IP protection/licensing strategy. prereq: MOT grad student

MOT 8950. International Management of Technology Project. (; 1.5 cr.; A-F or Audit; Every Spring) On-site residency in international locations for up to two weeks. Visits to local, technology-intensive companies. Lectures/discussions with company executives, government officials, and university faculty. Comparative analysis of management of technology concepts/issues in an international business context: social, economic, cultural, and governmental perspectives. Written assignment required. prereq: MOT grad student

Managers Communications (MCOM)

MCOM 5400. Managerial Communications for the HR Professional. (; 2 cr.; A-F only; Every Fall & Spring) Memo writing, oral presentations, and team communication required of HR professional. Emphasizes hands-on, experiential learning, including videotaping. prereq: HRIR student

MCOM 5500. Enhancing Your Executive Image in Business Communications. (2 cr. [max 4 cr.]; A-F only; Every Fall) Techniques to project executive presence in all business communications. prereq: MBA student

MCOM 5510. Persuasive Writing in Business. (; 2 cr.; A-F only; Periodic Fall) Writing to motivate, effect change. Form/content. Techniques of persuasion. Producing polished text. Writing with power. prereq: MBA student

MCOM 5530. Strategies and Skills for Managerial Presentations. (; 2 cr.; A-F only; Periodic Fall) Delivering key messages with clarity/confidence, regardless of audience or setting. Maximizing impact as a speaker, seated/standing. Personal communication style and audience. Tailoring message. Handling questions/answers. Using audio/visual tools. Presenting as a team. prereq: MBA student

Manufacturing Operations Mgmt (MM)

MM 3001W. Manufacturing in the Global Economy. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Manufacturing operations in today's rapidly changing global economy should function at the intersection of three important dimensions to achieve sustainable profitability: leadership, product quality, and innovation. Additional topics include systems, process improvement, supply chain management, regulatory affairs, and technology to manage change. Because clear, professional communication is essential to operate in the high-performance zone, the course also focuses on the role of writing and the writing process.

MM 3205. Engineering for Manufacturing Operations. (; 3 cr.; A-F or Audit; Every Fall & Spring) Foundational mechanical, electrical, industrial, and manufacturing engineering concepts/techniques essential to manufacturing operations management. Collaborating with other functional departments in enterprise to develop and maintain effective/efficient manufacturing operations. Production strategies for quality, safety, and time/cost efficiency. Allocation of resources, productivity, cost analysis. prereq: 30 cr

MM 3305. 3D Printing and Additive Manufacturing. (3 cr.; A-F or Audit; Every Fall & Spring) Overview of different types of 3D printing technology/operational requirements for setting up/running innovative manufacturing program using additive manufacturing (3D printing) rather than traditional subtractive manufacturing. Basics of process.

MM 4011. Design of Manufacturing Systems and Simulations. (; 3 cr.; A-F or Audit; Every Spring) Flow lines, assembly systems, cellular manufacturing, flexible manufacturing, automated systems. Facility layout, scheduling, batch sizing, group technology, bottleneck management. Modeling/analysis tools, including computer simulation/operations. prereq: 3901 or manufacturing experience

MM 4012. Manufacturing Processes and Technology. (; 3 cr.; A-F or Audit; Every Fall & Spring) Overview and modeling of commonly used core manufacturing processes. Process descriptions, process capabilities and performance, process models relating process parameters to part/process characteristics, process and quality control methods consistent with ISO9001 requirements. prereq: 3001 or manufacturing experience

MM 4035. Global Supply Chain Management. (; 3 cr.; A-F or Audit; Every Fall) Technology/processes to manage operations/quality accurately and real-time in global business environment. Supplier selection, costs of procurement, risk, time management,
out sourcing. Current issues/trends. prereq: 4102 or ABUS 4102 or professional experience

**MM 4039. Manufacturing Outsourcing Decisions.** (2 cr.; A-F or Audit; Every Spring)
Strategies to evaluate/make business decisions related to outsourcing product or manufacturing process. How to assess risks associated with outsourcing. How to maintain control of key supply chain factors for delivery of quality/value.

**MM 4045. Regulated Industry Compliance.** (3 cr.; A-F or Audit; Every Spring)
High tech industry compliance with government regulations, using medical tech sector: agencies, regulations/standards, compliance strategy, challenges, processes/controls, costs/risk/ethics, tracking/analysis/reporting. Product development and compliance systems for design, regulatory, quality, facilities/equipment, materials, packaging/labeling. prereq: 3001 or manufacturing experience

**MM 4102. Manufacturing Operations.** (3 cr.; A-F or Audit; Every Fall)
Concepts/principles related to operation of functions. Operations strategy, process design, just-in-time inventory management, forecasting, scheduling, quality improvement. Relationships between operations and environment. prereq: 3001, 45 cr

**MM 4201. Quality Engineering and Process Improvement.** (3 cr.; A-F or Audit; Every Fall)

**MM 4311. Sustainable Lean Manufacturing.** (2 cr.; A-F or Audit; Every Fall & Spring)
Sustainability and lean practices in manufacturing operations. Topics include concepts. History; metrics for auditing/improving processes. Product, operations, and supply chain planning. Communicating value/results. Impact on business, environmental, and social value. prereq: 3001, 45 cr

**MM 4501. Capstone.** (3 cr.; A-F or Audit; Every Spring)
Capstone project in consultation with faculty advisor/instructor. Independent investigation of manufacturing subject/challenge. prereq: MM major or minor or certificate or instcr consent

**MM 4550. Special Topics in Manufacturing.** (1 cr. [max 3 cr.]; A-F or Audit; Every Fall & Spring)
Seminar. Timely issues/themes in manufacturing.

**MM 4596. Internship.** (1-4 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Internship project in consultation with faculty advisor. Internship is hands-on learning experience in professional manufacturing setting. prereq: [MM major or minor or certificate or instcr consent], dept consent

### Manufacturing Technology (MT)

**MT 3111. Elements of Microelectronic Manufacturing.** (3 cr.; A-F only; Every Spring)
Common micro fabrication processes, how they are applied to CMOS manufacturing. prereq: Completion of physics, chemistry, college algebra or precalculus, with grade of at least C-, 45 sem cr

**MT 3112. Elements of Micro and Nano Manufacturing Laboratory.** (1 cr.; A-F only; Every Spring)
Basic process steps to make top-down micro/nano-scaled structures. Oxidation, photolithography, electron beam lithography, chemical vapor deposition, etching, rapid thermal annealing, wet chemical/plasma etching. Students build test chip containing various micro-mechanical structures. prereq: concurrent registration is required (or allowed) in 3111

**MT 3121. Thin Films Deposition.** (3 cr.; A-F only; Every Spring & Spring)
Thin film materials such as metals/oxides. Photolithography, methods of deposition. HV/UV range. Vacuum evaporation, sputtering, chemical vapor deposition. prereq: Physics, chemistry, college algebra or precalculus, 45 cr

**MT 3131. Introduction to Materials Characterization.** (4 cr.; A-F only; Every Spring)
Four methods: electron beam microscopy, optical microscopy/FTIR, proximal probe techniques, x-ray/ion beam scattering. Principles for, and information from, each method. prereq: Completion of physics, chemistry, college algebra or precalculus, with grade of at least C-, 45 sem cr

**MT 3141. Principles and Applications of Bionanotechnology.** (4 cr.; A-F only; Every Spring)
Introduction to protein, lipid, and nucleic biochemistry. Biomolecule design, production using recombinant DNA technology. Use in nanodevices and nano-materials. Applications of biological molecules in bionanotechnology. Effects of Brownian motion. Biomolecular surfaces forces. Biomolecule structure alterations due to molecular interaction. Self-assembly. prereq: Completion of physics, chemistry, college algebra or precalculus, with grade of at least C-, 45 sem cr

**MT 3142. Nanoparticle Technology and Engineering Laboratory.** (1 cr.; A-F only; Every Spring)
Overview of challenges and tools for measuring properties of nanoaerosols. Optical particle counters, condensation particle counters, differential mobility analysis, electrosprays, atomizers, single-particle mass spectrometers. prereq: Completion of physics, chemistry, college algebra or precalculus, with grade of at least C-, 45 sem cr

### Marketing (MKTG)

**MKTG 3001. Principles of Marketing.** (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Introduction to terms, concepts, and skills for analyzing marketing problems. Factors outside the organization affecting its product, pricing, promotion, and distribution decisions. Cases from actual organizations. prereq: ECON 1101

**MKTG 3010. Marketing Research.** (4 cr.; A-F or Audit; Every Fall & Spring)
Methods for collecting/analyzing data to solve marketing problems. Research design, secondary/primary data collection, sample design, data analysis. prereq: MKTG 3001, [SOC 2550 or equiv statistics course]

**MKTG 3040. Buyer Behavior.** (4 cr.; A-F or Audit; Every Fall & Spring)
Application of behavioral sciences to buying behavior. Perception, attitudes, learning, persuasion, motivation, decision-making, social/cultural influences, managerial implications. prereq: MKTG 3001, [3010 or concurrent registration is required (or allowed) in 3010]

**MKTG 4030. Sales Management.** (4 cr.; A-F or Audit; Every Fall & Spring)
Hiring, motivating, performance enhancement. Customer relationship management, data analysis, quantitative methods. Developing metrics to evaluate individual/group performance in attaining an organization's strategic goals. prereq: MKTG 3001, 3010, 3040

**MKTG 4050. Advertising and Promotion.** (4 cr.; A-F or Audit; Every Fall & Spring)

**MKTG 4060. Marketing Channels.** (4 cr.; A-F or Audit; Every Fall & Spring)
Design/management of channels of distribution in consumer/industrial settings. Interrelationships between marketing institutions in channels of distribution. Logistics, supply chain strategies. prereq: MKTG 3001, 3010, 3040

**MKTG 4080W. Marketing Strategy.** (WI; 4 cr.; A-F or Audit; Every Fall & Spring)
Determining product markets where organizations should compete based on abilities to create/maintain competitive advantage. External environment of business. Constructing/evaluating global marketing strategies. Largely case-based. prereq: MKTG 3001, 3010, 3040, 12 cr in marketing, sr

**MKTG 4082W. Brand Management.** (WI; 4 cr.; A-F only; Every Fall & Spring)

**MKTG 4090. Marketing Topics.** (2-4 cr.; [max 8 cr.]; A-F or Audit; Every Spring)
Selected topics and problems of current interest considered in depth. Class discussion, projects.
MKTG 6020. Advanced Logistics and Supply Chain Management. (2 cr.; A-F only; Every Fall & Spring)
Analyzes flow of physical product through channels and supply chains. Linkages between process of controlling physical flows, major functions of firm (e.g., finance, marketing, operations). Managing logistical interactions between firms to develop integrative supply chain management strategy. Simulation exercise. prereq: MBA 6210, MBA student

MKTG 6051. Marketing Research. (4 cr.; A-F only; Every Fall & Spring)
Methods for collecting/analyzing data to solve marketing problems. Survey research techniques. Research design, secondary/primary data collection, sample design, data analysis. Application of techniques to marketing problems, marketing research projects. prereq: MBA 6210, MBA student

MKTG 6055. Buyer Behavior. (4 cr.; A-F only; Every Fall & Spring)
Application of behavioral sciences to understanding buyer behavior. Perceptions, memory, affect, learning, persuasion, motivation, behavioral decision theory, social/cultural influences, managerial implications. Emphasizes class discussion. prereq: MBA 6210, MBA student

MKTG 6060. Distribution and Supply Chain Systems. (4 cr.; A-F only; Every Fall & Spring)
Interrelationships between marketing institutions, their formation into channels of distribution. Interorganizational problems, design/management of distribution channels. Supply chain strategies as means of achieving competitive advantage. prereq: MBA 6210, MBA student

MKTG 6065. Strategic Supply Chain Management. (2 cr.; A-F only; Every Spring)
Internal/inter-organizational design, strategic sourcing, alliances/partnerships, impact of technology on supply chain effectiveness. Managing flows, creating/sharing customer value, measuring competitive impact from supply chain excellence. prereq: [8060 or OMS 6056, or IDSc 6442 or IDSc 6423], 2nd yr MBA student

MKTG 6072. International Marketing. (4 cr.; A-F only; Periodic Fall & Spring)
Managing international marketing functions. Identifying marketing-based international business opportunities. Cultural factors in buyer behavior. Constructing/evaluating global/culturally adjusted marketing strategies. prereq: MBA 6210, MBA student

MKTG 6073. Technology Marketing. (2 cr.; A-F only; Every Spring)
Frameworks for marketing in high-tech contexts. Technology adoption, product development, life cycles, networks and standards, organizations, alliances, acquisitions, and market entry. prereq: [MBA 6210 or equiv], MBA student] or dept consent

MKTG 6075. Pricing Strategy. (4 cr.; A-F only; Every Fall & Spring)
Framework for assessing pricing decisions. Pricing in business-to-business markets, consumer goods markets, services, and not-for-profit companies. prereq: MBA 6210, MBA student

MKTG 6078. Advertising & Promotion. (4 cr.; A-F only; Every Fall & Spring)
Managing communication. Advertising, sales promotion, public relations, direct marketing. Setting communications objectives and budgets, media selection, creative strategy, sales promotion techniques. prereq: MBA 6210

MKTG 6080. Internet Marketing. (2 cr.; A-F only; Every Fall)
Concepts, processes, decisions associated with marketing through the Internet. Emphasizes profitability. Customer persuasion, building a customer base digitally, pricing, customer retention, channel/distribution issues. prereq: MBA 6210, MBA student

MKTG 6082. Brand Management. (4 cr.; A-F only; Every Spring)
Management of brands/brand equity in modern business enterprises. Measuring brand equity. Building brand equity. Leveraging brand equity through brand extensions/alliances. Lectures, case studies, group brand projects. prereq: MBA 6210, MBA student

MKTG 6084. Persuasion and Influence. (2 cr.; A-F only; Every Summer)
Successful marketers, leaders and communicators must not only make the right decisions-they must also influence others. Successfully managing other people depends on managing the influence process. Doing this effectively requires understanding the psychology of persuasion. This course is about the science of influence & persuasion. Through deeper understanding of human psychology, you will learn scientifically-tested and practical tools to become more influential in your dealings with consumers, clients, coworkers, & managers. Through a mix of lecture, discussion, reading, reflection, and experiential exercises, you will master the tools to be able to mobilize others by strategically crafting your communications. prereq: MBA 6210, MBA student

MKTG 6085. harnessing Consumer Irrationality. (2 cr.; A-F only; Periodic Fall, Spring & Summer)
People do surprising and funny things. Business leaders, policy makers, and scientists long have been interested in why people do what they do, and for a long time that interest has fallen under the rubric of a ?rational man? model. It is now clear that the rational model is imperfect, at best. This course takes a look at the less rational side of life, studying the shortcuts, the low road, and the error-prone processes that enable people to feel, decide, and act efficiently ? despite costs to rationality. For most of the past 200 years, most of what organizations, politicians, and well-meaning people did in order to make consumers change their behavior consisted of what might be called ?shoves??heavily-handed, choice-restricting, highly-incentivized, information-dense treatments that basically told consumers what to do (or else!). Those, by and large, do not work. Not only do they not work, they are costly and can even make the unwanted behavior emerge even more than before the shove by creating boomerang or counterproductive effects.

MKTG 6086. Digital Marketing. (2 cr.; A-F only; Periodic Fall & Spring)
Marketing practices have dramatically shifted with the rise of social media and the proliferation of devices, platforms, and applications. This rapidly changing environment presents new opportunities and challenges for marketers. Through a combination of case studies, best practice examples, current news items, and assignments, students learn how the elements of a digital strategy work together with traditional media to attract prospective customers. Specifically, students learn best practices for social media marketing, content marketing, organic and paid search, search engine optimization, e-mail marketing, landing pages and display advertising. Students discuss strategies for reputation management in a world where information is disseminated virally and discover how social media monitoring and data analysis can be used to improve marketing and product development activities. The importance of establishing digital marketing goals and analytics is covered as well as how to measure return on investment for digital activities.

MKTG 6088. Strategic Marketing. (2 cr.; A-F only; Every Fall, Spring & Summer)
Determining product-markets where organization should compete. Sustainable competitive advantage. Matching marketing strategy with environment. Coordinating marketing, other business functions. Organizing marketing function/management. prereq: MBA 6210, MBA student

MKTG 6090. Marketing Topics. (1-4 cr.; A-F only; Every Fall, Spring & Summer)
Selected topics/problems of current interest considered in depth. prereq: MBA 6210, MBA students

MKTG 6101. Independent Study. (1-4 cr.; [max 8 cr.]; A-F only; Periodic Fall & Spring) Independent directed reading/research.

MKTG 6801. Independent Study. (1-8 cr.; A-F or Audit; Every Fall, Spring & Summer)

MKTG 8809. Consumer Behavior Research Methods. (2 cr.; A-F or Audit; Periodic Fall & Spring)
Seminar. Topics related to conceptual theories/arguments about experimental design and statistical analysis of experiments. How to design experimental research for testing hypotheses and drawing conclusions. prereq: Doctoral student or [masters program student, instr consent]

MKTG 8810. Consumer Behavior Special Topics. (2 cr.; [max 8 cr.]; A-F or Audit; Periodic Fall & Spring)
Theories of consumer categorization. Literature on brand categories, category measurement, brand extensions/dilution/affect. Readings from branding literature. Theoretical analysis. prereq: Doctoral student or [master's program student, instr consent]
MKTG 8811. Consumer Attitudes and Persuasion I. (2 cr.; Student Option; Fall Odd, Spring Even Year)
Reading, discussing, and evaluating theories of consumer attitudes and persuasion. Theoretical analysis, rather than practitioner focus. prereq: [MBA 6210 or equiv], Business admin PhD student or instr consent

MKTG 8812. Consumer Attitudes and Persuasion II. (2 cr.; A-F or Audit; Fall Odd, Spring Even Year)
Science of persuasion. Principles of stickiness--universal principles that lead messages to succeed rather than fail. Principles of influence--universal psychological principles that motivate a person to say "yes." prereq: Doctoral student or instr consent

MKTG 8813. Consumer Judgment and Decision Making I. (2 cr.; A-F or Audit; Periodic Fall & Spring)
Different theoretical approaches taken in judgment and decision-making research. Heuristics/biases affect in decision making, judgments/decisions over time. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8814. Consumer Judgment and Decision Making II. (2 cr.; A-F or Audit; Periodic Fall & Spring)
Draws from work on prospect theory and its derivatives. Anomalous choice. Emphasizes applications on top of Marketing theory, from inter-temporal choice to regret and counterfactual thinking in consumers/managers. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8831. Seminar: Inter-Organizational Relations. (4 cr.; Student Option; Periodic Fall & Spring)
From an efficiency perspective, inter-organizational networks involved in task of moving goods and services from point of production to point of consumption. Literature covering the functional, institutional, analytical, and methodological traditions, as well as the behavioral school of thought and transaction cost and relational contracting. prereq: MBA 6210 or equiv, Business admin PhD student or instr consent

MKTG 8842. Quantitative Modeling I. (2-4 cr.; A-F or Audit; Periodic Fall & Spring)
Advanced readings seminar. Quantitative research in marketing. Topics from theoretical/empirical research in marketing, econometrics, and industrial organization. Classic/contemporary articles. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8843. Quantitative Modeling II. (2 cr.; A-F or Audit; Periodic Fall & Spring)
Advanced readings seminar. Quantitative research in marketing. Topics from theoretical/empirical research streams in marketing, econometrics, and industrial organization. Classic/contemporary articles. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8851. Seminar: Marketing Management and Strategy I. (2 cr.; Student Option; Periodic Fall & Spring)
Topics in marketing management and formulation and implementation of marketing strategies. Diversity of thought, within marketing and strategic management literature. prereq: [MBA 6210 or equiv], Business admin PhD student or instr consent

MKTG 8852. Marketing Management & Strategy II. (2 cr.; Student Option; Periodic Fall & Spring)
PhD seminar. Role of branding within the organization, its business strategy, and its success. Brand management. Critically evaluate fundamental ideas and more recent developments. prereq: Business admin PhD student or instr consent

MKTG 8890. Seminar: Marketing Topics. (1-4 cr. [max 8 cr.]; Student Option; Periodic Fall & Spring)
Current topics and problems of interest in depth. Topics vary with each offering. prereq: Business admin PhD student or instr consent

MKTG 8892. Readings in Marketing. (1-8 cr. [max 16 cr.]; Student Option; Every Fall & Spring)
Readings useful to student's individual program and objectives that are not available in regular courses. prereq: MBA 6210 or equiv, Business admin PhD student or instr consent

MKTG 8894. Graduate Research in Marketing. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer)
Individual research on an approved topic appropriate to student's program and objectives. prereq: MBA 6210 or equiv, Business admin PhD student or instr consent

Master of Business Admin (MBA)

MBA 5200. Directed Studies for Curricular Practical Training (International Full-Time MBA Students Only). (1-3 cr.; S-N only; Every Fall & Spring)
CPT is work authorization which allows a student to work in a job directly related to the student's major area of study before degree completion. prereq: International FT MBA student with approval from the MBA office

MBA 6030. Financial Accounting. (3 cr.; A-F only; Every Fall, Spring & Summer)
Basic principles of financial accounting, involving the conception/interpretation of corporate financial statements. prereq: MBA Student

MBA 6035. Managerial Accounting. (3 cr.; A-F only; Every Fall, Spring & Summer)
Cost systems introduced as potential sources of sustainable competitive advantage. Focuses on designing cost systems to provide manager with accurate, relevant, and timely information. prereq: 6030, 6230, MBA student

MBA 6108. Leading Self. (0-1 cr.; A-F only; Every Fall & Spring)

MBA 6110. Leading Others. (2 cr.; A-F only; Every Fall, Spring & Summer)
Achieving organizational goals by leading in ways that create motivation, engagement, commitment, positive social interactions, and job performance. Understanding and managing the characteristics of organizations, work groups, and individuals. The role of group dynamics, decision making, cooperation, conflict, and power in leading others.

MBA 6112. Leading Organizations. (0-0.5 cr.; max 1.5 cr.; A-F only; Every Fall, Spring & Summer)
Leverage leadership journey of full-time MBA program through Enterprise experience. Course integrated with work of MBA Enterprise teams as they set vision and strategy, translate strategy for optimal team functioning, and execute strategy for clients. Exercises, assessments, role-playing, discussions.

MBA 6120. Data Analysis and Statistics for Managers. (3 cr.; A-F only; Every Fall, Spring & Summer)
Concepts/principles of Business statistics, data analysis and presentation of results. Topics: exploratory data analysis, basic inferential procedures, statistical process control, time series/regression analysis, and analysis of variance. These methods are selected for their relevance to managerial decision making and problem solving. prereq: MBA student

MBA 6140. Managerial Economics. (0-2 cr.; A-F only; Every Fall & Spring)
How markets work, how positive economic rents (profits) are made, and how strategic behavior affects profits. Four major topical areas include market micro-structure, industrial structure, uncertainty, and incentives and firm governance. prereq: MBA student

MBA 6150. Managerial Communications. (1 cr.; A-F only; Every Fall)
Thinking strategically about communication. Writing/presentation skills. Communications best practices, guidelines from research/levels of experience. Opportunity to practice strenghten skills. prereq: MBA student

MBA 6210. Marketing Management. (3 cr.; A-F only; Every Fall, Spring & Summer)
Management of the marketing function; understanding the basic foundational marketing concepts and skills in strategy development and planning of operational and strategic levels pertaining to product offering decisions, distribution channels, pricing and communication. prereq: MBA student

MBA 6220. Operations Management. (3 cr.; A-F only; Every Fall, Spring & Summer)
Introduction to fundamentals of operations management principles and concepts. The course takes a strategic view of operations in both a manufacturing and service context and stresses linkages to other functional areas. Many of the cases in the course take an international perspective. prereq: MBA student

MBA 6230. Financial Management. (3 cr.; A-F only; Every Fall, Spring & Summer)
Tools/concepts of financial management. Emphasize use by financial/non-financial managers to measure creation of value within an organization. Evaluating business/ business opportunities, identifying financial requirements/sources. prereq: 6030, MBA student

**MBA 6235. Managerial Accounting.** (2 cr. [max 3 cr.]; A-F only; Every Fall, Spring & Summer)

Cost systems introduced as potential sources of sustainable competitive advantage. Course focuses on designing cost systems to provide manager with accurate, relevant, and timely information. Taught as part of an integrated functional core. prereq: MBA student

**MBA 6240. Competing in a Data-Driven Digital Age.** (2 cr. [max 3 cr.]; A-F only; Every Spring)

Contemporary managers must understand how the convergence of mobility, analytics, social media, cloud computing, and embedded devices are transforming firms, industries, markets and society. Using the foundation of data-driven business analytics, this course provides tools and frameworks for competing in the digital age. Students will learn general state-of-the-art analytics skills in the context of new platform based business models, digital search, big-data, social networks, social media and open innovation that pervade competition in the digital age. These will include the fundamentals of predictive modeling, large scale A/B testing, social networks analysis and an exposure to the work-horse tools of data-driven classification and prediction to explore patterns in rich datasets (such as k-nearest neighbors, classification trees and the design of recommendation systems). While this course will use case studies in the digital domain, the methods taught here have a wide range of applicability across functions and verticals in modern business environments. prereq: FT MBA student

**MBA 6300. Strategic Management.** (3 cr. [max 4 cr.]; A-F only; Every Fall & Spring)

Introduction to the concepts and techniques used to create and implement a sense of corporate direction; choices about products and markets that involve the integration of different functional areas; positioning a business to increase returns for shareholders and stakeholders; the skills involved in identifying issues, evaluating options, and implementing business plans. prereq: MBA student

**MBA 6315. The Ethical Environment of Business.** (2 cr. [max 3 cr.]; A-F only; Every Fall, Spring & Summer)

Analysis of ethical dilemmas and development of appropriate responses; relationship of ethical management to the law; implications for corporate profitability; managing shareholders vs. managing stakeholders; issues such as protection of the environment, workplace safety, product liability, regulation, and fiduciary obligations. prereq: MBA student

**MBA 6500. MBA Projects.** (2-4 cr. [max 6 cr.]; A-F only; Every Fall & Spring)

Interdisciplinary team approach to formulation/execution of an actual business problem. Teams work on problems currently faced by business, nonprofit, and government organizations in the Twin Cities metropolitan area. prereq: MBA student, instr consent

**MBA 6501. Carlson Funds Enterprise: Growth.** (2-4 cr. [max 12 cr.]; A-F only; Every Fall & Spring)

Lectures, assignments, modules. Hands-on real-money experience through Golden Gopher Growth Fund. prereq: MBA student or [approved to or accepted in] spring of 1st yr; [6031, ACCT 6100, ACCT 6160, MBA student, emphasis in finance mgmt] recommended

**MBA 6502. Carlson Funds Enterprise: Fixed Income.** (2-4 cr. [max 12 cr.]; A-F only; Every Fall & Spring)

Lectures, assignments, modules. Hands-on real-money experience through Golden Gopher Fixed Income Fund. prereq: [Applied to or accepted in] spring-A of 1st yr to begin in spring-B; [6031, ACCT 6100, ACCT 6160, MBA student, emphasis in finance mgmt] recommended

**MBA 6503. Carlson Ventures Enterprise.** (2-4 cr. [max 12 cr.]; Student Option No Audit; Every Fall & Spring)

Modeled after early-stage venture capital funds. Due diligence process. Starting/growing high-growth ventures. Exposure to University-based technologies, start-up companies, and experts. Business analysis/development. Assistance to non-University-based start-up companies seeking initial equity capital. prereq: MBA student, approved application, interview

**MBA 6504. Carlson Consulting Enterprise.** (2-4 cr. [max 12 cr.]; Student Option No Audit; Every Fall & Spring)

Connects cutting-edge ideas/technologies from classroom to real problems presented by clients. Students work collaboratively with clients to integrate strategy/technology. How to lead complex change initiatives. prereq: MBA student, approved application, interview

**MBA 6505. Carlson Brand Enterprise.** (2-4 cr. [max 12 cr.]; Student Option No Audit; Every Fall & Spring)

Students assist companies/organizations with marketing/brand challenges: apply theory, industry best practices. Work collaboratively in real-world environment. Critical thinking, applied marketing skills. prereq: MBA student, approved application, interview

**MBA 6600. Top Management Perspectives.** (1 cr.; S-N or Audit; Every Spring)

Brings students face-to-face with leading executives an entrepreneurs from throughout the nation. Values, attitudes, and skills for leadership. How personal characteristics and beliefs of leaders shape situations. prereq: MBA student

**MBA 6990. MBA Topics.** (2 cr. [max 8 cr.]; A-F only; Periodic Fall, Spring & Summer)

Various topics.

**Master of Business Taxation (MBT)**

**MBT 5200. Tax Accounting Methods and Periods.** (4 cr.; A-F or Audit; Every Fall)

Rules affecting timing of income and deductions for tax purposes. Examination of cash and accrual accounting methods on an overall basis and with respect to individual items of income and deductions; rules for changing accounting methods and periods; annual accounting and transactional concepts, including the claim of right doctrine, the Arrowsmith doctrine, and the tax benefit rule. prereq: ACCT 5135, MBT student

**MBT 5220. Tax Research, Communication, and Practice.** (4 cr.; A-F or Audit; Every Fall & Spring)


**MBT 5223. Tax-exempt Organizations.** (2 cr.; A-F or Audit; Spring Odd Year)

Tax law/issues concerning Section 501(c)(3) and other tax-exempt organizations. Qualification, procedures. Unrelated business income, private foundations (including intermediate sanctions), joint ventures, prereq: ACCT 5135

**MBT 5226. Negotiation Techniques in Taxation.** (2 cr.; A-F or Audit; Every Summer)

Hands-on approach. Applications from facilitating business sales, mergers, and acquisitions, to representing client’s position before IRS, to controlling TV remote. Negotiation process: planning, pre-negotiation preparation, strategy development.

**MBT 5230. Corporate Taxation I.** (2 cr.; A-F or Audit; Every Fall & Spring)


**MBT 5323. Mergers and Acquisitions I.** (2 cr.; A-F or Audit; Every Spring)

Different types of acquisitions, dispositions, reorganizations, and spin-offs involving C corporations. Tax consequences of acquisition to corporations/shareholders involved. Use of 338 elections, limitations on acquired net operating losses/credits, use of covenants not to compete, consulting agreements, deferred payment terms, treatment of transaction costs. prereq: 5230

**MBT 5333. Tax Aspects of Consolidated Returns.** (2 cr.; A-F or Audit; Every Summer)


**MBT 5335. Taxation of the Small Business Corporation.** (2 cr.; A-F or Audit; Every Summer)

Federal income taxation of S corporations. Election eligibility; termination of status;
MBT 5340. Taxation of Partners and Partnerships. (2 cr.; A-F or Audit; Every Spring)
Reviews tax consequences associated with formation, operation, and dissolution of a partnership. prereq: Acct 5135

MBT 5346. ASC 740 Computations and Analysis. (2 cr.; A-F or Audit; Every Fall & Spring)

MBT 5347. Tax Technology and Analytics Fundamentals. (2 cr.; A-F or Audit; Every Spring)
Tax technology is transforming the way tax departments are doing business in many amazing ways. Both public accounting firms and businesses are investing in people, process, data, and technology at a rapid pace. This course provides the student with relevant background on current technologies and associated challenges, managerial approaches, systems design, process, data challenges and risk assessment methods that are specific to the tax technology arena. Additionally, it will focus on the fundamental concepts of project management, business requirements, data analytics, implementation choices, and the necessary business cases that are being conducted in both the public and private sector.

MBT 5348. Advanced ASC 740 Concepts. (2 cr.; A-F or Audit; Spring Even Year)
Examination of topics under ASC 740 Accounting for Income Taxes. Share-based awards, uncertain tax positions, valuation allowances, business combinations, foreign operations, interim period tax calculations. Process design/perspective of stakeholders of income tax accounting. prereq: 5346

MBT 5350. Wealth Transfer I (Estates and Gifts). (2 cr.; A-F or Audit; Summer Even Year)

MBT 5353. Trusts and Estates. (2 cr.; A-F or Audit; Summer Odd Year)

MBT 5360. State and Local Taxation. (2 cr.; A-F or Audit; Every Fall & Spring)
Examines state levying of individual income, corporate income, property, sales, and excise taxes. Tax problems of businesses with multistate operations. prereq: Acct 5135, MBT student

MBT 5363. Compensation and Benefits. (2 cr.; A-F or Audit; Every Fall)
Federal income taxation of executive compensation, relevant fringe benefit programs. Benefit programs other than qualified retirement plans. Salary continuation, stock options, non-profit organization plans, health/welfare plans. prereq: ACCT 5135

MBT 5370. Taxation of Property Transactions. (2 cr.; A-F or Audit; Every Fall)
Determining realized gain or loss and recognized gain or loss, and tax treatment of that gain or loss on property dispositions. Consequences of property transactions including depreciation, depletion, basis, and capital gains problems. prereq: Acct 5135

MBT 5380. Tax Aspects of International Business I. (2 cr.; A-F or Audit; Every Fall)
Multinational business operations/transactions involving foreign income. Tax consequences of transactions with/by foreign organizations/companies. prereq: 5230

MBT 5381. Tax Aspects of International Business II. (2 cr.; A-F or Audit; Spring Even Year)
Foreign tax credit. Subpart F planning opportunities, international structuring (joint ventures, use of entity classification regulations). Transfer pricing, foreign currency. Legislative, regulatory, and judicial developments.

MBT 5382. Transfer Pricing. (2 cr.; A-F or Audit; Spring Odd Year)
Transfer pricing requirements facing multinational companies. Tax requirements of the United States and other countries that have adopted the "arm's-length standard" or the transfer pricing guidelines adopted by the Organization for Economic Cooperation and Development. Regulations, methods, economic models, pricing policies, transaction accounting, and management of audits of managing transfer prices within a multinational company. prereq: [5230, 5380] or equiv

MBT 5420. Current Topics in Taxation. (1-4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Tax research/compliance, other tasks. Students submit summary paper. prereq: ACCT 5135, MBT student

MBT 5500. Business, Government, and Economic Tax Policy. (2 cr.; A-F only; Every Fall & Spring)

MBT 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

Master of Development Practice (MDP)

MDP 5001. Ways of Knowing and Sustainable Livelihoods. (2 cr.; A-F or Audit; Every Fall)
Complexities of interdisciplinary study of development and a range of other "ways of knowing" in different cultures/groups and from a variety of situated perspectives. Key issues and concepts and key methodological challenges facing us as we engage in interdisciplinary and international development study and practice. Sustainable livelihoods. Team taught when possible by faculty from biological, social sciences, and humanities, or at minimum will include guest lecturers who can offer a range of disciplinary perspectives on questions of development. prereq: Grad MDP major or inst consent

MDP 5002. Research Methods for Sustainable Livelihoods. (4 cr.; A-F only; Every Spring)
Research/writing skills to support work in international development. Discussion of basic qualitative research methods/data analysis. Qualitative/quantitative data, collaborative research/analysis. Relationship between research/policy, prereq: MDP grad student or inst consent

MDP 5003. Field Study Pre-Departure Seminar. (1 cr.; Student Option No Audit; Every Spring)
Preparation for international field experience. Identify arrangements for summer field experience in consultation with faculty leader of seminar/MDP advisers. Feedback on colleagues' plans. prereq: MDP grad student or inst consent

MDP 5004. International Field Experience. (3 cr.; S-N or Audit; Every Summer)
International field experience. prereq: MDP grad student or inst consent

MDP 5100. International Field Seminar. (1 cr.; A-F only; Every Fall)
Debriefing/identifying important learning from field experiences. Complete final report on field project. Build upon skills in peer review/feedback developed in 5003. prereq: MDP grad student or inst consent

MDP 5200. Capstone Workshop in Development Practice. (3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring)
Learning from field experiences. Analytical/practical skills developed in academic training.
Apply skill/experiences to "real world" problem provided by local or international development-focused organization. Reflective practice. prereq: MDP grad student or instr consent

**Master of Healthcare Admin (MHA)**

MHA 8763. External Forces Affecting Health Services Delivery. (2 cr. ; A-F or Audit; Periodic Fall) Guidance in development of concepts, models, and principles of financing, social policy making, and organizing and human resource development for health services delivery. Written paper and teaching presentation required. prereq: PhD student

MHA 8782. Research Practicum. (2 cr. ; A-F or Audit; Every Fall & Spring) Field experience in healthcare research. Supervised independent and team research on selected topics and problems. prereq: PhD student

**Master of Science in Finance (MSF)**

MSF 6021. Fixed Income and Securities. (2 cr. ; A-F only; Every Fall) This class provides an introduction to fixed income markets. Topics include the price/yield relationship, no-arbitrage pricing of stripped coupon bonds, the duration/convexity approximation, the term structure of interest rates, defaultable bonds, mortgage-backed securities, inflation protected securities, bonds with embedded options, swap rates, the Fed Funds rate, repurchase agreements, and attribution analysis. prereq: Fall A Cohort Completion

MSF 6221. Fundamentals of Finance I. (2 cr.; A-F only; Every Summer) This course is the first course in a three-course sequence to introduce the ideas of corporate finance. This course will focus on an overview of corporate finance in the firm, the valuation principle, the time value of money, interest rates, valuing bonds, risk and return, and estimating the cost of capital.

MSF 6222. Fundamentals of Finance II. (2 cr.; A-F only; Every Summer) This course is the second course in a three-course sequence to introduce the ideas of corporate finance. Section I will introduce capital budgeting. Students will use the cost of capital learned at the end of the first course in conjunction with an introduction to the calculation of cash flows and the use/interpretation of decision rules for project selection. Section II will move into stock valuation and company valuation based upon the dividend discount model and enterprise model value; students will also be exposed to other valuation methods. Section III will introduce the effect of capital structure on company valuation, starting with perfect markets and introducing the opposing effects of taxation and financial distress on valuation. Students will complete a case to demonstrate understanding of the core concepts from the first three sections; the case is a continuing case with each week building on the prior week's work. Section IV will provide an introduction to financial options and option valuation.

MSF 6223. Fundamentals of Finance III. (2 cr.; A-F only; Every Fall) This course is the last of a three-course sequence that introduces the ideas of corporate finance. It focuses on the three major decisions of a firm: the financing decision, the capital structure decision, and the payout decision. There is also an introduction to corporate valuation. This course uses a balanced mix of lectures and case studies, and emphasizes the use of real world data. prereq: Summer Cohort Completion

MSF 6022. Financial Statement Analysis. (2 cr.; A-F only; Every Fall) This course teaches how to analyze financial statements, and it covers the following topics: overview of business activities and financial statements; profitability analysis and interpretation; credit risk analysis and interpretation; revenue recognition and operating income; asset recognition and operating assets; and inter-corporate entities. prereq: Summer Cohort Completion

MSF 6031. Financial Accounting. (3 cr.; A-F only; Every Summer) This course provides students with a deep understanding of financial accounting fundamentals so they can make decisions based on reported financials. Students will learn how a firm's operating activities, its investments, and financing transactions are recorded in the income statement, balance sheet, and statement of cash flows. Students will develop some skills needed to analyze financial statements that would later be used.

MSF 6121. Fixed Income and Securities. (2 cr.; A-F only; Every Fall) This class provides an introduction to fixed income markets. Topics include the price/yield relation, no-arbitrage pricing of stripped coupon bonds, the duration/convexity approximation, added from projects, operating strategies and financing proposals and to estimate the value of securities. This course extensively uses VBA macros, sensitivity tables and scenario analyses. prereq: Fall A Cohort Completion

MSF 6421. Computing for Finance: Excel/ VBA I & II. (4 cr.; A-F only; Every Summer) This course first introduces students to specific software (e.g., Excel VBA, ModelRisk Monte Carlo simulator) and databases (e.g., Bloomberg, Factset, CRSP, Compustat) that will be used throughout the MS program. It then focuses on the use of Excel for many topics in finance, including modern portfolio theory, optimal portfolio analysis and binomial option pricing. This course often takes the material being learned in the ?Fundamentals of Finance? course to motivate specific examples.

MSF 6422. Financial Econometrics and Computational Methods I. (2 cr.; A-F only; Every Fall) This course provides an introduction to the methods used in empirical finance. A review of statistics is followed by intensive instruction on matrix algebra that culminates in a fundamental understanding of linear regression, the basic empirical tool. Asset pricing theories are discussed and developed and then methods are derived to test them. The course will emphasize estimation and inference using computer-based applications. prereq: Summer Cohort Completion

MSF 6423. Financial Econometrics and Computational Methods II. (2 cr.; A-F only; Every Fall) This course builds on Financial Econometrics I and provides instruction on the econometrics used in empirical finance. Topics will include time series analysis, parametric models of volatility, evaluation of asset pricing theories, and models for risk management. The course will emphasize estimation and inference using computer-based applications. prereq: Fall A Cohort Completion

MSF 6621. Finance within the Macroeconomy. (2 cr.; A-F only; Every Fall) This course is intended to provide you with an understanding of modern macroeconomics. We are particularly interested in how financial markets and institutions fit into the overall macro system. By the time that the term is over you will have a much stronger sense of the ongoing macroeconomic news and policy discussion. Having a sense of this material is often helpful in job interviews as well. prereq: Fall A Cohort Completion

**Masters of Business Analytics (MSBA)**

MSBA 6120. Introduction to Statistics for Data Scientists. (3 cr.; A-F only; Every Summer) Introduction to statistics for data scientists.

MSBA 6250. Analytics for Competitive Advantage. (1.5 cr.; A-F only; Every Summer) Case/discussion-based introduction to variety of analytics-related issues/examples in
business. Business value, impact, benefits/limitations, as well as ethical, legal, privacy issues. Use of case studies, examples, guest speakers.

MSBA 6255. Fundamentals of Decision Analysis. (1.5 cr.; A-F only; Every Fall & Summer)
Quantitative problem solving formulation and solving skills.

MSBA 6310. Programming and Application Development. (3 cr.; A-F only; Every Fall)

MSBA 6320. Data Management, Databases, and Data Warehousing. (3 cr.; A-F only; Every Fall)

MSBA 6330. Harvesting Big Data. (3 cr.; A-F only; Every Fall)

MSBA 6345. Project Management of Analytics Projects. (1.5 cr.; A-F only; Every Fall)
Project Management of full-stack analytics projects: identifying deliverables and a methodology; gathering requirements (use cases, user stories); estimating and staffing the project; monitoring project status (earned value and visual methods); team roles in an agile project. prereq: MSBA student

MSBA 6355. Building and Managing Teams. (1.5 cr.; A-F only; Every Fall)
Examine individual, group and organizational aspects of team effectiveness; learn and practice basic skills central to team management; develop appreciation for team leadership function; learn the tools for effective team decision making and conflict management; develop general diagnostic skills for assessment of team issues within and across organizations and national boundaries.

MSBA 6410. Exploratory Data Analytics and Visualization. (3 cr.; A-F only; Every Fall)

MSBA 6420. Predictive Analytics. (3 cr.; A-F only; Every Fall)

MSBA 6430. Advanced Issues in Business Analytics. (3 cr.; A-F only; Every Spring)

MSBA 6440. Data-Driven Experimentation and Measurement. (3 cr.; A-F only; Every Spring)
Controlled experiments in business settings, experiment design, A/B testing. Specialized statistical methodologies. Fundamentals of econometrics, instrument variable regression, propensity score matching.

MSBA 6450. Modeling and Heuristics for Decision Making and Support. (3 cr.; A-F only; Every Spring)
Fundamentals of decision analysis, optimization, linear/integer programming, risk analysis, heuristics, simulation, decision technologies.

MSBA 6510. Business Analytics Experimental Learning. (6 cr.; A-F only; Every Spring)
This course involves hands-on application of the analytics methodologies, techniques, and tools learned throughout the program to a real-world problem (such as consulting for a real-world business client in the area of marketing, strategy, operation/supply chain, information technology, finance, accounting, or human resources) as well as the development and presentation of results, interpretations, insights, and recommendations.

Materials Science (MATS)

MATS 1001. Advances in Chemical Engineering and Materials Science. (1 cr.; S-N or Audit; Every Fall & Summer)
Introduction to chemical engineering, materials science/engineering. Practical examples of important advances in both fields. Design problems, career opportunities. Lectures, demonstrations, interactive exercises. prereq: Credit will not be granted if credit has been received for: ChEn 1001; Recommended for [chemical engineering, materials science/engineering] majors

MATS 2001. Introduction to the Science of Engineering Materials. (3 cr.; A-F only; Every Fall, Spring & Summer)

MATS 2002. Introduction to the Science of Engineering Materials Laboratory. (1 cr.; A-F only; Every Fall, Spring & Summer)
Lab experiments dealing with mechanical properties of engineering materials. Elastic modulus, tensile strength, creep, impact strength, fracture. prereq: [2001 or concurrent registration is required (or allowed) in 2001], IT student

MATS 3001. Thermodynamics of Materials. (3 cr.; A-F or Audit; Every Fall)

MATS 3002. Mass Transport and Kinetics. (3 cr.; A-F or Audit; Every Spring)

MATS 3011. Introduction to Materials Science and Engineering. (3 cr.; Student Option; Every Fall & Spring)
Builds progressively from electrons to atoms to bonding to crystal structures. Defects, X-ray diffraction, phase diagrams. Microstructure as basis for understanding mechanical/ electrical properties. Metals, polymers, ceramics, semiconductors, composites. prereq: CHEM 1061, CHEM 1065, [MATH 1272 or MATH 1372], PHYS 1302, CSE student

MATS 3012. Metals and Alloys. (3 cr.; A-F or Audit; Every Fall)
Structure of metals/alloys. Crystal structure/defects (point defects, dislocations, grain boundaries). Microstructure. Properties of metals, especially mechanical properties. prereq: [3011, Mats or ChEn upper div] or instr consent

MATS 3013. Electrical and Magnetic Properties of Materials. (3 cr.; A-F or Audit; Every Fall)

MATS 3041. Industrial Assignment I. (2 cr.; A-F only; Every Fall, Spring & Summer)
Industrial work assignment in engineering co-op program. Formal report on technical project related to industrial work. prereq: Mats upper div, completion of required courses in Mats program through fall sem of 3rd yr, GPA of at least 2.80, regis in co-op program

MATS 3045. Materials Science and Engineering Industrial Internship. (1 cr. [max 2 cr.]; A-F only; Every Fall, Spring & Summer)
Industrial internship, three to eight months. Formal report on technical project related to

MATS 3851W. Materials Properties Lab. (WI; 4 cr.; A-F or Audit; Every Spring) Characterization of properties of engineering materials. Mechanical, electrical, optical, magnetic, and thermal properties. Relationship between properties and materials structure. Specimen preparation. Data collection and analysis, including statistical analysis. Laboratory notebook and report writing. prereq: [3001, 3013, MatS upper div] or dept consent

MATS 4041. Industrial Assignment II. (2 cr.; A-F only; Every Fall, Spring & Summer) Industrial assignment in engineering co-op program. Application of materials science principles to engineering design problems in an industrial work environment. Formal written report and presentation. prereq: 3041, GPA of at least 2.80, registration in co-op program

MATS 4212. Ceramics. (3 cr.; A-F or Audit; Every Fall) Crystal structures, non-crystalline (glass) structures, microstructure. Ceramic phase relationships and phase diagrams. Ceramic properties: thermal, mechanical, electrical, magnetic, optical. Computer applications. prereq: [3011, 3001 or CHEN 3101], [MatS or ChEn upper div] or instr consent

MATS 4214. Polymers. (; 3 cr.; A-F or Audit; Every Spring) Polymer structure-property relations: structure/morphology of crystalline/amorphous state. Crystallization kinetics. Vitrification and glass transition. Mechanical properties, failure, permeability, optical/electrical properties, polymer composites, effect of processing on properties. prereq: [3011, 3001 or CHEN 3101], [upper div MatS or ChEn] or instr consent


MATS 4223W. Polymer Laboratory. (WI; 2 cr.; Student Option; Every Spring) Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization. prereq: 4214 or CHEM 4214 or CHEM 4221 or MATS 4214 or instr consent

MATS 4301W. Materials Processing. (WI; 4 cr.; A-F only; Every Spring) Casting, solidification and plastic forming of metals. Powder processing, forming operations, sintering of ceramics. Processing of thermoplastic/thermoset polymers. Computer applications of data collection/reduction. prereq: 4212. 4214 or concurrent registration is required (or allowed) in 4214 Upper Div MatS

MATS 4400. Senior Design Project. (; 3 cr.; A-F only; Every Spring) Work in teams to apply expertise in materials science/engineering toward a specific project. With mentor from industry or faculty member guidance, each team defines a problem/ follows design steps that culminate in a product design. prereq: Sr MatS major

MATS 4401. Senior Design Thesis I. (; 2 cr.; A-F only; Every Fall) First semester of a 2-semester thesis project. Research and design work directed by faculty member in Department of Chemical Engineering and Materials Science. Written reports are due at midterm and end of semester. At least one research presentation must be given. prereq: Credit will not be granted if credit has been received for: 4400; MatS senior, dept consent, GPA of at least 3.00, project approval by faculty adviser


MATS 4511W. Corrosion and Electrochemistry of Corrosion. (WI; 4 cr.; A-F or Audit; Periodic Fall) Electrochemical thermodynamics, electrochemical kinetics, theory of aqueous corrosion, theory of high temperature oxidation; specific topics include general corrosion, passivation, pitting, galvanic protection/ corrosion, environmental degradation of mechanical properties, corrosion of electronic components, growth of oxide scales by diffusion, materials selection and design. Computers used to collect lab data. prereq: MatS 3011 or instr consent, upper div CSE or grad

MATS 4512. Corrosion and Electrochemistry of Corrosion. (; 4 cr.; Student Option; Periodic Fall & Spring) Electrochemical thermodynamics, electrochemical kinetics, theory of aqueous corrosion, theory of high temperature oxidation; specific topics include general corrosion, passivation, pitting, galvanic protection/ corrosion, environmental degradation of mechanical properties, corrosion of electronic components, growth of oxide scales by diffusion, materials selection and design. Computers used to collect lab data. prereq: MatS 3011 or instr consent, upper div CSE or grad

MATS 4517. Electron Microscopy. (; 3 cr.; A-F or Audit; Periodic Spring) Transmission electron microscope, scattering and diffraction, electron sources, lenses, apertures and resolution, specimen preparation, diffraction patterns, kikuchi diffraction, planar defects, strain fields, high resolution imaging, X-ray spectrometry

MATS 4551. Electrochemical Engineering. (; 3 cr.; Student Option; Periodic Fall) Fundamentals of electrochemical engineering. Topics include electrochemical mass transfer, electrokinetics, thermodynamics of cells, modern sensors, formation of thin films and microstructured materials. Computer-based problems will be assigned. prereq: MatS 3011 or instr consent, upper div CSE or grad

MATS 4571. Independent Study in Materials Science. (; 1-3 cr.; max 6 cr.; Student Option No Audit; Every Fall, Spring & Summer) This course can take two forms: (a) Library, theoretical or design studies of scientific or engineering topics in materials science for an individual or small group of students. Course content and credits by arrangement with professor. Design credits available if arranged with professor. (b) Special topics course offered only once, e.g., by a visiting professor. prereq: upper div MatS

MATS 4593. Directed Study in Materials Science. (; 1-4 cr.; max 6 cr.; A-F only; Every Fall, Spring & Summer) Research studies of scientific or engineering topics in materials science for an individual or small group of students. Course content and credits by arrangement with professor. Design credits available if arranged with professor. May be used for upper division Honors Program experience if arranged with professor. prereq: Upper div MatS

MATS 4594. Directed Research in Materials Science. (; 1-3 cr.; max 6 cr.; Student Option No Audit; Every Fall, Spring & Summer) Independent lab research under faculty supervision for upper division students wanting honors experience. prereq: Instr and DUGS consent, upper div honor MatS major

MATS 5353. Electron Microprobe Theory and Practice. (; 3 cr.; Student Option; Periodic Spring) Characterizing solid materials with electron beam instrumentation, including reduction of X-ray data to chemical compositions. prereq: [One yr chem, one yr physics] or instr consent

MATS 5517. Electron Microscopy. (; 3 cr.; A-F or Audit; Periodic Spring) Transmission electron microscope, scattering and diffraction, electron sources, lenses, apertures and resolution, specimen preparation, diffraction patterns, kikuchi diffraction, planar defects, strain fields, high resolution imaging, X-ray spectrometry

MATS 5551. Electrochemical Engineering. (; 3 cr.; Student Option; Periodic Fall) Fundamentals of electrochemical engineering. Topics include electrochemical mass transfer, electrokinetics, thermodynamics of cells, modern sensors, formation of thin films and microstructured materials. Computer-based problems will be assigned. prereq: MatS 3011 or instr consent, upper div CSE or grad

MATS 5571. Colloids and Dispersions. (; 3 cr.; A-F or Audit; Every Fall) Preparation, stability, coagulation kinetics, or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures. prereq: Physical chemistry
MATS 8001. Structure and Symmetry of Materials. (3 cr.; Student Option; Every Fall) Comprehensive description of structure of materials, including metals, semiconductors, organic crystals, polymers, and liquid crystals. Atomic and molecular ordering, influence of intermolecular forces on symmetry and structure. Principles of scattering and use of X-ray, neutron, and electron diffraction. prereq: MatS and ChEn majors must take this course for a grade

MATS 8002. Thermodynamics and Kinetics. (; 3 cr.; A-F or Audit; Every Fall) First three laws of thermodynamics, free energy, equilibrium constants, fugacity and activity relationships, solution models, order-disorder transitions, phase transitions. Elementary statistical mechanics. Applications to materials systems, including surface energies, multicomponent equilibria, reaction kinetics, mass transport, diffusion


MATS 8004. Mechanical Properties. (; 3 cr.; A-F or Audit; Every Spring) Defects in crystalline materials, including point defects, dislocations, and grain boundaries. Structure and movement of defects related to mechanical behavior of materials. Tools used to understand crystals and crystallography.

MATS 8201. Applied Mathematics I: Linear Analysis. (3 cr.; A-F or Audit; Every Fall) Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/numerical analysis based on linear operator theory.

MATS 8204. Computational Methods and Applications to Problems in Materials Science and Engineering. (; 2 cr.; A-F or Audit; Every Spring) Implementation of computational methods/applications to numerical problems in materials science and engineering. Emphasizes implementation to applications, prereq: Grad student, knowledge of programming languages such as Fortran

MATS 8211. Physical Chemistry of Polymers. (; 4 cr.; Student Option; Every Spring) Introduction to polymer physical chemistry. Chain conformations; thermodynamics of polymer solutions, blends, and copolymers; light, neutron, and X-ray scattering; dynamics in dilute solutions and polymer characterization; dynamics of melts and viscoelasticity; rubber elasticity, networks, and gels; glass transitions; crystallization. prereq: Undergrad physical chem or instr consent

MATS 8221. Synthetic Polymer Chemistry. (; 4 cr.; A-F or Audit; Every Fall) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties. prereq: [Undergrad organic chemistry course, undergrad physical chemistry course] or instr consent

MATS 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

MATS 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

MATS 8555. MatS Teaching Practicum. (1-6 cr. [max 24 cr.]; S-N only; Every Fall, Spring & Summer) Experience in instruction including grading of student work, holding of office hours, and in special cases, lecturing. Students will work with and receive feedback from a faculty member in CEMS. prereq: Grad MATS or ChEn major and DGS permission

MATS 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MATS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MATS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

MATS 8993. Directed Study. (; 1-12 cr.; Student Option; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

MATS 8994. Directed Research. (; 1-12 cr.; Student Option; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

MATS 8995. Special Topics. (; 1-4 cr.; A-F or Audit; Every Fall, Spring & Summer) New or experimental courses offered by department or visiting faculty.

**Mathematics (MATH)**

MATH 1001. Excursions in Mathematics. (MATH; 3 cr.; Student Option; Every Fall & Spring) Introduction to the breadth and nature of mathematics and the power of abstract reasoning, with applications to topics that are relevant to the modern world, such as voting, fair division of assets, patterns of growth, and opinion polls. prereq: 3 yrs high school math or placement exam or [grade of at least C- in PSTL 731 or 732]

MATH 1031. College Algebra and Probability. (MATH; 3 cr.; Student Option; Every Fall, Spring & Summer) Graphs of equations and functions, transformations of graphs; linear, quadratic, polynomial, and rational functions, with applications; inverses and compositions of functions; exponential and logarithmic functions with applications; basic probability rules; conditional probabilities, binomial probabilities. prereq: 3 yrs high school math or satisfactory score on placement exam or grade of at least C- in [PSTL 731 or PSTL 732 or CI 0832]

MATH 1038. College Algebra and Probability Submodule. (; 1 cr.; A-F or Audit; Every Fall, Spring & Summer) For students who need probability/permutations/combinations portion of 1031. Meets with 1031, has same grade/work requirements. prereq: 1051 or 1151 or 1155

MATH 1051. Precalculus I. (MATH; 3 cr.; Student Option; Every Fall, Spring & Summer) Graphs of equations and functions, transformations of graphs; linear, quadratic, polynomial, and rational functions with applications; zeros of polynomials; inverses and compositions of functions; exponential and logarithmic functions with applications; coverage beyond that found in the usual 3 years of high school math. prereq: 3 yrs of high school math or satisfactory score on placement test or grade of at least C- in [PSTL 731 or PSTL 732 or CI 0832]

MATH 1142. Short Calculus. (MATH; 4 cr.; Student Option; Every Fall, Spring & Summer) A streamlined one-semester tour of differential and integral calculus in one variable, and differential calculus in two variables. No trigonometry/does not have the same depth as MATH 1271-1272. Formulas and their interpretation and use in applications. prereq: Satisfactory score on placement test or grade of at least C- in [1031 or 1051]

MATH 1151. Precalculus II. (MATH; 3 cr.; Student Option; Every Fall, Spring & Summer) Properties of trigonometric functions and their inverses, including graphs and identities, with applications; polar coordinates, equations, graphs; complex numbers, complex plane, DeMoivre’s Theorem; conic sections; systems of linear equations and inequalities, with applications; arithmetic and geometric sequences and series. prereq: Satisfactory score on placement exam or grade of at least C- in [1031 or 1051]

MATH 1155. Intensive Precalculus. (MATH; 5 cr.; Student Option; Every Fall & Spring) Graphs of equations and functions; polynomial and rational functions; inverses and composition of functions; exponentials and logarithms; trig functions, graphs, identities; polar coordinates; complex numbers; systems of linear equations; arithmetic, geometric

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
sequences, series; applications. prereq: 3 yrs high school math or satisfactory score on placement exam or grade of at least C- in [PSTL 731 or PSTL 732]

MATH 1241. Calculus and Dynamical Systems in Biology. (MATH; 4 cr.; Student Option; Every Fall & Spring) Differential/integral calculus with biological applications. Discrete/continuous dynamical systems. Models from fields such as ecology/evolution, epidemiology, physiology, genetic networks, neuroscience, and biochemistry. prereq: [4 yrs high school math including trig or satisfactory score on placement test or grade of at least C- in [1151 or 1155]], CBS student

MATH 1271. Calculus I. (MATH; 4 cr.; Student Option; Every Fall, Spring & Summer) Differential calculus of functions of a single variable, including polynomial, rational, exponential, and trig functions. Applications, including optimization and related rates problems. Single variable integral calculus, using anti-derivatives and simple substitution. Applications may include area, volume, work problems. prereq: 4 yrs high school math including trig or satisfactory score on placement test or grade of at least C- in [1151 or 1155]

MATH 1272. Calculus II. (4 cr.; Student Option; Every Fall, Spring & Summer) Techniques of integration. Calculus involving transcendental functions, polar coordinates, Taylor polynomials, vectors/curves in space, cylindrical/spherical coordinates. prereq: [1271 or equiv] with grade of at least C-

MATH 1371. CSE Calculus I. (MATH; 4 cr.; Student Option; Every Fall & Spring) Differentiation of single-variable functions, basics of integration of single-variable functions. Applications: max-min, related rates, area, curve-sketching. Use of calculator, cooperative learning. prereq: CSE or pre-bioprof concurrent registration is required (or allowed) in biosys eng (PRE), background in [precalculus, geometry, visualization of functions/graphs], instr consent: familiarity with graphing calculators recommended

MATH 1372. CSE Calculus II. (4 cr.; Student Option; Every Spring) Techniques of integration, Calculus involving transcendental functions, polar coordinates, Taylor polynomials, vectors/curves in space, cylindrical/spherical coordinates. Use of calculators, cooperative learning. prereq: Grade of at least C- in [1371 or equiv], CSE or pre-Bioprof/Biosys Engr

MATH 1471. UM Talented Youth Mathematics Program--Calculus I, First Semester. (MATH; 2 cr. [max 4 cr.; A-F or Audit; Every Fall]) Accelerated honors-level sequence for selected mathematically talented high school students. Single variable calculus through differentiation and its applications.

MATH 1472. UM Talented Youth Mathematics Program--Calculus I, Second Semester. (MATH; 2 cr. [max 4 cr.; A-F or Audit; Every Spring) Accelerated honors sequence for selected mathematically talented high school students. Integration and its applications.

MATH 1473. UM Talented Youth Mathematics Program--Calculus II, First Semester. (MATH; 2 cr. [max 4 cr.; A-F or Audit; Every Fall]) Accelerated honors sequence for selected mathematically talented high school students. Sequences and series, differential equations, 3D analytical geometry, and methods of proof.

MATH 1474. Honors Calculus IIB for Secondary Students. (3 cr.; Student Option; Every Spring) Accelerated honors sequence. Linear Algebra from geometric viewpoint. First-order systems of differential equations. prereq: 1473H

MATH 1571H. Honors Calculus I. (MATH; 4 cr.; A-F only; Every Fall) Differential/integral calculus of functions of a single variable. Emphasizes hard problem-solving rather than theory. prereq: Honors student and permission of University Honors Program

MATH 1572H. Honors Calculus II. (4 cr.; A-F only; Every Spring) Continuation of 1571. Infinite series, differential calculus of several variables, introduction to linear algebra. prereq: 1571H, honors student, permission of University Honors Program

MATH 2001. Actuarial Science Seminar. (1 cr.; S-N or Audit; Every Spring) Actuarial science as a subject and career. Guest lectures by actuaries. Resume preparation and interviewing skills. Review and practice for actuarial exams. prereq 1272 or equiv

MATH 2066. Elementary Differential Equations. (1-4 cr.; Student Option) Not taught: merely provides credit for transfer students who have taken a sophomore-level differential equations class that does not contain enough linear algebra to qualify for credit for 2243.

MATH 2142. Elementary Linear Algebra. (1-4 cr. [max 1 cr.; A-F or Audit]) Not taught: merely provides credit for transfer students who have taken a sophomore-level linear algebra course that does not contain enough differential equations to qualify for credit for 2243.

MATH 2241. Mathematical Modeling of Biological Systems. (3 cr. [max 4 cr.; Student Option; Every Fall & Spring) Development, analysis and simulation of models for the dynamics of biological systems. Mathematical topics include discrete and continuous dynamical systems, linear algebra, and probability. Models from fields such as ecology, epidemiology, physiology, genetics, neuroscience, and biochemistry. prereq: [1241 or 1271 or 1371] w/grade of at least C-

MATH 2243. Linear Algebra and Differential Equations. (4 cr.; Student Option; Every Fall, Spring & Summer) Linear algebra: basis, dimension, matrices, eigenvalues/eigenvectors. Differential equations: first-order linear, separable; second-order linear with constant coefficients; linear systems with constant coefficients. prereq: [1272 or 1282 or 1372 or 1572] w/grade of at least C-

MATH 2263. Multivariable Calculus. (4 cr.; Student Option; Every Fall, Spring & Summer) Derivative as linear map. Differential/integral calculus of functions of several variables, including change of coordinates using Jacobians. Line/surface integrals. Gauss, Green, Stokes Theorems. prereq: [1272 or 1372 or 1572] w/grade of at least C-

MATH 2283. Sequences, Series, and Foundations. (3 cr.; Student Option; Every Fall & Spring) Mathematical reasoning. Elements of logic. Mathematical induction. Real number system. General, monotone, recursively defined sequences. Convergence of infinite series/sequences. Taylor's series. Power series with applications to differential equations. Newton's method. prereq: [concurrence registration is required (or allowed) in 2243 or concurrent registration is required (or allowed) in 2263 or concurrent registration is required (or allowed) in 2373 or concurrent registration is required (or allowed) in 2374] w/grade of at least C-

MATH 2373. CSE Linear Algebra and Differential Equations. (4 cr.; Student Option; Every Fall & Spring) Linear algebra: basis, dimension, eigenvalues/eigenvectors. Differential equations: linear equations/systems, phase space, forcing/ resonance, qualitative/numerical analysis of nonlinear systems, Laplace transforms. Use of computer technology. prereq: [1272 or 1282 or 1372 or 1572] w/grade of at least C-, CSE or pre-Bio Prod/Biosys Engr

MATH 2374. CSE Multivariable Calculus and Vector Analysis. (4 cr.; Student Option; Every Fall & Spring) Derivative as linear map. Differential/integral calculus of functions of several variables, including change of coordinates using Jacobians. Line/surface integrals. Gauss, Green, Stokes theorems. Use of computer technology. prereq: [1272 or 1282 or 1372 or 1572] w/grade of at least C-, CSE or pre-Bioprof/Biosys Engr

MATH 2471. UM Talented Youth Mathematics Program--Calculus II, Second Semester. (MATH; 2 cr. [max 4 cr.; A-F or Audit; Every Spring) Accelerated honors sequence for selected mathematically talented high school students. Theoretical and geometric linear algebra.

MATH 2472. UM Talented Youth Mathematics Program--Calculus III, First Semester. (MATH; 2 cr. [max 4 cr.; A-F or Audit; Every Fall) Accelerated honors sequence for selected mathematically talented high school students. Geometry of surfaces and curves in R^n. Multivariable calculus through differentiation using linear algebra.

MATH 2473. UM Talented Youth Mathematics Program--Calculus III, Second
Semester. (MATH; 2 cr. [max 4 cr.]; A-F or Audit; Every Spring)
Accelerated honors sequence for selected mathematically talented high school students. Multivariable integration and classical vector analysis.

MATH 2474. Advanced Topics for Secondary Students. (; 3 cr.; Student Option; Every Spring)
Topics may include linear algebra, combinatorics, advanced differential equations, probability/statistics, numerical analysis, dynamical systems, topology/geometry. Emphasizes concepts/explorations. prereq: 2473H

MATH 2573H. Honors Calculus III. (; 4 cr.; A-F only; Every Fall)
Integral calculus of several variables. Vector analysis, including theorems of Gauss, Green, Stokes. prereq: Math 1572H or Math 2574H, honors student and permission of University Honors Program

MATH 2574H. Honors Calculus IV. (; 4 cr.; A-F only; Every Spring)
Advanced linear algebra, differential equations. Additional topics as time permits. prereq: Math 1572H or Math 2573H, honors student and permission of University Honors Program

MATH 2999. Special Exam. (5 cr.; Student Option; )

MATH 3283W. Sequences, Series, and Foundations: Writing Intensive. (WI; 4 cr.; Student Option; Every Fall & Spring)
Introduction to reasoning used in advanced mathematics courses. Logic, mathematical induction, real number system, general/monotone/recursively defined sequences, convergence of infinite series/sequences, Taylor's series, power series with applications to differential equations, Newton's method. Writing-intensive component. prereq: [concurrent registration is required (or allowed) in 2243 or concurrent registration is required (or allowed) in 2263 or concurrent registration is required (or allowed) in 2373 or concurrent registration is required (or allowed) in 2374] wi grade of at least C-

MATH 3584H. Honors Calculus IV: Advanced Placement. (; 5 cr.; Student Option; Periodic Fall)
Advanced linear algebra, differential equations. Introduction to complex analysis, prereq: [2583 or equiv]. IT Honors office approval

MATH 3592H. Honors Mathematics I. (; 5 cr.; A-F only; Every Fall)
First semester of three-semester sequence. Focuses on multivariable calculus at deeper level than regular calculus offerings. Rigorous introduction to sequences/series. Theoretical treatment of multivariable calculus. Strong introduction to linear algebra. prereq: dept consent; for students with mathematical talent interested in specialized area of math or original computer systems, stability. prereq: 2243 or 2373 or 2573

MATH 4065. Theory of Interest. (; 4 cr.; A-F only; Every Fall & Spring)
Time value of money, compound interest and general annuities, loans, bonds, general cash flows, basic financial derivatives and their valuation. Primarily for students who are interested in actuarial mathematics. prereq: 1272 or 1372 or 1572

MATH 4067W. Actuarial Mathematics in Practice. (WI; 3 cr.; A-F only; Every Spring)
Real world actuarial problems that require integration of mathematical skills with knowledge from other disciplines such as economics, statistics, and finance. Communication and interpersonal skills are enhanced by teamwork/presentations to the practitioner actuaries who co-instruct. prereq: 4065, ACCT 2050, ECON 1101, ECON 1102

MATH 4151. Elementary Set Theory. (3 cr.; Student Option; Every Fall & Spring)
Axioms for the real numbers. Techniques of proof for limits, continuity, uniform convergence. Rigorous treatment of differential/ integral calculus for single-variable functions. prereq: [(2243 or 2373), (2263 or 2374)] or 2574 or instr consent

MATH 4152. Elementary Mathematical Logic. (3 cr.; Student Option; Every Fall)
Propositional logic: notion of a first order language, a deductive system for first order logic, first order structures, Godel's completeness theorem, axiom systems, models of formal theories. prereq: one soph math course or instr consent

MATH 4428. Mathematical Modeling. (; 3 cr.; Student Option; Every Spring)
Sequels to MATH 4063. Topology of n-dimensional Euclidean space. Rigorous treatment of multivariable differentiation and integration, including chain rule, Taylor's Theorem, implicit function theorem, Fubini's Theorem, change of variables, Stokes' Theorem. prereq: 4603 or 5615 or instr consent

MATH 4512. Differential Equations with Applications. (; 3 cr.; Student Option; Every Fall & Spring)
Existence, enumeration, construction, algorithms, optimization. Pigeonhole principle, bijection combinatorics, inclusion-exclusion, recursions, graph modeling, isomorphism. Degree sequences and edge counting. Connectivity, Eulerian graphs, trees, Euler's formula, network flows, matching theory. Mathematical induction as proof technique. prereq: 2243, [2283 or 3283]

MATH 4990. Topics in Mathematics. (; 1-4 cr.; max 12 cr. ; Student Option; Every Fall, Spring & Summer)

MATH 4991. Independent Study. (; 1-4 cr.; max 12 cr. ; Student Option; Every Fall, Spring & Summer)

MATH 4992. Directed Reading. (; 1-4 cr.; max 12 cr. ; Student Option; Every Fall, Spring & Summer)

MATH 4992. Directed Reading. (; 1-4 cr.; max 12 cr. ; Student Option; Every Fall, Spring & Summer)

MATH 4993. Directed Study. (; 1-4 cr.; max 12 cr. ; Student Option; Every Fall, Spring & Summer)

MATH 4995. Senior Project for CLA. (; 1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Directed study. May consist of paper on specialized area of math or original computer
MATH 4997W. Senior project (Writing Intensive). (WI; 1 cr. [max 2 cr.]; A-F or Audit; Every Fall, Spring & Summer) Directed study. A 10-15 page paper on a specialized area, including some math that is new to student. At least two drafts of paper given to instructor for feedback before final version. Student keeps journal of preliminary work on project. Scope/topic vary with instructor. prereq: 2 sem upper div math; dept consent

MATH 5067. Actuarial Mathematics I. (4 cr.; Student Option; Every Fall) Future lifetime random variable, survival function. Insurance, life annuity, future loss random variables. Net single premium, actuarial present value, net premium, net reserves. prereq: 4065, [one sem [4xxx or 5xxx] probability or statistics] course

MATH 5068. Actuarial Mathematics II. (4 cr.; Student Option; Every Spring) Multiple decrement insurance, pension valuation. Expense analysis, gross premium, reserves. Problem of withdrawals. Regulatory reserving systems. Minimum cash values. prereq: 5067

MATH 5075. Mathematics of Options, Futures, and Derivative Securities I. (4 cr.; Student Option; Every Fall) Mathematical background (e.g., partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods--including Monte Carlo simulation). Interest-rate derivative securities, exotic options, risk theory. First course of two-course sequence. prereq: Two yrs calculus, basic computer skills

MATH 5076. Mathematics of Options, Futures, and Derivative Securities II. (4 cr.; A-F or Audit; Every Spring) Mathematical background such as partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods (including Monte Carlo simulation), interest-rate derivative securities, exotic options, risk theory. prereq: 5075

MATH 5165. Mathematical Logic I. (4 cr.; Student Option; Every Fall) Theory of computability: notion of algorithm, Turing machines, primitive recursive functions, recursive functions, Kleene normal form, recursion theorem. Propositional logic. prereq: 2283 or 3283 or Phil 5201 or CSCi course in theory of algorithms or instr consent

MATH 5166. Mathematical Logic II. (4 cr.; Student Option; Every Spring) First-order logic: provability/truth in formal systems, models of axiom systems, Godel's completeness theorem, Godel's incompleteness theorem: decidable theories, representability of recursive functions in formal theories, undecidable theories, models of arithmetic. prereq: 5165


MATH 5285H. Honors: Fundamental Structures of Algebra I. (4 cr.; Student Option; Every Fall) Review of matrix theory, linear algebra. Vector spaces, linear transformations over abstract fields. Group theory, including normal subgroups, quotient groups, homomorphisms, class equation, Sylow's theorems. Specific examples: permutation groups, symmetry groups of geometric figures, matrix groups. prereq: [2243 or 2373 or 2573], [2283 or 2574 or 3285]

MATH 5286H. Honors: Fundamental Structures of Algebra II. (4 cr.; Student Option; Every Fall & Spring) Ring/module theory, including ideals, quotients, homomorphisms, domains (unique factorization, euclidean, principal ideal), fundamental theorem for finitely generated modules over euclidean domains, Jordan canonical form. Introduction to field theory, including finite fields, algebraic/transcendental extensions, Galois theory. prereq: 5285

MATH 5335. Geometry I. (4 cr.; Student Option; Every Fall) Advanced two-dimensional Euclidean geometry from a vector viewpoint. Theorems/problems about triangles/circles, isometries, connections with Euclid's axioms. Hyperbolic geometry, how it compares with Euclidean geometry. prereq: [2243 or 2373 or 2573], [concurrent registration is required (or allowed) in 2263 or concurrent registration is required (or allowed) in 2374 or concurrent registration is required (or allowed) in 2574]

MATH 5336. Geometry II. (4 cr.; Student Option; Every Spring) Ring/module theory, including ideals, quotients, homomorphisms, domains (unique factorization, euclidean, principal ideal), fundamental theorem for finitely generated modules over euclidean domains, Jordan canonical form. Introduction to field theory, including finite fields, algebraic/transcendental extensions, Galois theory. prereq: 5285

MATH 5378. Differential Geometry. (4 cr.; Student Option; Every Fall) Basic geometry of curves in plane and in space, including Frenet formula, theory of surfaces, differential forms, Riemannian geometry. prereq: [2263 or 2374 or 2573], [2243 or 2373 or 2574], [2283 or 3283] recommended

MATH 5385. Introduction to Computational Algebraic Geometry. (4 cr.; Student Option; Every Fall) Geometry of curves/surfaces defined by polynomial equations. Emphasizes concrete computations with polynomials using computer packages, interplay between algebra and geometry. Abstract algebra presented as needed. prereq: [2263 or 2374 or 2573], [2243 or 2373 or 2574]


MATH 5447. Theoretical Neuroscience. (4 cr.; Student Option; Every Fall) Nonlinear dynamical system models of neurons and neuronal networks. Computation by excitatory/inhibitory networks. Neural oscillations, adaptation, bursting, synchrony. Memory systems. prereq: 2243 or 2373 or 2574

MATH 5467. Introduction to the Mathematics of Image and Data Analysis. (4 cr.; Student Option; Every Spring) Background theory/experience in wavelets. Inner product spaces, operator theory, Fourier transforms applied to Gabor transforms, multi-scale analysis, discrete wavelets, self-similarity. Computing techniques. prereq: [2243 or 2373 or 2573], [2283 or 2574 or 3283 or instr consent]; [[2263 or 2374], 4567] recommended

MATH 5485. Introduction to Numerical Methods I. (4 cr.; Student Option; Every Fall) Solution of nonlinear equations in one variable. Interpolation, polynomial approximation. Methods for solving linear systems, eigenvalue problems, systems of nonlinear equations. prereq: [2243 or 2373 or 2573], familiarity with some programming language

MATH 5490. Topics in Applied Mathematics. (4 cr.; [max 12 cr.]; Student Option; Periodic Fall & Spring)
Topics vary by instructor. See class schedule.

MATH 5525. Introduction to Ordinary Differential Equations. (4 cr.; Student Option; Periodic Fall & Spring)
Ordinary differential equations, solution of linear systems, qualitative/numerical methods for nonlinear systems. Linear algebra background, fundamental matrix solutions, variation of parameters, existence/uniqueness theorems, phase space. Rest points, their stability. Periodic orbits, Poincare-Bendixon theory, strange attractors. prereq: [2243 or 2373 or 2573], [2283 or 2574 or 3283]

MATH 5535. Dynamical Systems and Chaos. (4 cr.; Student Option; Every Fall & Spring)
Dynamical systems theory. Emphasizes iteration of one-dimensional mappings. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia/ Mandelbrot sets. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574]

MATH 5583. Complex Analysis. (4 cr.; Student Option; Every Fall, Spring & Summer)

MATH 5587. Elementary Partial Differential Equations I. (4 cr.; Student Option; Every Fall)
Emphasizes partial differential equations w/physical applications, including heat, wave, Laplace's equations. Interpretations of boundary conditions. Characteristics, Fourier series, transforms, Green's functions, images, computational methods. Applications include wave propagation, diffusions, electrostatics, shocks. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574]

MATH 5588. Elementary Partial Differential Equations II. (4 cr.; A-F or Audit; Every Spring)
Heat, wave, Laplace's equations in higher dimensions. Green's functions, Fourier series, transforms. Asymptotic methods, boundary layer theory, bifurcation theory for linear/ nonlinear PDEs. Variational methods. Free boundary problems. Additional topics as time permits. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574], [5587] or instr consent

MATH 5594H. Honors Mathematics - Topics. (4 cr.; [max 12 cr.]; A-F or A-F; Periodic Fall & Spring)
Topics vary depending on interests of instructor. Theoretical treatment of chosen topic. prereq: [3593H with grade of at least B, experience in writing proofs] or dept consent; intended for mathematically-talented students with proven achievement in theoretical mathematics courses

MATH 5615H. Honors: Introduction to Analysis I. (4 cr.; Student Option; Every Fall)
Axiomatic treatment of real/complex number systems. Introduction to metric spaces; convergence, connectedness, compactness. Convergence of sequences/series of real/complex numbers, Cauchy criterion, root/ratio tests. Continuity in metric spaces. Rigorous treatment of differentiation of single-variable functions, Taylor's Theorem. prereq: [2243 or 2373], [2263 or 2374], [2283 or 3283] or 2574

MATH 5616H. Honors: Introduction to Analysis II. (4 cr.; Student Option; Every Spring)

MATH 5651. Basic Theory of Probability and Statistics. (4 cr.; Student Option; Every Fall & Spring)
Logical development of probability, basic issues in statistics. Probability spaces, random variables, their distributions/expected values. Law of large numbers, central limit theorem, generating functions, sampling, sufficiency, estimation. prereq: [2263 or 2374 or 2573], [2243 or 2373] or 2574 or 3283 recommended.

MATH 5652. Introduction to Stochastic Processes. (4 cr.; Student Option; Every Fall & Spring)
Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion, prereq: 5651 or Stat 5101

MATH 5654. Prediction and Filtering. (4 cr.; Student Option; Every Spring)

MATH 5705. Enumerative Combinatorics. (4 cr.; Student Option; Every Fall & Spring)
Basic enumeration, bijections, inclusion-exclusion, recurrence relations, ordinary/exponential generating functions, partitions, Polya theory. Optional topics include trees, asymptotics, list algorithms, rook theory, involutions, tableaux, permutation statistics. prereq: [2243 or 2373 or 2573], [2263 or 2283 or 2374 or 2574 or 3283]

MATH 5707. Graph Theory and Non-enumerative Combinatorics. (4 cr.; Student Option; Every Fall & Spring)
Basic topics in graph theory: connectedness, Eulerian/Hamiltonian properties, trees, colorings, planar graphs, matchings, flows in networks. Optional topics include graph algorithms, Latin squares, block designs, Ramsey theory. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574]; [2283 or 3283 or experience in writing proofs] highly recommended; Credit will not be granted if credit has been received for: 4707

MATH 5711. Linear Programming and Combinatorial Optimization. (4 cr.; Student Option; Every Fall & Spring)
Simplex method, connections to geometry, duality theory, sensitivity analysis. Applications to cutting stock, allocation of resources, scheduling problems. Flows, matching/transportation problems, spanning trees, distance in graphs, integer programs, branch/bound, cutting planes, heuristics. Applications to traveling salesman, knapsack problems. prereq: 2 sems soph math [including 2243 or 2373 or 2573]

MATH 5900. Tutorial in Advanced Mathematics. (1-6 cr.; max 120 cr.; A-F or Audit; Every Fall, Spring & Summer)
Individually directed study.

MATH 5990. Topics in Mathematics. (4 cr.; max 12 cr.; Student Option; Periodic Fall & Spring)
Topics vary by instructor. See class schedule.

MATH 8001. Preparation for College Teaching. (1 cr.; S-N or Audit; Every Fall & Spring)
New approaches to teaching/learning, issues in mathematics education, components/expectations of a college mathematics professor. prereq: Math grad student in good standing or instr consent

MATH 8141. Applied Logic. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Applying techniques of mathematical logic to other areas of mathematics and computer science. Sample topics: complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

MATH 8142. Applied Logic. (3 cr.; A-F or Audit; Periodic Spring)
Applying techniques of mathematical logic to other areas of mathematics, computer science. Complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

MATH 8151. Axiomatic Set Theory. (3 cr.; A-F or Audit; Periodic Fall)
Axiomatic development of basic properties of ordinal/cardinal numbers, infinitary combinatorics, well founded sets, consistency of axiom of foundation, constructible sets, consistency of axiom of choice and of generalized continuum hypothesis. prereq: 5166 or instr consent

MATH 8152. Axiomatic Set Theory. (3 cr.; A-F or Audit; Periodic Fall)
Axiomatic development of basic properties of ordinal/cardinal numbers, infinitary combinatorics, well founded sets, consistency of axiom of foundation, constructible sets, consistency of axiom of choice and of generalized continuum hypothesis. prereq: 5166 or instr consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
MATH 8166. Recursion Theory. (3 cr.; A-F or Audit; Periodic Fall)
Analysis of concept of computability, including various equivalent definitions. Primitive recursive, recursive, partial recursive functions. Oracle Turing machines. Kleene Normal Form Theorem. Recursive, recursively enumerable sets. Degrees of unsolvability. Arithmetic hierarchy. prereq: Math grad student or instr consent

MATH 8167. Recursion Theory. (3 cr.; A-F or Audit; Periodic Spring)
Sample topics: complexity theory, recursive analysis, generalized recursion theory, analytical hierarchy, constructive ordinals. prereq: 8166

MATH 8172. Model Theory. (3 cr.; A-F or Audit; Periodic Fall)
Interplay of formal theories, their models. Elementary equivalence, elementary extensions, partial isomorphisms. Löwenheim-Skolem theorems, compactness theorems, preservation theorems. Ultraproducts. prereq: Math grad student or instr consent

MATH 8173. Model Theory. (3 cr.; A-F or Audit; Periodic Fall)
Types of elements. Prime models, homogeneity, saturation, categoricity in power. Forking. prereq: 8172 or instr consent

MATH 8190. Topics in Logic. (1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring)
Offered for one year or one semester as circumstances warrant.

MATH 8201. General Algebra. (3 cr.; A-F or Audit; Every Fall)
Groups through Sylow, Jordan-Hölder theorems, structure of finitely generated Abelian groups. Rings and algebras, including Gauss theory of factorization. Modules, including projective and injective modules, chain conditions, Hilbert basis theorem, and structure of modules over principal ideal domains.

MATH 8202. General Algebra. (3 cr.; A-F or Audit; Every Spring)
Classical field theory through Galois theory, including solvable equations. Symmetric, Hermitian, orthogonal, and unitary form. Tensor and exterior algebras. Basic Wedderburn theory of rings; basic representation theory of groups. prereq: 8201 or instr consent

MATH 8207. Theory of Modular Forms and L-Functions. (3 cr.; A-F or Audit; Every Fall)
Zeta and L-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, class number formulas; Riemann hypothesis; modular forms and associated L-function; Eisenstein series; Hecke operators, Poincaré series, Euler products; Ramanujan conjectures; Theta series and quadratic forms; waveforms and L-functions.

MATH 8208. Theory of Modular Forms and L-Functions. (3 cr.; A-F or Audit; Periodic Fall)
Applications of Eisenstein series: special values and analytic continuation and functional equations of L-functions. Trace formulas.
Gauss, Codazzi equations. Tensor calculus, Hodge theory, spinors, global differential geometry, applications. prereq: 8365 or instr consent

MATH 8370. Topics in Differential Geometry. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Current research in Differential Geometry. prereq: 8301 or 8365; offered for one yr or one sem as circumstances warrant

MATH 8380. Topics in Advanced Geometry. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Current research. prereq: 8301, 8365


MATH 8386. Calculus of Variations and Minimal Surfaces. ( ; 3 cr.; A-F or Audit; Periodic Fall) Theory of multiple integrals. Geometrical differential equations, i.e., theory of minimal surfaces and related structures (surfaces of constant or prescribed mean curvature, solutions to variational integrals involving surface curvatures), all extremals for variational problems of current interest as models for interfaces in real materials. prereq: 8595 or instr consent

MATH 8387. Mathematical Modeling of Industrial Problems. ( ; 3 cr.; A-F or Audit; Periodic Fall) Mathematical models from physical, biological, social systems. Emphasizes industrial applications. Modeling of deterministic/probabilistic, discrete/continuous processes; methods for analysis/computation. prereq: [5xxx numerical analysis, some computer experience] or instr consent

MATH 8388. Mathematical Modeling of Industrial Problems. ( ; 3 cr.; A-F or Audit; Periodic Fall) Techniques for analysis of mathematical models. Asymptotic methods; design of simulation and visualization techniques. Specific computation for models arising in industrial problems. prereq: 8597 or instr consent

MATH 8390. Topics in Mathematical Physics. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall) Current research. prereq: 8601; offered for one yr or one sem as circumstances warrant

MATH 8401. Mathematical Modeling and Methods of Applied Mathematics. ( ; 3 cr.; A-F or Audit; Every Fall) Dimension analysis, similarity solutions, linearization, stability theory, well-posedness, and characterization of type. Fourier series and integrals, wavelets, Green’s functions, weak solutions and distributions. prereq: 4xxx numerical analysis and applied linear algebra or instr consent

MATH 8402. Mathematical Modeling and Methods of Applied Mathematics. ( ; 3 cr.; A-F or Audit; Every Spring) Calculus of variations, integral equations, eigenvalue problems, spectral theory. Perturbation, asymptotic methods. Artificial boundary conditions, conformal mapping, coordinate transformations. Applications to specific modeling problems. prereq: 8401 or instr consent

MATH 8431. Mathematical Fluid Mechanics. ( ; 3 cr.; A-F or Audit; Periodic Fall) Equations of continuity/motion. Kinematics. Bernoulli’s theorem, stream function, velocity potential. Applications of conformal mapping. prereq: 5xxx numerical analysis of partial differential equations or instr consent


MATH 8444. FTE: Doctoral. ( ; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

MATH 8445. Numerical Analysis of Differential Equations. ( ; 3 cr.; A-F or Audit; Every Fall) Finite element and finite difference methods for elliptic boundary value problems (e.g., Laplace’s equation) and solution of resulting linear systems by direct and iterative methods. prereq: 4xxx numerical analysis, 4xxx partial differential equations or instr consent

MATH 8446. Numerical Analysis of Differential Equations. ( ; 3 cr.; A-F or Audit; Every Spring) Numerical methods for parabolic equations (e.g., heat equations). Methods for elasticity, fluid mechanics, electromagnetics. Applications to specific computations. prereq: 8445 or instr consent

MATH 8450. Topics in Numerical Analysis. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Selected topics. prereq: Grad math major or instr consent; offered as one yr or one sem crse as circumstances warrant

MATH 8470. Topics in Mathematical Theory of Continuum Mechanics. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Offered for one year or one semester as circumstances warrant.

MATH 8501. Differential Equations and Dynamical Systems I. ( ; 3 cr.; A-F or Audit; Every Fall) Existence, uniqueness, continuity, and differentiability of solutions. Linear theory and hyperbolicity. Basics of dynamical systems. Local behavior near a fixed point, a periodic orbit, and a homoclinic or heteroclinic orbit. Perturbation theory. prereq: 4xxx ODE or instr consent


MATH 8505. Applied Dynamical Systems and Bifurcation Theory I. ( ; 3 cr.; A-F or Audit; Periodic Fall) Static/Hopf bifurcations, invariant manifold theory, normal forms, averaging, Hopf bifurcation in maps, forced oscillations, coupled oscillators, chaotic dynamics, co-dimension 2 bifurcations. Emphasizes computational aspects/applications from biology, chemistry, engineering, physics. prereq: 5525 or 8502 or instr consent

MATH 8506. Applied Dynamical Systems and Bifurcation Theory II. ( ; 3 cr.; A-F or Audit; Periodic Fall) Background on analysis in Banach spaces, linear operator theory, Lyapunov-Schmidt reduction, static bifurcation, stability at a simple eigenvalue, Hopf bifurcation in infinite dimensions invariant manifold theory. Applications to hydrodynamic stability problems, reaction-diffusion equations, pattern formation, and elasticity. prereq: 5587 or instr consent

MATH 8520. Topics in Dynamical Systems. ( ; 1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring)
MATH 8590. Topics in Partial Differential Equations. ( ; 1-3 cr.; A-F or Audit; Periodic Fall & Spring) Offered for one year or one semester as circumstances warrant. prereq: 8502

MATH 8540. Topics in Mathematical Biology. ( ; 1-3 cr.; max 12 cr.; A-F or Audit; Every Fall & Spring) Offered for one year or one semester as circumstances warrant.

MATH 8571. Theory of Evolutionary Equations. ( ; 3 cr.; A-F or Audit; Every Fall) Infinite dimensional dynamical systems, attraction, existence and robustness. Linear semigroups, analytic semigroups. Linear and nonlinear reaction-diffusion equations, strong and weak solutions, well-posedness of solutions. prereq: 8502 or instr consent

MATH 8572. Theory of Evolutionary Equations. ( ; 3 cr.; A-F or Audit; Periodic Spring) Dynamics of Navier-Stokes equations, strong/weak solutions, global attractors. Chemically reacting fluid flows. Dynamics in infinite dimensions, unstable manifolds, center manifolds perturbation theory, Inertial manifolds, finite dimensional structures. Dynamical systems of turbulence. prereq: 8571 or instr consent

MATH 8580. Topics in Evolutionary Equations. ( ; 1-3 cr.; max 12 cr.; A-F or Audit; Periodic Fall) N/A prereq: 8572 or instr consent; offered for one yr or one semester as circumstances warrant

MATH 8581. Applications of Linear Operator Theory. ( ; 3 cr.; A-F or Audit; Periodic Fall) Metric spaces, continuity, completeness, contraction mappings, compactness. Normed linear spaces, continuous linear transformations. Hilbert spaces, orthogonality, projections. prereq: 4xxx applied mathematics or instr consent

MATH 8582. Applications of Linear Operator Theory. ( ; 3 cr.; A-F or Audit; Periodic Fall) Fourier theory. Self-adjoint, compact, unbounded linear operators. Spectral analysis, eigenvalue-eigenvector problem, spectral theorem, operational calculus. prereq: 8581 or instr consent

MATH 8583. Theory of Partial Differential Equations. ( ; 3 cr.; A-F or Audit; Every Fall) Classification of partial differential equations/characteristics. Laplace, wave, heat equations. Some mixed problems. prereq: [Some 5xxx PDE, 8601] or instr consent

MATH 8584. Theory of Partial Differential Equations. ( ; 3 cr.; A-F or Audit; Every Spring) Fundamental solutions/distributions, Sobolev spaces, regularity. Advanced elliptic theory (Schauder estimates, Garding's inequality). Hyperbolic systems. prereq: 8583 or instr consent

MATH 8590. Topics in Partial Differential Equations. ( ; 1-3 cr.; A-F or Audit; Every Fall & Spring) Research topics. prereq: 8602; offered for one yr or one sem as circumstances warrant

MATH 8600. Topics in Advanced Applied Mathematics. ( ; 1-3 cr.; max 12 cr.; Student Option; Every Fall & Spring) Offered for one yr or one semester as circumstances warrant. Topics vary. For details, contact instructor.

MATH 8601. Real Analysis. ( ; 3 cr.; A-F or Audit; Every Fall) Set theory/fundamentals. Axiom of choice, measures, measure spaces, Borel/Lebesgue measure, integration, fundamental convergence theorems, Riesz representation.


MATH 8640. Topics in Real Analysis. ( ; 3 cr.; max 12 cr.; A-F or Audit; Periodic Fall) Current research. prereq: 8602 or instr consent; offered for one year or one semester as circumstances warrant

MATH 8641. Spatial Ecology. ( ; 3 cr.; S-N or Audit; Periodic Fall) Introduction: role of space in population dynamics and interspecific interaction; includes single species and multispecies models, deterministic and stochastic theory, different modeling approaches, effects of implicit/explicit space on competition, pattern formation, stability diversity and invasion. Recent literature. Computer lab. prereq: Two semesters calculus, theoretical population ecology or four semesters more robust calculus, course in statistics or probability or instr consent


MATH 8652. Theory of Probability Including Measure Theory. ( ; 3 cr.; Student Option; Every Spring) Conditional distributions and expectations, convergence of sequences of distributions on real line and on Polish spaces, central limit theorem and related limit theorems, Brownian motion, martingales and introduction to other stochastic processes. prereq: 8651 or instr consent

MATH 8654. Fundamentals of Probability Theory and Stochastic Processes. ( ; 3 cr.; Student Option; Periodic Spring) Review of basic theorems of probability for independent random variables; introductions to Brownian motion process, Poisson process, conditioning, Markov processes, stationary processes, martingales, super- and sub-martingales, Doob-Meyer decomposition. prereq: 8651 or 8602 or instr consent

MATH 8655. Stochastic Calculus with Applications. ( ; 3 cr.; Student Option; Every Fall) Stochastic integration with respect to martingales, Itô's formula, applications to business models, filtering, and stochastic control theory. prereq: 8654 or 8659 or instr consent

MATH 8660. Topics in Probability. ( ; 1-3 cr.; max 12 cr.; Student Option; Every Fall & Spring) Offered for one year or one semester as circumstances warrant.

MATH 8665. Doctoral Pre-Thesis Credits. ( ; 1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MATH 8668. Combinatorial Theory. ( ; 3 cr.; A-F or Audit; Periodic Fall) Basic enumeration, including sets and multisets, permutation statistics, inclusion-exclusion, integer/set partitions, involutions and Polya theory. Partially ordered sets, including lattices, incidence algebras, and Mobius inversion. Generating functions.

MATH 8669. Combinatorial Theory. ( ; 3 cr.; A-F or Audit; Spring Even Year) Further topics in enumeration, including symmetric functions, Schensted correspondence, and standard tableaux; non-enumerative combinatorics, including graph theory and coloring, matching theory, connectivity, flows in networks, codes, and extremal set theory. prereq: 8668 or instr consent

MATH 8680. Topics in Combinatorics. ( ; 1-3 cr.; max 12 cr.; A-F or Audit; Every Fall & Spring) Selected topics. prereq: Grad math major or instr consent; offered as one yr or one sem cr as circumstances warrant

MATH 8701. Complex Analysis. ( ; 3 cr.; A-F or Audit; Every Fall) Foundations of holomorphic functions of one variable; relation to potential theory, complex manifolds, algebraic geometry, number theory. Cauchy's theorems, Poisson integral, Singularities, series, product representations.

**MATH 8702. Complex Analysis.** (3 cr.; A-F or Audit; Every Spring)

**MATH 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**MATH 8780. Topics in Complex Analysis.** (1-3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall) Current research. prereq: 8702 or instr consent; offered for one yr or one sem as circumstances warrant

**MATH 8801. Functional Analysis.** (3 cr.; A-F or Audit; Every Fall) Motivation in terms of specific problems (e.g., Fourier series, eigenfunctions). Theory of compact operators. Basic theory of Banach spaces (Hahn-Banach, open mapping, closed graph theorems). Frechet spaces. prereq: 8602 or instr consent

**MATH 8802. Functional Analysis.** (3 cr.; A-F or Audit; Periodic Spring) Spectral theory of operators, theory of distributions (generalized functions), Fourier transformations and applications. Sobolev spaces and pseudo-differential operators. C-star algebras (Gelfand-Naimark theory) and introduction to von Neumann algebras. prereq: 8801 or instr consent

**MATH 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

**MATH 8990. Topics in Mathematics.** (1-6 cr. [max 24 cr.]; S-N or Audit; Every Fall & Spring) Readings. research. prereq: instr consent

**MATH 8991. Independent Study.** (1-6 cr. [max 24 cr.]; Student Option; Every Fall, Spring & Summer) Individually directed study. prereq: instr consent

**MATH 8992. Directed Reading.** (1-6 cr. [max 24 cr.]; S-N or Audit; Every Fall & Spring) Individually directed reading. prereq: instr consent

**MATH 8993. Directed Study.** (1-6 cr. [max 24 cr.]; S-N or Audit; Every Spring) Individually directed study. prereq: instr consent

**MATH 8994. Topics at the IMA.** (1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Current research at IMA.

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### Mathematics Education (MTHE)

**MTHE 3101. Mathematics and Pedagogy for Elementary Teachers I.** (3 cr.; A-F only; Every Fall, Spring & Summer) Math content knowledge of K-6 in an environment modeling pedagogy for future implementation. Integrated content/methods. Problem solving, connections, communication, reasoning, representation. Functions, proportionality, number, numeration. prereq: [College algebra, elementary FDE student, jr status or above] or instr consent

**MTHE 3102. Mathematics and Pedagogy for Elementary Teachers II.** (3 cr.; A-F only; Every Fall, Spring & Summer) Math content knowledge of K-6 in an environment modeling pedagogy for future implementation. Integrated content/methods. Problem solving, connections, communication, reasoning, representation. Geometry, measurement, probability, statistics. prereq: 3101, college algebra

**MTHE 5011. Arithmetic Structures in School Mathematics.** (3 cr.; Student Option; Every Summer) Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the K-8 mathematics curriculum. Instructional materials and technology appropriate for elementary or middle school arithmetic. Credit hours and targeted level vary with particular classes. prereq: Enrollment in math initial licensure program or tchg exper

**MTHE 5021. Algebraic Structures in School Mathematics.** (3 cr.; Student Option; Every Fall) Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the algebra curriculum. Instructional materials and technology appropriate for arithmetic. Each offering of the course will focus on either elementary/middle or middle/secondary grade levels. prereq: Tchg exper or instr consent

**MTHE 5031. Geometric Structures in School Mathematics.** (3 cr.; Student Option; Every Spring) Pedagogy, content, and instructional strategies for teaching geometry. Content and issues relevant to the geometry curriculum. Instructional materials and technology appropriate for geometry. Each offering will focus on either elementary/middle or middle/secondary grade levels. prereq: Enrollment in math initial licensure program

**MTHE 5100. Topics in Mathematics Education.** (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Issues, materials, and instructional techniques focusing on a single current topic of particular relevance to secondary school and college mathematics teachers.

**MTHE 5155. Rational Number Concepts and Proportionality.** (3 cr.; Student Option; Fall Every Year) The relationship between the development of rational number concepts and proportional reasoning skills. Examination of how newer school curricula treat these concepts. Application of materials in the classroom and analysis of results. Reading and responding to current research, prereq: Educ student or instr consent

**MTHE 5171. Teaching Problem Solving.** (3 cr.; Student Option; Periodic Spring & Summer) Investigation of fundamental concepts and principles of problem solving, reasoning, and proof. Emphasis on activities and applications appropriate for junior and senior high classes. Pedagogical experiences to prepare teachers to teach problem solving, reasoning, and proof in classrooms.

**MTHE 5172. Teaching Probability and Statistics.** (3 cr.; Student Option; Fall Odd Year) Investigation of fundamental concepts and principles of probability and statistics. Emphasis on activities and applications appropriate for junior and senior high school classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy accurately and effectively in classrooms.

**MTHE 5305. Middle School Mathematics Methods.** (2 cr.; A-F only; Every Fall) The unique needs of middle school students in the mathematics classroom. Mathematics content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school mathematics classroom. prereq: Elem ed licensure student

**MTHE 5314. Teaching and Learning Mathematics.** (3 cr.; Student Option; Every Fall) Methods, materials, and curriculum development. Principles of learning. Review of research. Preparation/evaluation of tests, units, and materials of instruction. Recent developments in mathematics curriculum and in instructional alternatives. Issues in teaching/learning. Program planning/evaluation, prereq: Math Ed or MEd or CI MEd or grad student or instr consent

**MTHE 5355. Mathematics for Diverse Learners.** (3 cr.; Student Option; Every Fall & Spring) Mathematical concepts and methods for exceptional students, both low achieving and gifted. Experimental materials and methods designed for underachieving students. prereq: Teaching license or student in elem ed or special ed or instr consent

**MTHE 5366. Technology-Assisted Mathematics Instruction.** (3 cr.; Student Option; Every Spring) Technology--including computers, programmable and graphing calculators, and video--as instructional tools in mathematics; design and evaluation of technology-based mathematics lessons; the effect of technology on the mathematics curriculum; managing the technology-enriched classroom.

**MTHE 5696. Student Teaching in Mathematics.** (1-8 cr.; S-N only; Every Spring)
Student teaching in secondary school mathematics classes. prereq: MEd/initial licensure student or instr consent

MTHE 5993. Directed Studies in Mathematics Education. (2 cr.; S-N or Audit; Every Fall, Spring & Summer) Secondary school classroom teaching project to improve specific teaching skills, planned by student, approved/directed by student’s adviser. prereq: Math ed MEd student, instr consent

MTHE 8561. School Mathematics Curricula - 1850 to Present. (1-3 cr.; A-F only; Every Fall) Historical antecedents of present day school mathematics curricula. Examine primary source materials by reviewing early mathematics texts from curriculum library.

MTHE 8571. Research in Mathematics Education. (3 cr.; Student Option; Periodic Fall) Designed for advanced graduate students in mathematics education. Presentation and discussion of Ph.D. thesis proposals and other contemporary research. prereq: 5313, 8501

MTHE 8591. Seminar: Mathematics Education. (1-3 cr.; Student Option; Fall or Spring or Summer) Problems of mathematics instruction from kindergarten through junior college; opportunity to develop proposals and design models for empirical research. prereq: Math educ PhD student

MTHE 8995. Problems: Mathematics Education. (1-6 cr.; max 12 cr.; Student Option; Fall or Spring or Summer) Students survey most recent literature and design and prepare research reports on special topics. prereq: MA or PhD educ major with math education concentration

Mechanical Engineering (ME)

ME 2011. Introduction to Engineering. (4 cr.; A-F or Audit; Every Fall) Skills critical for practicing engineers. Mechanical engineering, engineering design. Visual, written, and oral communication forms. Computer-based design tools.


ME 3222. Mechanisms & Machine Design. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Selection of standard mechanical components such as bearings, gears, and fasteners. Analysis and synthesis of motion in machines. Displacement, velocity, and acceleration of mechanisms. Machine design project: Apply lecture topics to develop new machines that fulfill customer specifications. prereq: [3221 or concurrent registration is required (or allowed) in 3221], [Sci 1113 or equiv]

ME 3281. System Dynamics and Control. (4 cr.; A-F or Audit; Every Fall, Spring & Summer) Dynamics of mechanical, electrical, thermal, fluid, and hybrid systems. System response using Laplace transform and numerical integration. Fourier transform and convolution. Transfer functions and frequency response. Introduction to classical control. prereq: AEM 2021. [Math 2243 or Math 2373], ME upper div


ME 3331. Thermodynamics. (3 cr.; A-F only; Every Fall, Spring & Summer) Properties, equations of state, processes, cycles for reversible and irreversible thermodynamic systems. Modes of energy transfer. Equations for conservation of mass, energy, entropy balances. Application of thermodynamic principles to modern engineering systems. prereq: Chem 1021, Phys 1301

ME 3332. Fluid Mechanics. (3 cr.; A-F only; Every Fall, Spring & Summer) Mass, momentum conservation principles. Fluid statics, Bernoulli equation. Control volume analysis, dimensional analysis, internal and external viscous flow. Momentum and energy considerations. Introduction to boundary layers. prereq: Math 2243, 3331

ME 3333. Heat Transfer. (3 cr.; A-F only; Every Fall, Spring & Summer) Mechanisms of heat transfer. Conduction, convection, radiation. Boundary layer analysis using momentum and energy equations. Applications such as fins, heat exchangers, electronics cooling, bioheat transfer, energy conversion technologies, phase change energy storage and boiling. prereq: 3332

ME 3990. Curricular Practical Training. (1 cr. max 2 cr.; S-N only; Every Fall, Spring & Summer) Industrial work assignment involving advanced mechanical engineering technology. Reviewed by faculty member. Final report covering work assignment. prereq: ME major

ME 4031W. Basic Mechanical Measurements Laboratory. (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer) Experimental methods, statistical estimates of experimental uncertainty, calibration, signal conditioning, selected transducers for mechanical measurements, data acquisition/processing. Temperature, pressure, humidity, stress-strain, force, velocity, flow/radiative properties. prereq: IE 4521, upper div ME

ME 4043W. Industrial Assignment II. (WI; 4 cr.; A-F only; Every Fall, Spring & Summer) Solution of system design problems that require developing criteria, evaluating alternatives, and generating a preliminary design. Final report emphasizes design communication and describes design decision process, analysis, and final recommendations. prereq: 3041

ME 4044. Industrial Assignment III. (2 cr.; A-F only; Every Fall, Spring & Summer) Industrial work assignment in engineering co-op program. Evaluation based on student’s formal written report covering semester work assignment, prereq: ME upper div, registration in ME co-op program

ME 4054W. Design Projects. (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer) Students work in teams and undertake single, substantial design project. Design problems are open-ended. Product design process. Teams give formal presentation of progress at mid-semester design review, show completed work at design show. prereq: 2011, 3221, 3222, 3281, 3331, 3332, 3333, 4031W, AEM 2021, AEM 3031, EE 3005, ME upper div

ME 4080. Topics in Mechanical Engineering. (1-4 cr.; max 8 cr.; Student Option; Every Fall) Topics vary each semester. prereq: ME upper div

ME 4081H. Mechanical Engineering Honors Thesis I. (2 cr.; A-F or Audit; Every Fall, Spring & Summer) Unstructured research course enabling honors students to do independent research supervised by faculty. Selection of suitable topics according to individual interests and faculty approval. Thesis and oral defense. prereq: ME upper div honors student, instr consent

ME 4082H. Mechanical Engineering Honors Thesis II. (WI; 2 cr.; A-F or Audit; Every Fall, Spring & Summer) Unstructured research course enabling honors students to do independent research supervised by faculty. Selection of suitable topics according to individual interests and faculty approval. Thesis and oral defense. prereq: ME upper div honors student, instr consent

ME 4090. Advanced Engineering Problems. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Independent research project with faculty adviser in mechanical engineering, typically related to adviser's research interests. Student contacts adviser to develop project description well before project's start date. prereq: ME upper div, instr consent

**ME 4131W. Thermal Environmental Engineering Laboratory.** (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Experimental investigation of heat and mass transfer, refrigeration, air conditioning, solar energy, indoor air quality, and other topics related to refrigeration, building heating/cooling, and indoor air quality. prereq: 3332, 3333, 4031W. [ME upper div or grad student]

**ME 4231. Motion Control Laboratory.** (4 cr.; A-F or Audit; Every Fall & Spring) Microprocessor programming, digital filters, frequency response testing, modeling of electromechanical systems, closed loop velocity and position control, programmable logic controllers, factory automation, open loop position control of a vibratory system using input shaping, closed loop position control using pole placement. prereq: 3281, 4031W. ME upper div


**ME 4331. Thermal Energy Engineering Laboratory.** (4 cr.; A-F or Audit; Every Fall & Spring) Measurement/analysis of heat transfer in single phase, multiphase, and turbulent flows. Experimental measurements relevant to thermal/fluid systems, statistical design of experiments/uncertainty analysis. Heat exchange. prereq: [3332, 3333, 3333, 4031W]. ME upper div or grad student

**ME 4431W. Energy Conversion Systems Laboratory.** (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Analyze operation/control of engines, power plants, heating/ventilation systems. Performance characteristics of devices, measurement techniques. Interpretation of experimental data. Presentation of results. prereq: 3333, 4031W. ME upper div or grad student

**ME 5070. Topics in Mechanical Engineering.** (1-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Specialized topics within areas of mechanical engineering. Emphasis on topics of current interest. Topics vary each semester. prereq: CSE upper div or grad student

**ME 5101. Vapor Cycle Systems.** (4 cr.; A-F or Audit; Periodic Summer) Vapor compression and absorption refrigeration systems; heat pumps; vapor power cycle analysis, regeneration, reheat, compound cycle modifications, combines gas turbine--vapor cycle systems. prereq: CSE upper div or grad student

**ME 5103. Thermal Environmental Engineering.** (4 cr.; A-F or Audit; Every Fall) Thermodynamic properties of moist air; psychrometric charts; HVAC systems; solar energy; human thermal comfort; indoor air quality; heating and cooling loads in buildings. prereq: 3331 or 3332, 3333, CSE upper div or grad

**ME 5105. HVAC System Design.** (4 cr.; A-F or Audit; Periodic Summer) Design procedures used for heat exchangers, cooling towers, hydronic systems, and air handling systems. HVAC system design for a commercial building. prereq: 5103, [CSE upper div or grad student]

**ME 5113. Aerosol/Particle Engineering.** (4 cr.; A-F or Audit; Every Fall) Kinetic theory, definition, theory and measurement of particle properties, elementary particle mechanics, particle statistics; Brownian motion and diffusion, coagulation, evaporation and condensation, sampling and transport. prereq: CSE upper div or grad student

**ME 5116. Cleanroom Technology and Particle Monitoring.** (4 cr.; A-F or Audit; Periodic Summer) Fundamentals of cleanroom technology for microelectronics manufacturing; airborne and liquid-borne particulate contaminants; particle monitors: optical and condensation particle counters, wafer surface scanner, microscopy; filter performance and testing; cleanroom design and operation; high purity systems; particle detection in processing equipment. prereq: CSE upper div or grad student


**ME 5223. Materials in Design.** (4 cr.; Student Option; Every Fall) Fundamental properties of engineering materials. Fabrication, treatment. Physical/corrosive properties. Failure mechanism, cost/value analysis as related to material selection specification. prereq: 3221, ME upper division or grad student

**ME 5228. Introduction to Finite Element Modeling, Analysis, and Design.** (4 cr.; A-F or Audit; Every Fall) Finite elements as principal analysis tool in computer-aided design (CAD); theoretical issues and implementation aspects for modeling and analyzing engineering problems encompassing stress analysis, heat transfer, and flow problems for linear situations. One-, two-, and three-dimensional practical engineering applications. prereq: CSE upper div or grad, 3221, AEM 3031, CSci 1113, MatS 2001

**ME 5241. Computer-Aided Engineering.** (4 cr.; A-F or Audit; Every Fall & Spring) Apply computer-aided engineering to mechanical design. Engineering design projects and case studies using computer-aided design and finite element analysis software; design optimization and computer graphical presentation of results. prereq: 3222, CSci 1113 or equiv. CSE upper div or grad

**ME 5243. Advanced Mechanism Design.** (4 cr.; A-F or Audit; Periodic Summer) Analytical methods of kinematic, dynamic, and kinetostatically dynamic analysis and synthesis of mechanisms. Computerized design for function, path, and motion generation based on Burmester theory. prereq: CSE upper div or grad, 3222 or equiv, basic kinematics and dynamics of machines; knowledge of CAD packages such as Pro-E recommended


**ME 5248. Vibration Engineering.** (4 cr.; Student Option; Periodic Summer) Apply vibration theory to design; optimize isolators, detuning mechanisms, viscoelastic suspensions and structures. Use modal analysis methods to describe free vibration of complex systems, relating to both theoretical and test procedures. prereq: CSE upper div or grad, 3281

**ME 5281. Analog and Digital Control.** (4 cr.; Student Option; Every Spring) Continuous and discrete time feedback control systems. Frequency response, stability, poles and zeros; transient responses; Nyquist and
Bode diagrams; root locus; lead-lag and PID compensators, Nichols-Ziegler design method. Digital implementation aliasing; computer-aided design and analysis of control system. prereq: 3281

ME 5286. Robotics. (4 cr.; A-F or Audit; Every Spring) Manipulator forward/inverse kinematics, homogeneous transformations, coordinate frames, Jacobian/velocity control, task primitives/programming, computational issues. Determining path trajectories. Reaction forces, manipulator dynamics/control. Vehicle kinematics, dynamics, and guidance. Lab project demonstrates concepts. prereq: 3281 or equiv. [upper div ME or AEM or CSci or grad student]


ME 5332. Intermediate Fluid Mechanics. (3 cr.; Student Option; Every Fall) Bridge between introductory fluid mechanics and advanced graduate level course. Principles of incompressible and compressible flows, boundary layer theory, and analysis using differential formulations of the governing conservation equations. Analysis of phenomena relevant to the practice of engineering is emphasized through problem solving. Prereq: 3332 or equiv, CSE upper division or graduate student.


ME 5351. Computational Heat Transfer. (4 cr.; A-F or Audit; Every Fall & Spring) Numerical solution of heat conduction/ analogous physical processes. Develop/use computer program to solve complex problems involving steady/unsteady heat conduction, flow/heat transfer in ducts, flow in porous media. prereq: 3333, CSE upper div or grad student

ME 5446. Introduction to Combustion. (4 cr.; A-F or Audit; Every Fall) Thermodynamics, kinetics, energy and mass transport, pollutants in reacting systems. Reactors, laminar and turbulent flames. Ignition, quenching, and flame stability. Diffusion flames. Combustion in reciprocating engines, steam power plants, and turbines, with emphasis on internal combustion engine performance and emissions. prereq: 3331, 3332, 3333, CSE upper div or grad student

ME 5461. Internal Combustion Engines. (4 cr.; A-F or Audit; Every Spring) Basic spark ignition and diesel engine principles, air-fuel-air and actual engine cycles, cycle modeling, combustion and emissions, knock phenomena, air flow and volumetric efficiency, mixture requirements, ignition requirements and performance. Lectures/complementary labs. prereq: CSE upper div or grad student. C or better in [3332, 3333] or 3324

ME 5462. Gas Turbines. (4 cr.; A-F or Audit; Periodic Fall & Spring) Gas turbine cycles, regeneration, recuperation, reheate, intercooling, combined cycle plants, and thermochanical regeneration. Axial and radial flow compressors and turbines; combustor designs, energy analysis, emissions, and noise. Turbojet, fanjet, turboprop engine performance. Stationary power plants, vehicular propulsion, hybrid vehicles. prereq: 3331, 3332, 3333, CSE upper div or grad student

ME 5465. Energy-Resources, Technology and Society. (4 cr.; A-F or Audit; Periodic Fall) Scientific/technological underpinnings described/analyzed for 21st Century. Energy systems analysis, energy conversion technologies, availability analysis, renewable/non-renewable resources, environmental impacts, societal impacts of energy use patterns/energy policies. prereq: 3333, CSE upper division or grad

ME 5566. Modern Thermodynamics. (4 cr.; A-F only; Every Fall & Spring) Applications of thermodynamics to natural phenomena. Multiscale approach. Student group projects, with undergrads and grad students in same group. Three hours/week classroom instruction, one hour/week project discussion. Project presentations at weeks 8 and 14 are webcast. prereq: 3331 or equiv

ME 8001. Research Ethics and Professional Practice. (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Intellectual property, data management, social responsibility, authorship, and plagiarism, conflict of interest, and reporting misconduct. Case studies. Recent newspaper articles.

ME 8113. Advanced Aerosol/Particle Engineering. (3 cr.; A-F or Audit; Periodic Spring) Introduction to kinetic theory, definition, theory, and measurement of particle properties; elementary particle mechanics, particle statistics; Brownian motion and diffusion, coagulation, evaporation and condensation, sampling, and transport. prereq: CSE grad student or instr consent

ME 8221. New Product Design and Business Development I. (4 cr.; A-F or Audit; Every Fall) Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence the same year. prereq: CSE grad student, some design experience

ME 8222. New Product Design and Business Development II. (4 cr.; A-F or Audit; Every Spring) Sponsoring company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence with 8221 the same year. prereq: 8221


ME 8229. Finite Element Methods for Computational Mechanics: Transient/ Dynamic Problems. (4 cr.; A-F or Audit; Every Spring) Computational mechanics involving transient or dynamic situations; development and analysis of computational algorithms. Stability and accuracy of algorithms, convergence issues; linear/nonlinear situations. Implicit, explicit, mixed, and variable time discretization approaches; modal-based methods for engineering problems prereq: 5228 or equiv, 5341, AEM 3031, CSci 1113

ME 8243. Topics in Design. (4 cr.; max 12 cr.; A-F or Audit; Every Fall & Spring) Topics vary with each offering.

ME 8253. Computational Nanomechanics. (3 cr.; Student Option; Every Spring) Fundamentals of mechanical properties in nanometer scale. Role of discrete structure and underlying atomic, molecular, and interfacial forces are illustrated with modern examples. Overview of computational atomistic methods. Lectures, hands-on computing using publicly available or personally developed scientific software packages. prereq: CSE grad student
ME 8254. Fundamentals of Microelectromechanical Systems (MEMS). (4 cr.; A-F only; Every Spring)  
Major classes, components, and applications of MEMS. Principles behind operation of MEMS devices/systems. Standard microfabrication techniques. Unique requirements, environments, and applications of MEMS. Students apply microfabrication techniques/applications to design/manufacture of a MEMS device or microsystem.

ME 8262. Topics in Modeling and Analysis of Manufacturing Processes. (4 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring)  
Advanced topics in Manufacturing. Analytical/numerical modeling of manufacturing processes. Use of computer-based modeling tools and computer controlled manufacturing machines. Comparison of predictions/measurements of process variables and part characteristics. Part production/testing. Processes, technologies, and topics vary with each offering. prereq: 3221, AEM 3016

ME 8268. Properties and Fabrication of Plastics and Composites. (4 cr.; A-F or Audit; Every Spring)  

ME 8281. Advanced Control System Design. (4 cr.; A-F or Audit; Every Fall)  

ME 8282. Control of Nonlinear Systems. (4 cr.; A-F or Audit; Periodic Fall)  

ME 8285. Vehicle Dynamics and Control. (3 cr.; A-F or Audit; Every Fall)  
Vehicle control systems, dynamic models used in their development. Cruise control, adaptive cruise control, ABS, automated lane keeping, automated highway systems, yaw stability control, active rollover prevention, engine control, active/semi-active suspensions. prereq: 5281 or EE 5231 or equiv

ME 8287. Topics in Dynamics and Control. (2-4 cr. [max 12 cr.]; A-F or Audit; Every Fall)  
Topics vary with each offering. prereq: 5281

ME 8322. Advanced Fluid Dynamics in Mechanical Engineering. (3 cr.; A-F or Audit; Every Spring)  
Advanced fluid dynamics course addressing the theory and applications of fluid flows pertinent to mechanical engineering. The course focuses on the physical phenomena, mathematical formulations, and advanced problem-solving techniques for flows ranging from microscale flows to turbulence, with examples from mechanical engineering practice. Prerequisite an intermediate fluid mechanics course or permission of instructor.

ME 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)  
No description prereq: Master's student, adviser and DGS consent

ME 8337. Experimental Methods in the Thermal Sciences. (3 cr.; A-F or Audit; Periodic Fall)  
The course will provide fundamentals on optics theory and optical instruments for students to understand and implement cutting-edge optical diagnostic tools, and to design optical methods for measurements in fluid and thermal sciences. The course will cover commonly used optical measurement techniques including particle image/tracking velocimetry, laser induced fluorescence, Schlieren photography, and digital holography.

ME 8341. Conduction. (3 cr.; A-F or Audit; Every Fall)  
Advanced understanding/application of conduction/diffusion to heat/mass transfer problems. Solving ordinary/partial differential equations related to physics of diffusion. Special topics in numerical micromscale heat transfer. prereq: Undergrad class in heat transfer or instr consent

ME 8342. Convection. (3 cr.; A-F or Audit; Every Spring)  
Heat transfer in fluids flowing around bodies and in tubes/ducts. Forced/natural convection. Laminar/turbulent flow regimes. Turbulent transport and modeling. High-speed flows, viscous dissipation, variable property effects. Application to heat exchange devices. Convective mass transfer. prereq: Grad level course on fundamentals of fluid mechanics that has a substantial component on viscous flows or inst conset

ME 8343. Radiation. (3 cr.; A-F or Audit; Every Spring)  

ME 8345. Computational Heat Transfer and Fluid Flow. (3 cr.; Student Option; Every Fall & Spring)  

ME 8350. Heat Transfer Physics. (3 cr.; A-F only; Spring Odd Year)  

ME 8361. Molecular Gas Dynamics. (3 cr.; A-F or Audit; Periodic Fall)  

ME 8362. Introduction to Plasma Technology. (3 cr.; A-F or Audit; Periodic Spring)  

ME 8381. Bioheat and Mass Transfer. (3 cr.; Student Option; Periodic Summer)  
Analytical/numerical tools to analyze heat/mass transfer phenomenon in cryobiological, hyperthermic, other biomedically relevant applications. prereq: CSE grad student, upper-division transport/fluids course; [physics, biology] recommended

ME 8390. Advanced Topics in the Thermal Sciences. (1-3 cr. [max 18 cr.]; A-F or Audit; Every Spring)  
Topics vary according to instructor.

ME 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)  
No description prereq: Doctoral student, adviser and DGS consent

ME 8446. Advanced Combustion. (3 cr.; A-F or Audit; Periodic Fall)  
Fundamental understanding of linkage between thermodynamics, chemical kinetics, and transport phenomena in combustion systems. Heat release rate, flame stability, and emissions. How those issues arise in furnaces, internal combustion engines, and rockets. prereq: Undergrad courses in thermodynamics, fluid mechanics, heat transfer, IT grad student; 5446 or 8641 highly recommended

ME 8462. Turbomachinery. (3 cr.; A-F or Audit; Periodic Summer)  
Thermodynamic analysis of energy transfer between fluid and rotor; dimensional analysis; principles of axial, mixed, and radial flow pumps, fans, compressors, and turbines; cascade performance; computer flow simulations; applications to propulsion systems and power plants. prereq: CSE grad student, 3321, 3322 or equiv or instr consent

ME 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)  
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; dept consent for 3rd/4th registrations, up to 24
Combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**ME 8772. Advanced Transportation Technologies Seminar.** (1 cr.; S-N or Audit; Every Fall)
Advanced technologies specifically related to transportation. Topics drawn from core science/technology areas of human factors, intelligent vehicles, traffic modeling/management, sensing, communications, and controls.

**ME 8773. Graduate Seminar.** (1 cr.; S-N or Audit; Every Fall & Spring)
Recent developments. prereq: CSE grad student

**ME 8774. Graduate Seminar.** (1 cr.; S-N or Audit; Every Fall & Spring)
Recent developments. prereq: 8773

**ME 8775. Technical Communication.** (1 cr.; S-N or Audit; Periodic Fall)
One-day workshop on presenting a seminar. Students deliver one-hour seminar on technical topic and attend nine other technical seminars.

**ME 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**ME 8794. Mechanical Engineering Research.** (1-4 cr.; S-N only; Every Fall, Spring & Summer)
Directed research, prereq: instr consent

**ME 8800. Modern Developments in Mechanical Engineering.** (1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Seminars on topics in engineering science of importance to mechanical engineers. Invited scholars deliver five-lecture series on each topic; two to five topics each semester. prereq: CSE grad student

**ME 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

**ME 8990. Curricular Practical Training.** (1-2 cr. [max 6 cr.]; S-N only; Every Fall, Spring & Summer)
Industrial work assignment involving advanced mechanical engineering. Review/approval by faculty member and director of graduate studies. Final report covering work assignment.

**Medical Device Innovation (MDI)**

**MDI 5001. Technical Writing Essentials.** (0-1 cr.; A-F only; Every Fall)
This new core course focuses on the important skill to train MedTech professionals to communicate technical information to a broad audience in an effective manner. prereq: grad MDI major

**MDI 5002. Technology Foresight and Forecasting.** (2 cr.; A-F only; Every Fall, Spring & Summer)
Tools/techniques for technology forecasting, assessment, foresight for decision making in medical device industry. Topics include technology dynamics, research/development, portfolio management, resource allocation. prereq: grad MDI major

**MDI 5003. Technology Foresight & Forecasting Analytical Lab.** (1 cr.; A-F only; Every Fall)
This course is a continuation of MDI 5002: Technology Foresight & Forecasting and will afford students with an opportunity to complete the therapeutic area analysis they began in the summer semester, prepare a PowerPoint presentation in consultation with the instructor, and then present the results of their analysis to a group of MDI faculty. prereq: grad MDI major

**MDI 5004. Clinical Foundations of Medical Device Innovation.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Master essential topics to deepen knowledge of Clinical Environment in which products will be conceived, tested, used. Topics include surgical protocols, physician, surgeon, nursing, technical support functions. Medical terminology, anatomy/physiology, ethnology research, Healthcare Law, Medicare/Medicaid, HIPAA requirements. prereq: MDI grad student. Non-MDI graduate students and non-degree graduate students may register for this course with permission of the MDI program.

**MDI 5006. Finance, Valuation, and Entrepreneurship.** (2 cr.; A-F only; Every Summer)
Course provides students the opportunity to develop the entrepreneurial skills important in managing design, development, and commercialization of medical devices. Focuses on creating value within the organization, financial methods important to managers in technology-based organizations, and business plan development. Topics include budgeting, projecting financial needs, and managing working capital. Registration is limited to MDI students only.

**MDI 5008. Quality, Regulatory and Manufacturing Management.** (2 cr.; A-F only; Every Spring)
Course provides students with understanding of the global regulatory environment in which the medical device industry operates. Students gain a fundamental understanding of critical quality systems regulations including ISO13485/ISO14971 and their relationship to the FDA's cGMP regulations. Students gain practical experience using tools that are essential to both product development and continuation/sustaining engineering including: design control procedures, FMEA, verification and validation, internal and external (supplier) management and audit methods. prereq: MDI graduate student only

**MDI 5010. Product Innovation & Development Management.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Framework for conceptualization, design, development, commercialization process for medical products. Survey of key steps in innovation, from engineering/business perspective. Cross-functional development of concepts/processes. prereq: Grad MDI student. Non-MDI graduate students and non-degree graduate students may register for this course with permission of the MDI program.

**MDI 5012. Medical Industry Macro Environment.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Application of macro environmental analysis to medical device industry. Methods reviewed. Industry-relevant case studies/macro environmental analysis of firms of interest. Political, economic, social, technological, legal, ecological factors that impact medical innovation. prereq: MDI grad student. Non-MDI graduate students and non-degree graduate students may register for this course with permission of the MDI program.

**MDI 5013. Medical Device Center Practicum I.** (2 cr.; A-F only; Every Fall, Spring & Summer)
First of three part series of practicum courses for MDI program. Focus on teaching innovation skills/process using known/pre-assigned clinical needs as examples in collaboration with Medical Device Center. Essential steps in BioDesign process. Apply knowledge to specific real-world examples. prereq: Grad MDI student

**MDI 5014. Medical Device Center Practicum II.** (2 cr.; A-F only; Every Fall, Spring & Summer)
Second of three part series of practicum courses for MDI program. Clinical environment, including research tools/methods, filtering/translation needs, ideation/prototype development, communication with functional managers, corporate executives/investors. prereq: Grad MDI student

**MDI 5015. Medical Device Center Practicum III.** (2 cr.; A-F only; Every Spring)
Medical Device Innovation Practicum III is the third of a three part series. Students will gain a high-level understanding of essential steps in the BioDesign process related to ideation. The steps of the ideation process will include brainstorming and prototyping of potential solutions, risk assessment, and business strategy development. Students will prepare and present a technical evaluation that articulates the value of their new technology or device to functional managers, corporate executives, and/or investors. prereq: Grad MDI student

**MDI 5020. Medical Device Innovation Capstone.** (2 cr.; A-F only; Every Summer)
The MDI capstone is an independent, original, and applied investigation on a relevant subject, problem, or issue in areas of medical device technologies, policy, business, and innovation. All students in the MDI program are required to complete a capstone project as part of the program. Registration is open to MDI students only.

**MDI 5050. Interpersonal & Team Effectiveness.** (1 cr.; A-F only; Every Summer)
MDI 5050 builds the context and capability innovation leaders need to manage effective
interpersonal relationships and develop high performance teams. Emphasis is placed on foundational principles and practices that help leaders self-manage, engage and influence key stakeholders, and generate shared commitment for team and project success. Students will increase their self-awareness through self and peer feedback and develop an action plan to enhance their leadership effectiveness in both their current work role and their MDI practicum teams. prereq: Grad MDI student

MDI 5051. Leading Innovation & Change. (1 cr.; A-F only; Every Fall) MDI 5051 explores the role and differentiating capabilities of outstanding innovation leaders in complex and dynamic environments. Emphasis is placed on principles and practices that help leaders focus on the right strategies, build the organizational capability required to execute a strategy, lead change initiatives and sustain commitment versus compliance among diverse stakeholders. Students will practice improving their team effectiveness and develop a change leadership plan to support implementation of either a current work initiative or their upcoming Capstone Project. prereq: Grad MDI Student and completion of MDI 5050.

Medical Industry Leadership Inst (MILI)

MILI 5589. Medical Technology Evaluation and Market Research. (; 2 cr.; A-F only; Every Spring) Hands-on experience in creating a value proposition for new medical technologies. Leadership pathways in medical technology, insurance, and delivery industries. Personal input from industry leaders: United Health Group, Medtronic, and Mayo Clinic.

MILI 5990. The Healthcare Marketplace. (2 cr. [max 3 cr.]; A-F only; Every Fall & Spring) Physican services, hospital services, insurance, long-term care, pharmaceuticals, and medical devices, and information technology. Lectures, discussions, and presentations from healthcare business leaders.

MILI 5995. Medical Industry Valuation Laboratory. (; 2 cr.; A-F only; Every Fall, Spring & Summer) Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, investors. prereq: instr consent

MILI 5999. Independent Study. (; 1-8 cr. [max 16 cr.]; A-F only; Every Fall, Spring & Summer) Independent study.

MILI 6235. Pharmaceutical Industry: Business and Policy. (; 2 cr.; A-F only; Every Spring) Business/policy issues specific to pharmaceutical industry. Interdisciplinary perspectives, active involvement by industry leaders.

MILI 6421. Topics: Medical Industry. (; 2 cr.; A-F only; Every Spring) Topics: Various medical industry topics

MILI 6562. Information Technology in Health Care. (; 2 cr.; Student Option; Every Fall) Theoretical/conceptual base for health care information technology. Applications of current/developing health IT. Approaches to evaluate effectiveness of health IT systems. Information technology, computer technology, and data structures commonly found in health care information systems. Information system design/evaluation. prereq: MBA student

MILI 6589. Medical Technology Evaluation and Market Research. (; 2 cr.; A-F only; Every Spring) Hands-on experience in creating a value proposition for new medical technologies. Leadership pathways in medical technology, insurance, and delivery industries. Personal input from industry leaders United Health Group, Medtronic, and Mayo Clinic. prereq: MBA student

MILI 6726. Medical Device Industry: Business and Public Policy. (2 cr.; A-F only; Every Fall) This course, with the insight of industry leaders, addresses public-private sector interactions and the business, public policy, regulatory, and technology management issues that concern medical device and biotechnology companies.

MILI 6890. The Healthcare Marketplace. (2 cr.; A-F only; Every Fall & Spring) Survey of trillion dollar medical industry. Physician/hospital services, insurance, pharmaceuticals, medical devices, information technology. Scale, interactions, inter-relationships, market opportunities, barriers. prereq: MBA student


MILI 6995. Medical Industry Valuation Laboratory. (; 2 cr.; [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, investors. prereq: Grad student

MILI 6996. Medical Industry Valuation Laboratory. (; 2 cr.; [max 10 cr.]; A-F only; Every Fall & Spring) Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, investors. prereq: Approved application

MILI 6997. MILI Global Valuation Lab. (4 cr. [max 20 cr.]; A-F only; Periodic Summer) Global version of medical industry leadership institute valuation lab. Assess value of propriety inventions.

MILI 6998. MILI Fellows. (0-2 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Fellows will apply the knowledge they have acquired in the MILI Valuation Lab course to assess the commercial viability of innovations developed by the Medical Device Center’s Innovation Fellows.

MILI 6999. Independent Study. (; 0-8 cr. [max 16 cr.]; A-F only; Every Fall, Spring & Summer) Independent study.

Medical Laboratory Sciences Pr (MLSP)

MLSP 1010. Introduction to Medical Laboratory Science. (; 1 cr.; S-N only; Every Fall, Spring & Summer) Introduction to medical laboratory sciences. Primary disciplines in field/areas of specialty practice. Career pathways explored in hospital laboratories, public health, research.

MLSP 5011W. Professional Issues in the Health Care Community. (WI; 2 cr.; A-F only; Every Spring & Summer) Current literature and written discussion to explore the laboratory profession: healthcare systems, professional scope of practice, regulatory and licensure issues, medical ethics, Interprofessional practice models and current topics impacting health care delivery. Focus is on the medical laboratory’s crucial role in patient care.

MLSP 5012. Foundations in Interprofessional Communication and Collaboration. (; 1 cr.; A-F only; Every Fall) Interprofessional approach to health care. Online discussion topics. Directed group activities. Personal/professional image, teamwork, self/peer assessment, health professions, professional identity and integrity, relationships between professions and those they serve. Introduction to basic education theory, instructional design for laboratory practitioners. prereq: Admission into MLS Program

MLSP 5013. Scholarly Inquiry and Analysis in Medical Laboratory Sciences. (; 1 cr.; A-F only; Every Fall & Summer) Review concepts of scientific inquiry. Major steps of research project. How to select topics, evaluate literature, and construct and test working hypothesis. Analyze and interpret data, report results. Quantitative, qualitative, and mixed methods research designs.

MLSP 5014W. Laboratory Operations and Management in Health Care Systems. (WI; 2 cr.; A-F only; Every Fall & Summer) Theory/practice of fiscal/personnel management for laboratory professionals. Includes introduction to laboratory information systems, legal aspects of test reporting, Government regulatory, certification, licensure, medical ethics of health care, accreditation

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
MLSP 5111. Concepts of Diagnostic Microbiology. (3 cr. ; A-F only; Every Fall) Presentation of medically significant human bacterial and yeast diseases. Epidemiology, physiology, and pathogenic interactions between man and microorganism. Laboratory regulations, epidemiological characteristics, laboratory testing and mechanisms of antimicrobial therapy and resistance. prereq: [MICB 3301 or equivalent], [BIOC 3021 Biochemistry or equivalent] or instr consent

MLSP 5112. Application of Diagnostic Microbiology Principles. (2 cr. ; A-F only; Every Fall) Application in identification and treatment of microorganisms causing human diseases. Emphasis on aerobic and anaerobic bacteria, mycobacteria, and yeast from various body sites. Specimen processing, culture workup, conventional microscopy, and molecular and immunological techniques.

MLSP 5113. Advanced Concepts in Diagnostic Microbiology. (3 cr. ; A-F only; Every Spring) Physiology and pathogenic interactions between man and microorganism. Epidemiology, prevention, recovery, conventional, immunological, molecular identification, and methods and treatment of microorganisms involved in human diseases. prereq: 5111 or instr consent

MLSP 5211. Fundamentals in Hematology and Hemostasis. (3 cr. ; A-F only; Every Fall) Anatomy and physiology of hematopoietic and coagulation systems. Basic blood cell morphology and common hematology and hemostasis tests. Clinical implications for health and disease. prereq: PHSL 3051 or instr consent

MLSP 5212. Application of Hematology & Hemostasis Principles. (1 cr. ; A-F only; Every Fall) Theory, performance, and application of common hematologic and hemostatic diagnostic procedures. Interpretation and correlation of laboratory findings. Venipuncture, cell counting, white blood cell differential, red and white blood cell morphology, interpretation, and coagulation studies. prereq: concurrent registration is required (or allowed) in 5211

MLSP 5213. Diagnostic Hematology. (3 cr. ; A-F only; Every Spring) Blood and bone marrow in assessment of hematologic function and disease. Major focus on normal development and differentiation, abnormal changes found in disease. Cytocchemical stains, flow cytometry, cytogenetics, molecular diagnostics. prereq: [5211, 5212] or instr consent

MLSP 5214. Advanced Hematology Morphology. (1 cr. ; A-F only; Every Spring) Blood and bone marrow in assessment of hematologic function and presence of disease. Major focus on normal development and differentiation, abnormal changes in pathologic conditions. Cytocchemical stains, flow cytometry, cytogenetics, molecular diagnostics. prereq: [5211, 5212, concurrent registration is required (or allowed) in 5213] or instr consent

MLSP 5311. Fundamental Biomedical Laboratory Techniques. (4 cr. ; A-F only; Every Spring & Summer) Principles of good laboratory practice, experimental design/standard operating procedures, laboratory technical skills, safety, process control. Analytical techniques include colorimetry, chromatography, electrochemical, immunologic, nucleic acid techniques. prereq: 8 credits General Chemistry, 6 credits Organic Chemistry, 3 credits Biochemistry

MLSP 5312. Body Fluid Analysis. (2 cr. ; A-F only; Every Fall) Formation of urine and body fluids, changes that occur in disease, testing used for diagnosis and treatment. Correlation of test results with clinical information discussed. Laboratory skills in body fluid analysis introduced. prereq: 8 credits General Chemistry, 6 credits Organic Chemistry, 3 credits Biochemistry

MLSP 5313. Chemical Analysis in Health and Disease. (3 cr. ; A-F only; Every Spring) Pathophysiology of organ systems and metabolic disorders. Liver, heart, kidney, lungs, diabetes. Health and disease states evaluated in context of clinical chemistry. prereq: 8 credits General Chemistry, 6 credits Organic Chemistry, 3 credits Biochemistry

MLSP 5513. Transfusion Medicine Principles and Methods. (3 cr. ; A-F only; Every Fall) Didactic material covering genetics, detection, significance of human blood group antigens and antibodies. Donor and compatibility testing. Component therapy, transfusion reactions. Hemolytic disease of fetus and newborn. Immune hemolytic anemias. Quality systems. Alternate technologies. prereq: [5511, upper level genetics course] or instr consent


MLSP 5701. Clinical Experience in Microbiology. (2 cr. ; S-N only; Every Fall, Spring & Summer) Gain practical experience, apply technical competencies learned on campus to microbiology laboratory. Develop entry-level competencies and assist in making transition to clinical practitioner. Guided by clinical preceptors and university faculty. prereq: Advanced standing in MLS program

MLSP 5702. Clinical Experience in Hematology and Hemostasis. (2 cr. ; S-N only; Every Fall, Spring & Summer) Gain practical experience and apply technical competencies learned on campus to hematology laboratory. Designed to develop entry-level competencies and assist student in making transition to clinical practitioner. Course guided by clinical preceptors and university faculty. prereq: Advanced standing in MLS program

MLSP 5703. Clinical Experience in Clinical Chemistry and Urinalysis. (2 cr. ; S-N only; Every Fall, Spring & Summer) Gain practical experience and apply technical competencies learned on campus to Clinical Chemistry Laboratory. Designed to develop entry-level competencies and assist student in making transition to clinical practitioner. Course guided by clinical preceptors and university faculty. prereq: Advanced standing in MLS program

MLSP 5704. Clinical Experience in Transfusion Medicine. (2 cr. ; S-N only; Every Fall, Spring & Summer) Gain practical experience and apply technical competencies learned on campus to Transfusion medicine lab. Designed to develop entry-level competencies and assist in making transition to clinical practitioner. Course guided by clinical preceptors and university faculty. prereq: Advanced standing in MLS program

MLSP 5801. Advanced Practicum Experience in Specialty Disciplines. (1 cr. ; S-N only; Every Fall, Spring & Summer) Advanced practicum experience. Restricted enrollment. Students can select variety of specialty sub-disciplines of MLS including cytogenetics, flow cytometry, molecular diagnostics, toxicology, virology, education, management, research, public health, bone marrow tissue transplantation. prereq: Advanced standing in MLS program

Medical Physics (MPHY)

MPHY 5138. Research Seminar. (1-5 cr. ; S-N or Audit; Every Fall)

MPHY 5139. Seminar and Journal Club. (1 cr. [max 2 cr.]; S-N or Audit; Every Spring) Current research/topics related to goals/methods of biophysical sciences and medical physics. Lectures/discussions.

MPHY 5170. Basic Radiological Physics. (3 cr. ; Student Option; Every Fall) Theoretical/experimental aspects of radiological physics. Physical properties of various ionizing radiations, interactions of ionizing radiations with matter, methods of radiation dose measurement. prereq: instr consent

MPHY 5171. Medical and Health Physics of Imaging I. (3 cr. ; Student Option; Every Fall) Physics of diagnostic imaging: specification/quantification of image quality, X-ray production, image receptors, magnetic
resonance imaging, radiation exposure and protection. Special imaging techniques, including mammography, computed tomography, and direct digital image capture. prereq: 5170 or instr consent

MPHY 5172. Radiation Biology. (; 3 cr.; Student Option; Every Fall & Spring) Effects of ionizing radiation on cells, tissues, and organisms. Biochemical/physiological bases of radiation effects. Biological rationale for radiation therapy practices. prereq: 5170 or instr consent

MPHY 5173. Medical and Health Physics of Radiation Therapy. (; 3 cr.; Student Option; Every Spring) Measurements of radiation quality, output, and depth dose distributions for clinical use. Treatment parameter calculation. Beam modification and shaping. Treatment planning for fixed field and rotational therapy in external beam, intracavitary, and interstitial therapy. Computer applications in treatment planning. Principles/criteria for radiation protection. prereq: 5170 or instr consent

MPHY 5174. Medical and Health Physics of Imaging II. (; 3 cr.; Student Option; Every Spring) Physics of diagnostic imaging. Ultrasound, theoretical/experimental applications of radionuclides in medicine and biology. Counting statistics and imaging systems associated with radiopharmaceuticals, radiation dosimetry, and safety in nuclear medicine. prereq: 5170 or instr consent

MPHY 5177. Radiation Therapy Physics Lab: Radiation Physics Basics. (; 3 cr.; A-F only; Every Spring) This course provides students hands-on experience with Hardware/software used in radiation therapy clinic for physics measurements. prereq: 5170 or concurrent registration is required (or allowed) in 5173 or instr consent

MPHY 5178. Radiation Therapy Physics Lab: Radiation Therapy Basics. (; 3 cr.; A-F only; Every Spring) This course provides students hands-on experience with Hardware/software used in radiation therapy clinic for physics measurements. prereq: 5170 or concurrent registration is required (or allowed) in 5173 or instr consent

MPHY 5179. Radiation Therapy Physics Lab: Dosimetric Principles. (; 3 cr.; A-F only; Every Spring) This course provides students hands-on experience with Hardware/software used in radiation therapy clinic for physics measurements. prereq: 5170 or concurrent registration is required (or allowed) in 5173 or instr consent

MPHY 5180. Advanced Physics of Magnetic Resonance Imaging (MRI). (; 3 cr.; Student Option; Every Spring) NMR (nuclear magnetic resonance) and MRI physics, spatial selection and encoding, imaging hardware and system engineering. Imaging sequences, associated contrast/resolution. Recent developments in MRI. prereq: 5174 or instr consent

MPHY 5183. Advanced Digital Imaging Science. (; 3 cr.; Student Option; Every Fall & Spring) Role of digital image science in medical imaging. Measurement of image quality, digital radiography. Image reconstruction for CT, SPECT, PET, and MRI. 3D image processing, image registration/visualization. Picture archiving, communications systems. prereq: 5171 or instr consent

MPHY 5184. Advanced Topics in Radiation Therapy Physics. (; 2 cr.; A-F only; Every Fall) Special procedures. Total body irradiation, intensity-modulated radiation therapy, stereotactic radiosurgery/radiotherapy, image-guided radiation therapy. Treatment planning algorithms/techniques. Brachytherapy. prereq: [5170, 5173] or instr consent

MPHY 8293. Directed Study in Biophysical Sciences and Medical Physics. (; 1-12 cr.; Student Option; Every Fall, Spring & Summer) Individualized study under faculty direction. prereq: instr consent

MPHY 8294. Directed Research in Biophysical Sciences and Medical Physics. (; 1-12 cr.; Student Option; Every Fall, Spring & Summer) Individualized research under faculty direction. prereq: instr consent

MPHY 8333. FTE: Master’s. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) No description) prereq: Master’s student, adviser and DGS consent

MPHY 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) No description) prereq: Doctoral student, adviser and DGS consent

MPHY 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr.; max 12 cr.) No Grade Associated; Every Fall, Spring & Summer) tbld prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MPHY 8777. Thesis Credits: Master’s. (; 1-18 cr.; max 50 cr.) No Grade Associated; Every Fall, Spring & Summer) No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MPHY 8888. Thesis Credit: Doctoral. (; 1-24 cr.; max 100 cr.) No Grade Associated; Every Fall, Spring & Summer) No description) prereq: Max 18 cr per semester or summer; 24 cr required

MEDC 5185. Principles of Biomolecular Simulation. (; 3 cr.; Student Option; Periodic Fall) Molecular simulation for students in medicinal chemistry, pharmaceutics, biochemistry, and chemical physics prereq: Chem 3502 or instr consent

MEDC 5245. Introduction to Drug Design. (; 3 cr.; A-F or Audit; Every Fall) Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design, mechanism of action drugs. prereq: Chem 3502 or instr consent

MEDC 5494. Advanced Methods in Quantitative Drug Analysis. (2 cr.; A-F or Audit; Periodic Fall & Spring) Quantitative methods (HPLC, GC, TLC, immunoassays) for analysis of drugs/metabolites in biological fluids. Advanced techniques such as capillary electrophoresis, supercritical fluid chromatography, GC-MS, LC-MS, tandem mass spectrometry. Chromatographic theory/statistical approaches to method validation.

MEDC 5495. Vistas in Medicinal Chemistry Research. (; 1 cr.; S-N or Audit; Every Fall) Selected topics of contemporary interest in medicinal chemistry

MEDC 5710. General Principles of Medicinal Chemistry. (; 2 cr.; A-F or Audit; Periodic Fall) Fundamental principles of enzyme inhibitors, combinatorial chemistry and library design, drug receptor interactions and signal transduction mechanisms, and molecular modeling. prereq: MedC grad student or instr consent

MEDC 8001. General Principles of Medicinal Chemistry. (; 3 cr.; A-F or Audit; Every Fall) Fundamental principles of molecular recognition, physiochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA. prereq: Med chem grad student or instr consent

MEDC 8002. General Principles of Medicinal Chemistry. (; 3 cr.; A-F or Audit; Every Spring) Fundamental principles of molecular recognition, physiochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA. prereq: Med chem grad student or instr consent

MEDC 8050. Physical and Mechanistic Organic Chemistry. (2 cr.; A-F only; Every Fall) Didactic instruction in foundational principles of physical and mechanistic organic chemistry. Recitation component in which students actively solve organic chemistry reaction mechanisms and related problems in organic and medicinal chemistry during course meeting times with faculty guidance. prereq: First-year Medicinal Chemistry grad students or by permission.

MEDC 8070. The Chemistry and Biology of Infectious Diseases. (3 cr.; A-F only; Periodic Fall & Spring) The objectives of this course are to provide a comprehensive overview of antimicrobial agents used in infectious diseases with an emphasis on the underlying foundational principles in chemistry and biology. Antibiotic, antifungal, and antiprotozoal agents will be covered. For each antimicrobial agent, the history, discovery, synthesis, structure-activity relationships, spectrum of activity, clinical uses, mechanism(s) of action, resistance, drug disposition properties, and adverse reactions will be discussed in great detail.

MEDC 8100. Medicinal Chemistry Seminar. (1 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Current topics. prereq: Grad major or instr consent

MEDC 8333. FTE: Master’s. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer)
MEDC 8413. Chemistry of Nucleic Acids. (; 3 cr.; A-F only; Spring Even Year) Chemical aspects of nucleic acid structure and function, synthesis, and functional variants. prereq: [Medicinal chem or chem or biochem] grad student

MEDC 8420. Natural Products Chemistry. (; 3 cr.; A-F only; Spring Odd Year) Biosynthesis of natural products with an emphasis on how these biochemical principles can be used in drug discovery and design through metabolic engineering and combinatorial biosynthesis. Natural product isolation, structure determination, target identification, and the role of synthetic organic chemistry. prereq: [CHEM 8321, biochemistry] or equiv or course director approval

MEDC 8435. BioAssay & Data Analysis. (1 cr.; A-F or Audit; Spring Even Year) Emphasis is an intro to bioassay & rodent experimental design approaches, data analysis & basic statistical analysis of corresponding data. Concepts of what instrumentation resources are available within the Department of Medicinal Chemistry & the Institute for Therapeutics Discovery & Development (ITDD), what the corresponding bioassays that can be measured on those resources, considerations & criteria for the development of a new bioassay, how to design basic rodent (mouse & rat) animal experiments including power-analysis (how to predict the number of animals needed for the experiment), as well as data analysis (mean, standard error of the mean (SEM), standard deviation of the mean (SD)) & statistical analysis [student t-test, one-way Anova, two-way Anova, & appropriate post-hoc tests], prereq: MEDC 8001 or instructor permission

MEDC 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

MEDC 8461. Design of Cancer Immunotherapeutics. (3 cr.; A-F only; Spring Even Year) Cancer immunotherapy is one of the fastest growing and most exciting areas in anti-cancer drug design today. The emphasis in this course will be to familiarize the student with the basic concepts of the immune system and to survey current advanced approaches for the development and design of small molecule, protein and cell based immunotherapies for the treatment of cancer.

MEDC 8471. High Throughput Drug Discovery. (3 cr.; A-F only; Spring Even Year) Combinatorial chemistry, multi-compound based technologies, their use in screening bioassays to discover lead compounds. Solidphase synthesis, designing compound libraries, pharmacological assay design, data interpretation, biological target selection, compound lead optimization. prereq: Undergraduate [chemistry or biochemistry] or instr consent

MEDC 8500. Design of Chemotherapeutic Agents. (; 2 cr.; A-F or Audit; Periodic Fall) Modern aspects of designing chemotherapeutic agents. Strategies for enzyme inhibition and metabolic blocks in development of anticancer, antimicrobial, and antiviral agents. prereq: 5600 or instr consent

MEDC 8600. Chemical Aspects of Drug Metabolism and Bioactivation. (; 2 cr.; A-F or Audit; Periodic Fall) Chemical and enzymatic mechanisms of biotransformation and bioactivation of drugs and other xenobiotics. Reactivity and fate of bioactivated metabolites. prereq: 5600 or instr consent

MEDC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MEDC 8700. Advanced Concepts in Drug Design. (; 2 cr.; A-F or Audit; Periodic Spring) Current approaches to rational design of drugs. prereq: 5600 or instr consent

MEDC 8753. MOLECULAR TARGETS OF DRUG DISCOVERY. (3 cr.; A-F only; Fall Even Year) Structure of biological macromolecules that are targets of drugs. Techniques to accelerate directed drug discovery. Protein structure/interactions. Popular target classes. Computational tools for visualizing/analyzing protein-ligand and protein-protein interactions. Structural characterization at a level sufficient to underpin critical data evaluation. Biophysical techniques to assess weak ligand binding and suitable for fragment-based lead discovery. prereq: 5710 or 8002 or CHEM 5412 or structural biochemistry or instr consent

MEDC 8760. Design of Peptidomimetics. (; 3 cr.; A-F only; Fall Even Year) Current approaches to design and synthesis of mimetics of biologically active peptides. Structural and conformational rationale used in peptidomimetic design. prereq: 5600 or instr consent

MEDC 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MEDC 8800. Medicinal Chemistry Laboratory Techniques. (; 1-2 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring) Experimental repetitions in medicinal chemistry research laboratories. prereq: Grad med chem major or instr consent

MEDC 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

MEDC 8900. Research in Medicinal Chemistry. (; 1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Study and experimental investigation. prereq: Grad med chem major or instr consent

MEDC 7500. Global Health. (; 0.5-8 cr. [max 16 cr.]; A-F only; Every Summer) Global nature of health and health care. Global health by systems (cardiology, GI, oncology, etc.). Tropical infectious diseases, public health. Refugee/migrant health, cross cultural health care, travel medicine. All core required topics for ASTMH certification. Case-based lectures. Lab component during modules 4-7. prereq: instr consent

MEDC 7505. Infectious Disease Research. (; 2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Although much of medical school consists of assimilating large amounts of information and learning how to apply facts to the diagnosis, treatment, and prevention of certain illnesses, much of this information is "soft," and revisions are almost continuously being made. This course permits the student to participate in the process and better understand its limitations. The object of study may be a clinical or laboratory problem dealing with the diagnosis, treatment, natural history, or epidemiology of infections. Studies regarding antibiotic action, resistance testing, toxicity, host defenses, viral infections, and mechanisms of pathogenicity are especially encouraged.

MEDC 7507. Research in Oncology. (; 6 cr.; H-N or Audit; Every Fall, Spring & Summer) The student is involved in ongoing laboratory studies in an area under active investigation by a faculty member in oncology. Topics may include, but are not limited to, studies of cell differentiation, cell signaling and G-proteins, neutrophil membrane biochemistry and function, molecular biology of gene expression in hematopoietic and tumor cells, regulation of cellular genes by CMV, mechanisms of action by interferons, biology
MED 7509. Research in Immunology--Rheumatology. (1-15 cr.; H-N or Audit; Every Fall & Spring)
Under the direct supervision of a faculty member, the student plans and carries out a well-defined project in immunobiology. The student is expected to review the subject area of the project, interpret relevant literature, plan and carry out experiments, interpret these experiments (including statistical evaluation of the data), and prepare a written report of the project. Opportunities available for genetics of systemic lupus, apoptosis in immune system, molecular and cellular biology of lymphocytes, the establishment of immune self-tolerance and interplay of viral infection and autoimmunity.

MED 7511. Research in Gastroenterology. (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student works with a staff member in the gastroenterology section and carries out an active research program under the direction of the staff. Time will be available to attend various clinical functions of the GI section. There are no prerequisites other than interest in the project.

MED 7512. Research in Hematology. (2-8 cr.; H-N or Audit; Every Fall & Spring)
The student who is specifically interested in laboratory research becomes acquainted with a problem or problems currently under investigation in hematology, including errors in red cell metabolism leading to hemolytic anemias, errors in hemoglobin structure, membrane structure, studies of endothelium, including mechanisms of atherosclerosis, abnormalities in leukocyte function and movement, and stem cell physiology. Student attendance is welcomed at the various divisional teaching and research conferences. Stipends are available and opportunities to obtain an award of $2,000 (Livermore Memorial Hematology Research Award) may result from research started in this course.

MED 7518. Research in Diabetes and Endocrinology. (6 cr.; H-N or Audit; Every Fall & Spring)
The student plans and executes a research project under the supervision of a faculty member in the Section of Diabetes, Endocrinology, and Metabolism. Special areas for investigation include molecular basis of thyroid hormone action, molecular regulation of pancreatic islet genes, immunology and immunogenetics of diabetes mellitus, dietary management of diabetes mellitus, neuroendocrinology, and intermediate metabolism of carbohydrates. Depending on the project, there may be limited time available for participation on the clinical activities of the Section. This elective familiarizes the interested student with methods and problems in endocrinology, enhances their problem-solving ability, and allows the student to gain research experience in a specialized area of endocrinology.

MED 7521. Infectious Disease, Clinical Aspects. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student functions as integral member of the clinical infectious diseases team during this elective. They will evaluate patients, participate in all discussions, and explore the literature on problems relating to patients they have seen. Additional reading, conferences, and clinical lab rounds also are an integral part of the course, as will a weekly series of didactic lectures covering some major clinical problems. Formal demonstrations and microbiology laboratory involvement vary among the four teaching hospitals. Faculty at the four hospitals are as follows: HC: Drs. P. Peterson, R. Schut, M. Simpson, D. Tsukayama; SR: Drs. K. Henry, C. Sullivan; UM: Drs. J. Goodman, S. Kline, L. Sabath, T. Schacker; and VA: Drs. G. Ficlie, E. Janoff, J. Johnson, V. Morrison, J. Thorn.
prereq: 7500

MED 7522. Medical Gastroenterology. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student, as a member of the G.I. consult team, does work up and attends teaching rounds on patients with gastrointestinal disease, attends gastrointestinal conferences (clinical, x-ray, pathology), gain outpatient clinical experience, and becomes familiar with special diagnostic techniques, such as endoscopy, liver biopsy, and small intestinal biopsy. Night call is not required.

MED 7523. Medical Diabetes, Endocrinology, and Metabolism. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
Focus is on clinical recognition of disease states, incise work up, and clinical management of both outpatient and inpatient settings, and is designed to benefit the student regardless of career or specialty objectives. The student deals with problems relating to the function of the hypothalamic-pituitary unit, the thyroid, parathyroid, gonads, pancreas, and adrenal glands.

MED 7524. Cardiovascular Medicine. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
A six-week exposure to acute and consultative cardiology with an emphasis on angina, acute myocardial infarction, heart failure, arrhythmias, and ECG interpretation. prereq: One med clin clerkshp

MED 7525. Cardiovascular Medicine. (4-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student participates in the evaluation and management of the acute and chronic cardiovascular disease problems as they occur in both the inpatient consultation service and the outpatient setting. Supervised electrocardiographic interpretation sessions are available to allow development of skills in electrocardiography. The student attends cardiovascular clinical conferences as well as informal didactic teaching conferences.

MED 7526. Medical Oncology Consultation. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
As a member of the oncology consult team, the student does work ups and presentations for teaching rounds on inpatient consultations, do patient evaluations in the oncology clinic, and participate in oncology conferences. Emphasis is on the clinical evaluation and management of new cancer patients. Special experiences may be arranged upon student request. Night call is not required. prereq: 7500

MED 7528. Clinical Hematology. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student is given initial responsibility for proposing diagnosis and treatment plans for patients with hematologic illness. Consultations for hospitalized patients plus new and return outpatients will be seen in the hematology clinic. Weekly hematology teaching conferences are held jointly at several hospitals. Blood and bone marrow morphology teaching sessions and seminars on clinical aspects of coagulation will be included. Either Wintrobe's Clinical Hematology (8th edition), Williams' Hematology (4th edition), or Hoffman's Hematology (2nd edition) would be a valuable reference for this course.

MED 7530. Cardiology Research Elective. (2-8 cr.; max 16 cr.); H-N only; Every Fall, Spring & Summer)
Students work with faculty member on original or ongoing research project, review subject area, and help plan/execute research work. Topics include basic lab research and projects in clinical cardiology.

MED 7531. Clinical Outpatient and Consultative Rheumatology. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Musculoskeletal complaints are among the most common problems that present to primary care physicians. A clinical rheumatology rotation can be elected at one of three University affiliated sites. Three- or six-week rotations are offered. The student's responsibilities include seeing patients in clinic and conducting a small number of inpatient rheumatologic consultations. The student participates in a series of discussions and case-based solving sessions.

MED 7532. Pulmonary Disease. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
Evaluation of clinical pulmonary problems and the pathophysiology of pulmonary disease is emphasized. The student becomes part of a consult service along with a pulmonary fellow and medical resident, and evaluates both inpatients and outpatients. The student participates in didactic pulmonary conferences and attend a weekly interhospital chest conference at the Fairview-University Medical Center. The student may be asked to choose a pulmonary topic and give a short, formal presentation.

MED 7533. Clinical Allergy. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Practical aspects of allergic/immunologic work ups, treatments. Content modified depending upon individual student needs; special programs (e.g., laboratory methods) arranged depending upon student needs. Clinical material provided through Fairview-University, Regions, VA Hospitals, inpatient consultations, offices of practicing allergists in Twin Cities area. Lectures, seminars, discussions.

MED 7534. Research in Allergy. (6 cr.; H-N or Audit; Every Fall & Spring) The student works with a staff member. He/she may choose to participate in ongoing research within our program or in an original investigative project of the student's design. He/she is expected to review the subject area of the investigation as well as plan, perform, interpret his/her studies, and make a presentation as well as a written report on the project.

MED 7535. Clinical Allergy, Asthma and Immunology Elective Rotation. (3 cr.; H-N or Audit; Every Fall & Spring) Manage adults/children with atopic dermatitis, contact dermatitis, urticaria, angioedema, food allergies, asthma, chronic cough, dysfunctional breathing, hypersensitivity pneumonias, allergic bronchopulmonary aspergillosis allergic rhinoconjunctivitis, nonallergic rhinitis, nasal polyps, sindusitis, eosinophilic esophagitis/gastritis, food protein intolerances, anaphylaxis, recurrent infections, venom allergy; prereq: It is recommended but not required that third and fourth year medical students should have at least one primary care rotation finished. Knowledge of how to perform full medical history and exam is required.

MED 7548. Clinical Genetics. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) Designed for students interested in clinical pediatrics and medicine as well as academic genetics. The student builds basic genetic skills by participating as a member of the combined medicine/pediatrics clinical genetics group at the Fairview-University Medical Center. The activities include weekly hospital rounds, genetics clinic and genetics conference, and hospital consultations when requested. The student evaluates patients with different types of genetic problems and discusses these cases fully. During the second three weeks of the rotation, the student is expected to prepare one topic for genetics conference.

MED 7554. Fluid Electrolyte Acid-Base Metabolism. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) The student serves as a member of a consulting team that evaluates patients with A/B and F/E abnormalities associated with a variety of medical and surgical diseases. Several tutorials are held each week. Topics of fluid and electrolytes, year 2, are reviewed and expanded upon with more advanced material and emphasis on clinical application. The student also participates in the regular activities of the nephrology consultation service. The student evaluates and follows patients with different disorders affecting the kidney; in particular those with acute and chronic renal failure with their attendant fluid and electrolyte problems. prereq: 7500 or instr consent

MED 7555. Medicine Rural Ambulatory Elective. (3-4 cr. [max 8 cr.]; H-N only; Every Fall, Spring & Summer) Out-patient practice of primary care internal medicine.

MED 7556. Renal Consultation. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer) Offers a unique opportunity to see a large number of acutely ill patients with disturbed renal function. Although the patients seen are consult patients, the consult team participates intimately in the care of these patients. There is opportunity for study of the physiological impact of severe renal failure in both medical and surgical patients. Student participates in the consultation service, where the nephrology consult team and the primary service physician manage patients with severe electrolyte problems and renal failure. There is a close interaction between the two students on the rotation, the residents, and staff, allowing simultaneous theoretical discussion and practical patient management. Individual initiative is required. A thorough review of the relevant year 2 courses (kidney, fluid and electrolytes) will enhance this learning experience. prereq: 7500

MED 7561. Outpatient and Clinical Nephrology. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Focus is on renal problems common to a community clinic and hospital practice. Renal clinics are held four days a week. Inpatient consultation is done daily. Didactic lectures are given. This experience is appropriate for the student interested in primary care. prereq: 7500

MED 7562. Clinical Nephrology. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer) The student spends four weeks on the renal consult service. They attend the departmental teaching conferences, including the renal pathology and clinical nephrology conferences held every week. They work closely with the renal fellows and may attend the Renal and Hypertension Clinics. They are expected to present the cases for their patients, including clinical and lab data, and assessment of problems to the attending physician on rounds. Night, weekend or holiday call is not required. prereq: 7500

MED 7573. Acute Care Internal Medicine. (2-4 cr.; H-N or Audit; Every Fall & Spring) This course provides an opportunity to acquire skills in the diagnosis and treatment of acute conditions encountered in internal medicine. The student works with attending physicians and medical residents to evaluate patients (including many with undiagnosed illnesses) in both the ER and urgent care on Monday through Friday (8:30 A.M. to 5:00 PM). Learning is enhanced by a daily didactic curriculum. prereq: 7500, Med 7501

MED 7579. Critical Care/MICU. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Evaluation of performance is based on abilities in eliciting a history, conducting an appropriate physical exam, use of lab and imaging studies, breadth and depth of knowledge base, differential diagnosis, formulation of a treatment program, verbal and written presentation, patient relationship, interaction with colleagues and other hospital staff, and on overall professionalism. prereq: 7501 or instr consent

MED 7582. Medical Intensive Care Unit--Regions Medical Center. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer) Key principles of diagnosis/management of critical illness. Emphasizes cardiopulmonary assessment/management. Using mechanical ventilation, hemodynamic monitoring as focal points. One-month clinical rotation.

MED 7583. Fundamentals of Clinical Oncology. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) This multidisciplinary course provides an introduction to the fundamentals of clinical oncology (adult and pediatric) and is designed for the medical student interested in entering any specialty. Emphasis is placed upon understanding important concepts of oncology, acquiring practical skills relevant to the diagnosis and treatment of the common malignancies, and gaining confidence in providing psychosocial support to patients and families. The student follows newly diagnosed patients as they go through their initial evaluation/staging tests for malignancy and participate in planning treatments. Approximately two hours a day is devoted to conferences and tutorial sessions developed specifically for the student enrolled in this course. prereq: 7500 or Ped 7501

MED 7595. Musculoskeletal Problems in Primary Care Practice. (3 cr.; H-N or Audit; Every Fall, Spring & Summer) The focus of this course is on the evaluation of various common musculoskeletal problems likely to be encountered in a primary care practice. Emphasis is placed on the proper musculoskeletal examination, basic joint aspiration and injection techniques, as well as developing better interpretive skills in reviewing laboratory values and bone/joint radiographs. In addition to attending patient clinics daily, the student is part of interactive conferences and didactic sessions covering various rheumatologic/medical orthopedic topics. Teaching methods include the use of patient instructors, videotapes, polarized microscopy, labeled skeleton, and computer teaching programs. The student works with full-time staff including Drs. Thomas Bloss, David Rhude, Peter Schlesinger, and the course director, Tom Stilman. prereq: 7500

MED 7596. Occupational Health. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This course consists of conferences, clinical experience in occupational health, and optional visits to local workplaces. The conferences include a review of common occupational diseases and an introduction to occupational health law and policy through case presentations by students, and discussion with faculty and residents in occupational medicine.
MED 7598. Biomedical Ethics.  (; 2-6 cr. ; H-N or Audit; Every Fall & Spring) In this independent study course, the student is expected to identify a particular health care ethics problem from either the clinical or public policy perspective. Each student will write a substantive paper based upon their arranged practicum experience.

MED 7599. Bioethics Theory.  (; 3-6 cr. ; H-N or Audit; Every Fall & Spring) In this independent study course, the student is expected to attend interdisciplinary seminars on basic issues in bioethics, and to write one substantive paper on a bioethical problem. Prereq: Students must meet with instructor prior to enrolling in course.

MED 7601. Research in Renal Diseases and Hypertension.  (; 1-15 cr. ; H-N or Audit; Every Fall & Spring) This course addresses a research topic developed by the student and his/her preceptor. Topics include clinical and basic research problems in nephrology. Faculty of the Division of Renal Diseases and Hypertension are available as preceptors for this course.

MED 7602. Advanced Physical Diagnosis.  (; 4 cr.; H-N or Audit; Every Fall, Spring & Summer) Didactic/interactive sessions, professors rounds, student presentations. Presentation/paper for physical diagnosis symposium. Assessment based on classroom/bedside performance in effort, use, practice of physical diagnosis techniques. Month-long elective in February. Prereq: Med sr

MED 7603. Palliative Medicine at Hennepin County Medical Center.  (; 0-4 cr.; H-N only; Every Fall, Spring & Summer) Hospital-based. Practice of palliative medicine. Students function as sub-interns under supervision of board-certified hospice/palliative medicine physicians. Assessment of patients with advanced medical illness. Focuses on pain/non-pain symptom management and complex medical decision making. Faculty presentations, periodic student presentations. Prereq: 7500

MED 7604. Hospitalist and Palliative Medicine.  (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer) Student function as sub-interns under supervision of experienced hospitalists in caring for problems as primary caregiver/consultant. Care of hospitalized patients with broad mix of medical problems, in ICU/non-ICU settings. Students work with palliative medicine consult team in managing patients with advanced illness, care focused on pain management and complex medical decision making. Faculty present core topics in hospitalist/palliative medicine. Periodic topic presentations by students.

MED 7605. Regions Hospital Hospital Medicine Elective.  (; 4-8 cr.; H-N only; Every Fall, Spring & Summer) Students work alongside staff. Students choose from medicine inpatient service, surgical co-management service, hospital medicine palliative care team, progressive care unit, and evening admission team. Prereq: 7500


MED 7666. Medicine Pediatrics Ambulatory Elective.  (; 3-4 cr. ; max 8 cr.; H-N or Audit; Every Fall, Spring & Summer) Out-patient practice of primary care internal medicine and pediatrics.

MED 7700. Clerkship: Internal Medicine Primary Care Selective.  (; 4 cr. ; max 8 cr.; P-N only; Every Fall, Spring & Summer) Four-week ambulatory experience. Focuses on both specialty-specific areas and process-of-care in ambulatory setting. Prereq: [3rd or 4th yr] medical student

MED 7701. Clerkship: Medicine/Pediatrics Primary Care Selective.  (; 4 cr. ; max 8 cr.; P-N only; Every Fall, Spring & Summer) Four-week ambulatory experience. Focuses on both specialty-specific areas and process-of-care in ambulatory setting. Prereq: [3rd or 4th yr] medical student

MED 7703. VAMC Patient Safety.  (3 cr.; H-N only; Every Fall, Spring & Summer) Three-week long elective incorporating reading, case analysis, consultation, simulation, presentations, projects in patient safety. Educate residents/medical students at University of Minnesota in multidisciplinary patient safety principles/practices. Prereq: 3rd or 4th year medical student or current medical resident

MED 7900. Sub-internship in Critical Care.  (; 4 cr.; H-N only; Every Fall, Spring & Summer) Second part of the required 12 weeks of experience in internal medicine started in Medicine 7500. Medicine 7900 is a "sub-internship" in which the student takes direct responsibility for patient care. Therapeutic decision making and care planning are emphasized. The student is part of a patient care team and assumes responsibility for the evaluation and care of three new patients per week. Acute care tutorials with learning objectives and suggested readings are an important part of the course. Self-directed learning tools are available.

MED 7910. Internal Medicine Residency.  (6 cr. ; max 120 cr.; No Grade Associated; Every Fall, Spring & Summer) Internal medicine residency.

MED 7920. Medicine-Pediatric Residency.  (; 6 cr. ; max 120 cr.; No Grade Associated; Every Fall, Spring & Summer) Medicine-pediatric residency.

MED 7930. Internal Medicine Fellowship.  (; 6 cr. ; max 120 cr.; No Grade Associated; Every Fall, Spring & Summer) Internal medicine fellowship.

MEDICAL STUDIES (MEST)

MEST 1002. Medieval Tales and their Modern Echoes.  (GP,LITR; 3 cr.; Student Option; Every Spring) Knights of the Round Table, dragon-slayers, magic djinn, pilgrims in Hell. How these stories have been retold in modern fiction, film, and the arts. Texts from Europe and other regions of globe.

MEST 1200. Topics.  (; 3 cr.; Student Option; Periodic Spring) See Course Guide for specific topic titles.

MEST 1905. Freshman Seminar.  (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Topics specified in Class Schedule. Prereq: Fr

MEST 3001. Introduction to Medieval History.  (GP,HIS; 3 cr.; Student Option; Every Fall, Spring & Summer) Europe from decline of Rome to early Renaissance. Politics, institutions, society, economy, and culture of Middle Ages.

MEST 3002. Medieval Tales and their Modern Echoes.  (GP,LITR; 3 cr.; Student Option; Every Spring) Knights of the Round Table, dragon-slayers, magic djinn, pilgrims in Hell. How these stories have been retold in modern fiction, film, and the arts. Texts from Europe and other regions of globe.

MEST 3009. Medieval Art.  (AH; 3 cr.; Student Option; Every Fall & Spring) Medieval art in Western Europe, from around 1000 to the mid-14th century. Works from France, Spain, Germany, Italy, and England examined in their historical context. Cross cultural relations, development of completely new forms of art and techniques, and the processes of realization.

MEST 3102. Chaucer.  (3 cr.; A-F or Audit; Every Fall & Spring) Major/representative works written by Chaucer, including The Canterbury Tales, Troilus and Criseyde, and the dream visions. Historical, intellectual, and cultural background of the poems. Language, poetic theory, form.

MEST 3610. Topics in Medieval Studies.  (3-4 cr.; max 24 cr.; Student Option; Every Fall & Spring) Fall of Rome through end of Middle Ages (ca. 300-1500 A.D.). Topics specified in Class Schedule.

MEST 3611. Medieval Cities of Europe: 500-1500.  (GP,HIS; 3 cr.; Student Option; Every Fall & Spring)
Evolution of Western European cities from the late Roman town to the early Renaissance city-state.

MEST 3613. History of the Crusades. (GP,HIS; 3 cr.; Student Option; Every Fall, Spring & Summer) Crusading spirit in Europe. Results of classic medieval crusades ca 1095-1285. States established by crusaders in Near East. Internal European crusades. Chronological prolongation of crusading phenomenon.

MEST 3616. France in the Middle Ages. (3 cr.; Student Option; Periodic Fall) Politics, society and culture in medieval France from the end of the Carolingians to the end of the Hundred Years War.

MEST 3617. Pagans, Christians, Barbarians: The World of Late Antiquity. (3 cr.; A-F or Audit; Fall Odd Year) Between classical and medieval, pagan and Christian, Roman and barbarian, the late antique world was a dynamic age. Course focuses on the Mediterranean region from the 2nd to the mid-7th century exploring such topics as the conversion of Constantine, the fall of Rome, barbarian invasions, the spread of Christianity, and the rise of Islam.

MEST 3993. Directed Studies in Medieval Studies. (1-3 cr.; Student Option; Every Fall, Spring & Summer) Directed study with one of core faculty members of Medieval Studies program. prereq: Previous work in a medieval studies discipline, instr consent

MEST 4610. Intermediate Topics in Medieval Studies. (3 cr.; Student Option; Every Fall, Spring & Summer) Topics between fall of Roman Empire and end of Middle Ages (ca. 300-1500 A.D.). Topics specified in Class Schedule.

MEST 4612. Old English I. (3 cr.; Student Option; Periodic Fall) Introduction to the language through 1150 A.D. Culture of Anglo-Saxons. Selected readings in prose/poetry.

MEST 4613. Old English II. (3 cr.; Student Option; Periodic Spring) Critical reading of texts. Introduction to versification. Readings of portions of Beowulf.

MEST 5610. Advanced Topics in Medieval Studies. (3 cr.; max 15 cr.) Student Option; Every Fall & Spring) From late antiquity through end of Middle Ages (circa 300-1500 A.D.). Topics specified in Class Schedule, prereq: One yr work in some area of Middle Ages, reading knowledge of appropriate language, instr consent

MEST 5993. Directed Studies in Medieval Studies. (1-3 cr.; max 6 cr.) Student Option; Every Fall & Spring) Directed study with one of the core faculty of medieval studies program. prereq: One yr work in some area of Middle Ages, reading knowledge of appropriate language, instr consent

MEST 8010. Medieval Studies Colloquium. (3 cr.; max 9 cr.) Student Option; Every Fall & Spring) Lectures by and discussions with faculty and visiting speakers.

MEST 8110. Seminar in Medieval Studies. (3-4 cr. [max 48 cr.]; A-F or Audit; Every Fall & Spring) Offered when feasible. prereq: Appropriate languages, instr consent

Microbial Engineering (MICE)

MICE 5355. Advanced Fermentation and Biocatalysis Laboratory. (1 cr.; S-N only; Every Spring) Methods in industrial microbiology, lab. and pilot scale fermentation/biocatalysis engineering. Lab experiments carried out in fermentation pilot plant. Operation of bench/pilot scale bioreactors. Designing bioreactors. Process optimization, monitoring, and control. Scale-up experiments, data analysis. prereq: [3301 or BIOL 3301], grad student in microbial engineering or upper-dv major in [microbiology or chem engineering or biochemistry], instr consent

MICE 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) No description prereq: Master's student, advisor and DGS consent

MICE 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) No description prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MICE 8920. Teaching Practicum. (1 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Supervised experience in classroom, laboratory, and/or recitation instruction; develops skills in effective use of instructional techniques, materials, tests, and measurements. prereq: Grad MIE major

Microbiol/Immun/Cancer Biology (MICA)

MICA 5000. Practicum: Teaching. (0 cr.; No Grade Associated; Every Fall & Spring) Supervised experience in lab instruction. Use of instructional materials, tests/measurement.

MICA 8002. Structure, Function, and Genetics of Bacteria and Viruses. (4 cr.; A-F or Audit; Every Fall) Structure, function, and metabolism of microorganisms. Microbial genetics. Molecular virology. prereq: [One undergrad or grad course each in [microbiology, genetics, biochemistry]] or instr consent

MICA 8003. Immunity and Immunopathology. (4 cr.; Student Option; Every Fall) Lymphocyte activation, signal transduction in lymphocytes, antigen receptor genetics, antigen presentation, lymphoid anatomy, adaptive immune responses to microbes, immunodeficiency, immunopathology, cytokines, transplantation, autoimmunity. prereq: Upper level undergrad immunology course or instr consent


MICA 8005. Topics in Microbiology, Immunology, and Cancer Biology. (1-4 cr.; A-F or Audit; Every Fall & Spring) Colloquium format. Readings/discussion on specialized topic. prereq: 8012, [8002 or 8003 or 8004] or instr consent

MICA 8006. Protein Sequence Analysis. (3 cr.; Student Option; Fall Even Year) DNA and protein sequence and protein structure databases; protein sequence analysis; methods for display of sequence comparison and prediction results; Genetics Computer Group (GCG) sequence analysis programs; and current literature and research problems. prereq: Biochem course, knowledge of UNIX operating system recommended

MICA 8007. Cell Biology and Biochemistry of the Extracellular Matrix. (3 cr.; A-F or Audit; Every Fall & Spring) Concepts in cell adhesion and tissue composition and importance of cell adhesion in tissue function and disease. Topics range from structure/function/assembly of tissue components to cellular adhesion mechanisms. prereq: 8002 or 8004 or instr consent

MICA 8009. Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death. (2 cr.; Student Option; Every Spring) Aspects of mechanisms involved in growth control at level of nuclear function. Neoplasia in hormonal cancers (such as prostate cancer)

MICA 8010. Microbial Pathogenesis. (3 cr.; A-F or Audit; Fall Even Year) Molecular mechanisms of bacterial/viral pathogenesis. Strategies of disease causation/interaction with host, regulation of virulence factors, mechanism of virulence factor transmission to other microbes. preq: MICA grad student or inst

MICA 8011. Current Topics in Immunology. (3 cr.; A-F or Audit; Every Spring) Colloquium format. In-depth reading, discussion preq: MICA 8003 or instr consent

MICA 8012. Writing and Reviewing a Research Proposal. (2 cr.; A-F only; Every Fall) Assist first/second year graduate students to prepare research proposals for funding. preq: First or second year MICA grad student

MICA 8013. Translational Cancer Research. (2 cr.; A-F only; Every Spring) Clinical issues in cancer research. Discuss translational research projects as they pertain to a variety of cancers. preq: 8004 or instr consent

MICA 8014. Small RNA Biology. (2 cr.; A-F or Audit; Every Spring) Small RNAs as major regulators of gene/protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Biology of small RNAs and their role in health and disease. preq: BIOS 8002 or MICA 8004 or equiv or instr consent

MICA 8094. Research in Microbiology, Immunology, and Cancer Biology. (1 cr.; [max 5 cr.]; S-N or Audit; Every Fall, Spring & Summer) One-on-one research training from faculty adviser during laboratory rotation. preq: 1st yr MICA grad student

MICA 8320. Readings in Neurobiology. (1-4 cr.; Student Option; Every Fall) Topics in neurobiology and neurophysiology.

MICA 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) preq: Master’s student, adviser and DGS consent

MICA 8371. Mucosal Immunobiology. (3 cr.; A-F or Audit; Fall Odd Year) Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces, interactions/responses of various mucosal tissues to pathogens, current approaches being used to target protective vaccination to mucosal tissues. Lectures, journal club format. preq: 8001 or instr consent

MICA 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) preq: Doctoral student, adviser and DGS consent

MICA 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd preq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MICA 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) preq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MICA 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) Thesis credit: doctoral. preq: MICA PhD student, adviser consent

MICA 8910. Seminar: Faculty Research Topics. (0 cr.; No Grade Associated; Every Fall & Spring) State-of-the-art information presented by scientific experts within/outside the University. preq: MICA grad student

MICA 8920. Seminar: Student Research Topics. (0 cr.; No Grade Associated; Every Fall & Spring) Current thesis topics and other aspects of microbiology, immunology, and cancer biology. preq: MICA grad student or instr consent

Microbiology (MICB)

MICB 3301. Biology of Microorganisms. (5 cr.; A-F or Audit; Every Fall, Spring & Summer) Taxonomy, anatomy, physiology, biochemistry, pathogenesis, immunology, ecology of microbes. Molecular structure in relation to bacterial function/disease. Includes lab. preq: [BIOL 1002 or BIOL 1009 or BIOL 2003], [CHEM 2301 or BIOC 2331]

MICB 3303. Biology of Microorganisms. (3 cr.; A-F only; Every Fall, Spring & Summer) Taxonomy, anatomy, physiology, biochemistry, pathogenesis, infectious disease, immunology, ecology of microbes. Molecular structure in relation to function of bacteria, fungi, protozoa, viruses. preq: [BIOL 1002 or BIOL 1009 or BIOL 2003], [CHEM 2301 or BIOC 2331]

MICB 4111. Microbial Physiology and Diversity. (3 cr.; Student Option; Every Fall) Structural/functional organization of bacteria/archaea. Energy metabolism utilizing light, inorganic/organic chemicals. Cell morphologies, roles/assembly of surface structures. Growth/survival mechanisms in various extreme environments. Adaptation to changing conditions by development of specialized cells/structures, altering metabolic patterns. preq: BioC 3021 or Biol 3021 or BioC 4331

MICB 4131. Immunology. (3 cr.; Student Option; Every Fall) Molecular, genetic, cellular bases for humoral/cell-mediated immunity. Innate immunity. Antigen recognition by B/T lymphocytes. Interactions between lymphocytes/other cells of immune system. Cytokines. Immunoregulation. Key aspects of clinical immunology. preq: [VPB 2022 or BIOL 2032 or VPB 2032 or VBS 2032 or 3301 or MCB 3301], [BIOL 3021 or BIOL 3021 or BIOL 4331]

MICB 4141W. Biology, Genetics, and Pathogenesis of Viruses: Writing Intensive. (WI; 4 cr.; A-F only; Every Spring) Structure, attachment, entry. Genome replication/mRNA production. Reverse transcription. Transcription from DNA virus templates. Replication of DNA virus genomes. Viral pre-mRNA. Translational control. Assembly, host defense, tumor viruses, pathogenesis, HIV, antivirals/vaccines, preq: BIOL 3003, MIB 3301 or BIOL 4004] or instr consent; enrollment limited to Microbiology majors by permission from waitlist (graduating seniors only, small enrollment)

MICB 4151. Molecular and Genetic Bases for Microbial Diseases. (3 cr.; Student Option; Every Spring) Genetic basis of microbial pathogenesis. Effect of gene transfer and regulation on evolution of microbial pathogens and capacity to colonize, induce disease. Biochemical and cellular interactions between bacteria and human hosts. preq: MCB 4131 and BioC 3021 advised

MICB 4161W. Eukaryotic Microbiology. (WI; 3 cr.; A-F only; Every Fall) Cell biology of higher eukaryotes, animal/plant pathogenesis, evolution, industrial microbiology. Tetrahymena/Chlamydomyces/Paramecium/Toxoplasma/Aspergilus/Neurospora. preq: 3301, [GCD 3022 or Biol 4003]

MICB 4171. Biology, Genetics, and Pathogenesis of Viruses. (3 cr.; A-F only; Every Spring) Structure, attachment, entry. Genome replication/mRNA production by RNA viruses. Reverse transcription. DNA virus templates. Replication of DNA virus genomes. Processing of viral pre-mRNA. Translational control. Assembly, host defense, tumor viruses, pathogenesis, HIV, antivirals, preq: [BIOL 3021, BIOL 4003, [3301 or BIOL 4004] or instr consent; seats are prioritized for CBS majors (others who meet the course prerequisites can contact the instructor for permission)

MICB 4215. Advanced Laboratory: Microbial Physiology and Diversity. (3 cr.; A-F or Audit; Every Fall) Isolation/cultivation of wide variety of bacteria. Physiological experiments illustrate characteristic features of microorganisms, preq: 3301 or Bio 3023 or VBS 2032 or intro microbiology course with lab

MICB 4225W. Advanced Laboratory: Microbial Genetics. (WI; 3 cr.; A-F only; Every Fall) Yeast is used as model organism for microbial molecular genetic principles such as isolation of mutants, meiotic mapping, mitotic recombination, and gene replacement. Hands-on experimentation. preq: 3301, BIOL 4003
MICB 4235. Advanced Laboratory: Virology, Immunology, and Microbial Genomics. (3 cr.; Student Option; Every Spring) Techniques, experimental methods in microbial genetics, immunology, Virology used to study microbes/interactions with host. prereq: 3301, 4131, BIOC 3021, [completed or concurrent registration is required in MicB 4141W/4171]; access from a wait list

MICB 4793W. Directed Studies: Writing Intensive. (WI; 1-7 cr.; S-N or Audit; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes readings, use of scientific literature, prereq: instr consent, dept consent; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements

MICB 4794W. Directed Research: Writing Intensive. (WI; 1-7 cr. [max 15 cr.]; S-N or Audit; Every Fall, Spring & Summer) Laboratory or field investigation of selected areas of research. prereq: instr consent, dept consent; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements

MICB 4993. Directed Studies. (1-6 cr. [max 36 cr.]; S-N only; Every Fall, Spring & Summer) Individual study on selected topics or problems. Emphasizes selected readings, scientific literature, prereq: 3301, dept consent

MICB 4994. Directed Research. (1-7 cr. [max 28 cr.]; S-N or Audit; Every Fall, Spring & Summer) Lab or field investigation of selected areas of research, prereq: 3301, instr consent

Military Science (MIL)

MIL 103. MS I Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Fall) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1101

MIL 104. MS I Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1102

MIL 203. MS II Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Fall) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1201

MIL 204. MS II Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1202

MIL 303. MS III Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Fall) Army ROTC leadership and personal development lab. prereq: Completion of basic courses, concurrent registration is required (or allowed) in 3301

MIL 304. MS III Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: Completion of basic courses, concurrent registration is required (or allowed) in 3302

MIL 403. MS IV Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Fall) Army ROTC leadership and personal development lab. prereq: Completion of basic courses, concurrent registration is required (or allowed) in 3401

MIL 404. MS IV Zero Credit Lead Lab. (; 0 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: Completion of basic courses, concurrent registration is required (or allowed) in 3402

MIL 1003. Military Science I Leadership Lab. (1 cr. ; A-F only; Every Fall) Basic skills. Preview advanced course. Team-building leadership skills. prereq: concurrent registration is required (or allowed) in 1201

MIL 1101. Introduction to the Army and Critical Thinking. (; 1 cr.; A-F only; Every Fall) Introduces cadets to the personal challenges and competencies that are critical for effective leadership. Cadets learn how the personal development of life skills such as critical thinking, goal setting, time management, physical fitness, and stress management relate to leadership, officer, and the Army profession.

MIL 1102. Introduction to the Profession of Arms. (; 1 cr.; A-F only; Every Spring) Leadership fundamentals such as setting direction, problem-solving, listening, presenting briefs, providing feedback, and using effective writing skills. Cadets explore dimensions of leadership attributes and core leader competencies in the context of practical, hands-on, and interactive exercises.

MIL 1104. MS I One Credit Lead Lab. (; 1 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1102

MIL 1201. Leadership and Decision Making. (; 2 cr.; A-F only; Every Fall) The outcomes of MIL 1201 are demonstrated through Critical and Creative Thinking and the ability to apply Troop Leading Procedures. Comprehension of the officer's role in leading change by applying innovative solutions to problems in concert with the principles of mission command. The Army profession is also stressed through leadership forum and a leadership self-assessment. prereq: concurrent registration is required (or allowed) in lab

MIL 1202. Army Doctrine and Team Development. (; 2 cr.; A-F only; Every Spring) MIL 1202 begins the journey to understand and demonstrate cross-cultural competencies as they relate to Army doctrine and how they apply in a combatant commander's engagement strategies. Army values, teamwork, and Warrior Ethos and their relationship to the Law of Land Warfare and philosophy of military service are also stressed. The ability to lead and follow is also covered through team building exercises in small units up to squad level. prereq: Must enroll in lab

MIL 1203. MS II One Credit Lead Lab. (; 1 cr.; A-F only; Every Fall) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1201

MIL 1204. MS II One Credit Lead Lab. (; 1 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: concurrent registration is required (or allowed) in 1202

MIL 3301. Training Management and Warfighting Functions. (; 3 cr.; A-F only; Every Fall) MIL 3301 includes introduction to squad/platoon tactical operations using troop leading procedures and battle drills to achieve the assigned mission within the commander's intent. Through the introduction of the leadership lab practicum the cadets learn to plan, resource, and execute training of subordinates within the leadership labs. This experience gives the cadet the opportunity to work on their teamwork and leadership skills in a hands-on performance-oriented environment. prereq: Two yrs of ROTC or equiv established by U.S. Army, must see Army ROTC dept officials, concurrent registration is required (or allowed) in lab

MIL 3302. Applied Leadership in Small Unit Operations. (; 3 cr.; A-F only; Every Spring) MIL 3302 balances adaptability and professional competence building on the tactical lessons introduced in MIL 3301. Adaptability concepts introduced include analysis of complex problems, creating solutions that exhibit agile and adaptive thinking, analysis of the environment and formulation of solutions to tactical and organizational problems. prereq: Two yrs of ROTC or equiv established by U.S. Army, must see Army ROTC dept officials, concurrent registration is required (or allowed) in lab

MIL 3303. MS III One Credit Lead Lab. (; 1 cr.; A-F only; Every Fall) Army ROTC leadership and personal development lab. prereq: Completion of basic courses, concurrent registration is required (or allowed) in 3301

MIL 3304. MS III One Credit Lead Lab. (; 1 cr.; A-F only; Every Spring) Army ROTC leadership and personal development lab. prereq: Completion of basic courses, concurrent registration is required (or allowed) in 3302

MIL 3401. The Army Officer. (; 3 cr.; A-F only; Every Fall) MIL 3401 places primary emphasis on officerhood with the MS IV cadets, who are the educational main effort within the Battalion. MIL 3401 and 3402 together refine and ultimately complete the cadet-to-commissioned officer transition. Mission command and ethics are stressed to assist the cadet in further embracing their role as a future army officer.
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
readings, lectures, in-class role-playing, writing-to-learn activities, quizzes, tests, discussions, qualitative research, and reflective writing assignments. Prereq: Students enrolled in the Program of Mortuary Science who have successfully completed an introductory course in general psychology approved by the program.

MORT 3022W. Funeral Service Arrangements Laboratory. (WI; 3 cr.: A-F only; Every Fall & Spring) This course provides students with practical tools to conduct funeral arrangements with diverse client families. Coursework includes application of MORT 3021W material, group discussion, and laboratory-based application of skills. Each student will conduct a simulated arrangement with a community volunteer based on real-world arrangement scenarios. Delivery and assessment of coursework will be via readings, lectures, in-class role-playing, quizzes, tests, writing-to-learn activities, and reflective writing assignments. prereq: Students enrolled in the Mortuary Science program


MORT 3048. Microbiology and Pathology for Funeral Service. (4 cr.; A-F only; Every Fall, Spring & Summer) Basic principles of microbiology/pathology for funeral service, including bacteriology, rickettsiology, virology, protozoology, mycology, methods of transmission of infectious disease. Control procedures for protection of public health as related to funeral practice. Scientific focus on causes of disease, mechanisms of disease development, pathways by which morphologic changes occur. prereq: General biology course with lab

MORT 3051. Restorative Art. (2 cr.; A-F only; Every Fall & Spring) Theories, principles, and techniques related to process of preparing human remains for viewing. prereq: [3171 or concurrent registration is required (or allowed) in 3171]. concurrent registration is required (or allowed) in 3061, mortuary science major

MORT 3061. Embalming Theory. (3 cr.; A-F only; Every Fall & Spring) Process of chemically treating human remains to reduce presence/growth of microorganisms, to temporarily inhibit organic decomposition, and to restore decedent's physical appearance. prereq: [3171 or concurrent registration is required (or allowed) in 3171]. concurrent registration is required (or allowed) in 3051, mortuary science major

MORT 3065. Embalming Chemistry. (2 cr.; A-F only; Every Fall, Spring & Summer) Fundamentals of inorganic/organic chemistry and biochemistry. Chemical changes in human body during life, after death, and during chemical preservation. Disinfection, toxicology, embalming fluids. prereq: Intro course in general chemistry

MORT 3090. Independent Study Project. (1-15 cr.; A-F only; Every Fall, Spring & Summer) Independent study contracted between instructor, program director, and student. prereq: Mortuary science major

MORT 3091W. Independent Study in Funeral Service. (WI; 1-4 cr.; A-F only; Every Fall, Spring & Summer) Students complete a project supervised by a faculty member. Credit(s) is negotiated with the faculty member based on the size and scope of the project. Students must demonstrate that the project has value within the major. prereq: Mortuary science major

MORT 3151. Restorative Art Laboratory. (1 cr.; max 2 cr.; A-F only; Every Fall & Spring) Principles/techniques for restorative art. Modeling facial features with clay or wax. Use of restorative techniques. Cosmetic application on human remains. prereq: [3171 or concurrent registration is required (or allowed) in 3171]. concurrent registration is required (or allowed) in 3051, mortuary science major

MORT 3161. Embalming Laboratory. (1 cr.; max 2 cr.; A-F only; Every Fall & Spring) Practices/procedures of chemically preserving/restoring human remains, prereq: [3171 or concurrent registration is required (or allowed) in 3171]. concurrent registration is required (or allowed) in 3061, mortuary science major

MORT 3171. Human Anatomy Laboratory. (2 cr.; A-F or Audit; Every Fall) Study of gross human anatomy using cadavers. Anatomical structures, post-mortem examination, embalming, pathology, restorative art, forensic science. prereq: 4 cr of biology, 3 cr of human anatomy

MORT 3370. Death and Dying Across Cultures and Religions. (3 cr.; A-F only; Every Fall) How people of differing racial, ethnic, and cultural backgrounds understand meaning of death. How disposition of human remains occurs.

MORT 3379. Clinical Funeral Service Rotation. (1-6 cr.; max 18 cr.; A-F only; Every Fall, Spring & Summer) Practical experience working in clinical settings related to funeral service. What it means to be a funeral director in contemporary American society. prereq: 3021W, 3051, 3061, 3151, 3161, 3171, 3370, mortuary science major

MISC 3101. Project Development. (1-15 cr.; A-F only; Every Fall, Spring & Summer) Development, completion, approval of MdS project proposal. Steps/skills of academic project design/development including academic research/writing. Library data base searching methods/citation styles. prereq: 3001W, MdS major, adviser referral, permission number, basic computer/internet skills

MISC 3102. Project Registration 1. (3 cr.; A-F only; Every Fall, Spring & Summer) Complete project developed in MISC 3101 by conducting research, accomplishing project outcome(s), securing narrative evaluation from project adviser/evaluator. prereq: 3001W, MdS major, C- or above in 3101, approved project proposal, permission number, basic computer and internet skills

MISC 3103. Project Registration 2. (1-15 cr.; A-F only; Every Fall, Spring & Summer) Complete project developed in MISC 3101 by conducting research, accomplishing project outcome(s), securing a narrative evaluation from project adviser/evaluator. prereq: 3001W, MdS major, C- or above in 3101, approved project proposal, permission number, basic computer/internet skills

MISC 3104. Project Registration 3. (1-15 cr.; A-F only; Every Fall, Spring & Summer) Complete project developed in MISC 3101 by conducting research, accomplishing project outcome(s), securing a narrative evaluation from project adviser/evaluator. prereq: 3001W, MdS major, C- or above in 3101, approved project proposal, permission number, basic computer/internet skills

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Museum Studies (MST)

MST 5011. Museum History and Philosophy. (3 cr. ; A-F or Audit; Every Fall) Historical and philosophical roots of museums and emerging philosophical issues faced by museums today - from art, history, science, and youth to living collections, living history sites, and historic houses. Field trips to area museums.

MST 5012. Museum Practices. (3 cr. ; A-F or Audit; Every Spring) Practical aspects of museum work. Standards, practices, responsibilities, issues, all set in greater museum context. Curatorial/educational duties, collections management, security, funding, boards, public relations, installation, budgeting, prereq: Grad student or instr consent

MST 5020. Internship. (1-6 cr. [max 32 cr.]; S-N or Audit; Every Fall, Spring & Summer) Students arrange to perform a professional-level task in a museum of good standing under close supervision of a member of the museum's professional staff. Instructor must approve a work plan and report. prereq: 5011, 5012, dept consent

MST 8993. Directed Study in Museum Studies. (1-4 cr. [max 16 cr.]; A-F or Audit; Every Spring & Summer) Study by a student, largely self directed with consultation of a faculty member, on a topic not covered (or not covered in depth) by another course. Program of study is determined jointly by student and advising faculty member. prereq: 5012 or concurrent registration is required (or allowed) in 5012], instr consent, dept consent

Music (MUS)

MUS 440. Chamber Ensemble Registration. (0 cr. ; No Grade Associated; Every Fall, Spring & Summer) Registration mechanism for chamber ensembles.

MUS 901. Junior Recital. (0 cr. ; A-F or Audit; Every Fall, Spring & Summer) Preparation for junior recital. Student will be supervised by major applied instructor. prereq: Music major, concurrent registration is required (or allowed) in applied music, instr consent, dept consent

MUS 951. Senior Recital. (0 cr. ; A-F or Audit; Every Fall, Spring & Summer) Preparation for senior recital. Student will be supervised by major applied instructor. prereq: Music major, concurrent registration is required (or allowed) in applied music, instr consent, dept consent

MUS 1013. Rock I: The Historical Origins and Development of Rock Music to 1970. (AH,DSJ; 3 cr. ; A-F or Audit; Every Fall & Summer) Musical, cultural, historical, social, and political evolution of rock music, from its traceable antecedents in mid-19th century America through the early 1970s. Emphasizes manner in which African, European, and other ethnic traditions combined in a uniquely American manner.

MUS 1014. Rock II: Rock Music from 1970 to the Present. (AH,DSJ; 3 cr. ; Student Option; Every Spring) Musical, cultural, and historical evolution of rock music and related pop forms. Progressive rock, punk, disco, new wave, MTV, heavy metal, hip-hop, grunge, turntable-based styles, women in rock.


MUS 1021. Introduction to Music. (AH; 3 cr. ; Student Option; Every Fall, Spring & Summer) Survey of European/American "art," "popular" music in context of those cultures. Aural analyses of musical styles/forms.

MUS 1051. Class Piano for Nonmusic Majors I. (2 cr. ; Student Option No Audit; Every Fall, Spring & Summer) For nonmusic majors with little or no keyboard background. Functional skills such as reading, harmonizing, playing by ear and improvising, along with basic technique and study of elementary solo and ensemble repertoire.

MUS 1052. Class Piano for Non Music Majors II. (2 cr. ; Student Option No Audit; Every Fall & Spring) For nonmusic majors with little or no keyboard background. Functional skills such as reading, harmonizing, playing by ear and improvising, along with basic technique and study of elementary solo and ensemble repertoire.

MUS 1053. Piano Class Lesson I. (2 cr. ; A-F or Audit; Every Fall & Spring) Fundamentals for the beginning guitarist; picking strums. Students must furnish acoustic guitar. prereq: [1501, 1511 with grade of at least C-] or diagnostic test administered by School of Music

MUS 1054. Guitar Class Lesson I. (2 cr. ; A-F or Audit; Every Fall & Spring) Fundamentals for the beginning guitarist; basic strumming techniques, bass runs, finger-picking strums. Students must furnish acoustic guitar. prereq: 1471 or instr consent

MUS 1055. Guitar Class Lesson II. (2 cr. ; A-F or Audit; Every Spring) Fundamental techniques in context of those cultures. Aural analyses of musical styles/forms.

MUS 1056. Guitar Class Lesson III. (2 cr. ; A-F or Audit; Every Fall) Fundamental techniques in context of those cultures. Aural analyses of musical styles/forms.

MUS 1057. Guitar Class Lesson IV. (2 cr. ; A-F or Audit; Every Summer) Fundamental techniques in context of those cultures. Aural analyses of musical styles/forms.

MUS 1058. Guitar Class Lesson V. (2 cr. ; A-F or Audit; Every Fall & Spring) Fundamental techniques in context of those cultures. Aural analyses of musical styles/forms.

MUS 1151. Piano: Class Lessons I. (2 cr. ; A-F or Audit; Every Fall) Functional skills such as reading, transposing, harmonizing, improvising, and playing by ear. Keyboard theory, technique, and repertoire. prereq: Music major, instr consent

MUS 1152. Piano: Class Lessons II. (2 cr. ; A-F or Audit; Every Spring) Functional skills such as reading, transposing, harmonizing, improvising, and playing by ear. Keyboard theory, technique, and repertoire. prereq: instr consent

MUS 1155. Keyboard Skills I. (2 cr. ; A-F or Audit; Every Fall) Reading, transposing, harmonizing, improvising, playing by ear. Keyboard theory, technique, music learning skills. prereq: Keyboard major or music major with extensive keyboard background or instr consent
class music making, guest artists, videos, listening.

MUS 1904. Freshman Seminar. (3 cr. [max 6 cr.]; A-F only; Periodic Fall & Spring) Topics vary. prereq: Fr

MUS 1905. Topics: Freshman Seminar. (3 cr.; A-F or Audit; Every Fall & Spring) Topics specified in Class Schedule.

MUS 1908W. Topics: Freshman Seminar. (CIV WI; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall) Topics specified in Class Schedule.

MUS 3021. Introduction to Music. (AH; 3 cr.; Student Option; Every Fall, Spring & Summer) Survey of European and American art and popular music in the context of those cultures; aural analyses of musical styles and forms.

MUS 3029. American Music Cultures. (AH, DSS; 3 cr.; Student Option; Every Fall) Explore folk, country, gospel, blues, polka, klezmer, powwow, mariachi, and salsa to understand the ways in which ethnic identities coalesce and find expression in sound. Music cultures of nationally prominent European-, African-, Asian-, and Latin-American ethnic groups, and local communities in the Twin Cities metropolitan area.


MUS 3200. Campus Singers. (2 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Campus Singers is a non-auditioned ensemble and open to all members of the University community, including students, faculty, staff, and alumni. The Campus Singers sing diverse repertoire from various periods/cultures.

MUS 3230. Chorus. (1-2 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Includes the University Women's Chorus, Men's Chorus, Concert Choir, and Choral Union. Choruses participate in a variety of programs exploring both Western and non-Western repertoire from the Middle Ages through the 20th century. Concerts include touring, and collaborative campus and community performances. prereq: Choral and/or instrumental music background, audition, instr consent

MUS 3241. Vocal Literature (German Lieder) and Pedagogy. (1 cr.; A-F or Audit; Periodic Fall) German Lied: its origins, composers, and development. Musical/textual analysis of representative works. Poetry that serves as song text. Poets in German Romantic period. Topics/issues associated with voice in speech/singing. Vocal anatomy/physiology, process/methods/techniques, care. Listening assignments. prereq: [Vocal performance or accompanying major], 2 yrs music theory/history

MUS 3242. Vocal Literature (French Melodie) and Pedagogy. (1 cr.; A-F or Audit; Periodic Spring) French M?odie: its origins, composers, and development. Musical/textual analysis of representative works. Poetry that serves as song text. French symbolist poets. Listening assignments. prereq: [Vocal music or accompanying major], 2 yrs of music theory/history

MUS 3261. Italian Diction for Singers. (1 cr.; A-F or Audit; Every Fall) The sounds and symbols of the International Phonetic Alphabet, rules for correct Italian lyric diction, rudimentary Italian grammar, the meanings of Italian musical expressive markings, and Italian words most commonly found in song texts. prereq: Voice or choral music major, concurrent registration is required (or allowed) in applied voice

MUS 3262. English Diction for Singers. (1 cr.; A-F or Audit; Every Spring) English lyric diction for performance of classical vocal music. Use International Phonetic Alphabet for standard transcriptions of song texts, compile a dictionary of British/American art songs, perform songs in class, and prepare poetry for oral presentation and improvisation. prereq: Voice or choral music major, concurrent registration is required (or allowed) in applied voice

MUS 3263. German Diction for Singers. (1 cr.; A-F or Audit; Every Fall) Principles and practice of German lyric diction for classical vocal music. Transcriptions of German Lieder into International Phonetic Alphabet, elementary German grammar and common song vocabulary, 4 to 5 German songs performed in class for critique, and rules for pronunciation. prereq: Voice or choral music major, concurrent registration is required (or allowed) in applied voice

MUS 3264. French Diction for Singers. (1 cr.; A-F or Audit; Every Spring) Principles and practice of French lyric diction for classical vocal music. Transcriptions of French m?odie into International Phonetic Alphabet, elementary French grammar and common song vocabulary, 4 to 5 French songs performed in class for critique, and rules for pronunciation. prereq: Voice or choral music major, concurrent enrollment in applied voice

MUS 3311. Jazz Improvisation I. (2 cr.; A-F or Audit; Periodic Fall) Rudiments; analysis; improvisation on blues in three major keys and standard American popular jazz compositions from swing era to early bebop; applications of major and minor scales; ear training. prereq: Music major or instr consent

MUS 3340. Jazz Ensemble. (1 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium. prereq: Audition, instr consent

MUS 3350. Jazz Combo. (1 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) A performance laboratory class with emphasis on improvisation and learning the jazz vocabulary. A minimum of two public performances is required each semester. prereq: Audition, instr consent

MUS 3400. University and Campus Bands. (2 cr. [max 20 cr.]; Student Option; Every Fall & Spring) Lab course.

MUS 3401. Basic Conducting. (2 cr.; A-F or Audit; Every Fall & Spring) Beginning course in basic conducting techniques and role of the conductor. prereq: 1502, music major

MUS 3410. University Wind Bands. (1 cr.; [max 14 cr.]; A-F or Audit; Every Fall & Spring) Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate. prereq: Audition, instr consent

MUS 3420. Orchestras. (1 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate. prereq: Audition, instr consent

MUS 3430. Campus Orchestra. (2 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Orchestra for players who are not music majors or are unable to register for University Orchestra. Standard chamber/string orchestra literature rehearsed/performed. prereq: Non-music major or unable to register for University Orchestra

MUS 3440. Chamber Ensemble. (1 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Performance of chamber music; duos, trios, quartets, quintets, and other ensembles; combinations for instruments and voices. prereq: instr consent

MUS 3480. Marching Band. (2 cr. [max 12 cr.]; A-F or Audit; Every Fall) A 250-member performing organization open to players from all colleges. Performs at University football games and other athletic functions. prereq: instr consent

MUS 3490. Athletics Bands. (1 cr. [max 16 cr.]; A-F or Audit; Every Spring) Athletics bands for men's hockey, men's basketball, and women's sports. prereq: instr consent

MUS 3501. Theory and Analysis of Tonal Music III. (2 cr.; A-F or Audit; Every Fall) Harmony and voice-leading. Diatonic and basic chromatic chords. Form. Analysis of music from 18th/19th centuries. prereq: [(1501, 1502), 1511, 1512] with grade of at least C- or diagnostic test administered by School of Music

MUS 3502. Theory and Analysis of Tonal Music IV. (2 cr.; A-F or Audit; Every Spring) Harmony and voice-leading. Chromatic tonal practices. Form, including sonata, rondo, variations, and other standard categories
tonal composition. Analysis of music from 18th/19th centuries. prereq: [[3501, 3511] with grade of at least C-] or diagnostic test administered by School of Music

MUS 3506. Theory and Analysis of American Popular Music. (WI; 3 cr. ; A-F or Audit; Fall Odd Year)

Analysis of popular songs, primarily those within the Anglo-American tradition, with the strongest focus on the United States. Musical details, techniques, and forms pertaining to popular songs. Larger interpretive, historical, and sociological questions in the context of analyzing specific songs and recordings. prereq: [3501, 3511] with a grade of C- or better

MUS 3508. Review of Tonal Theory. ( ; 2 cr. ; Student Option; Every Fall)

Fast-paced review of 1501, 1502, and 3501. Focuses on diatonic and basic chromatic procedures, part-writing, and analysis. prereq: Theory placement exam

MUS 3509. Review of Tonal Theory IV. ( ; 2 cr. ; Student Option; Every Fall)

Remedial course. Harmony, voice-leading. Chromatic tonal practices. Form, including sonata, rondo, variations, and other standard categories of tonal composition. Analysis of music from 18th/19th centuries. prereq: Grad music student or inst consent

MUS 3511. Ear-Training and Sight-Singing III. ( ; 1 cr. ; A-F or Audit; Every Fall)

Melodic, harmonic, and rhythmic dictation. Sight-singing. Clef reading. Emphasizes chromatic harmony. prereq: [[1501, 1511 with grade of at least C-] or diagnostic test administered by School of Music], [music major or instr consent]

MUS 3512. Ear-Training and Sight-Singing IV. ( ; 1 cr. ; A-F or Audit; Every Spring)

Melodic, harmonic, and rhythmic dictation. Sight-singing. Clef reading. Emphasizes chromatic harmony. prereq: [[3501, 3511] with a grade of at least C- or diagnostic exam administered by School of Music], [music major or instr consent]

MUS 3518. Review of Ear-Training and Sight-Singing. ( ; 1 cr. ; Student Option; Every Fall)


MUS 3519. Review of Ear-Training and Sight-Singing. ( ; 1 cr. ; Student Option; Every Fall & Spring)

Remedial course. Fast-paced review of 3502. Focuses on diatonic/basic chromatic procedures. Emphasizes melodic/harmonic dictation. Individual sight-singing auditions. prereq: Grad student in music or inst consent

MUS 3601W. History of Western Music I. (WI; 3 cr. ; A-F or Audit; Every Spring)

History of European art-music tradition, its social contexts from antiquity to 1700: composers, styles, structures, social institutions. prereq: dept consent

MUS 3602W. History of Western Music II. (WI; 3 cr. ; A-F or Audit; Every Fall)

History of European art-music tradition, its social contexts, from 1700 to 1850. Composers, styles, structures, social institutions. prereq: 1502, 3601, music major, instr consent

MUS 3603W. History of Western Music III. (WI; 3 cr. ; A-F or Audit; Every Spring)

History of European/Asian art, popular music traditions, from 1850 to present. Composers, styles, structures, social institutions. prereq: [3501 3511, 3602] with a grade of at least C-, music major or instr consent

MUS 3950. Topics in Music. ( ; 1-3 cr. ; max 15 cr.) ; Student Option; Periodic Fall & Spring)

Each offering focuses on a single topic. Topics specified in Class Schedule.

MUS 3993. Directed Studies. (1-4 cr. [max 10 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Guided individual reading or study. Prereq instr consent, dept consent, college consent.

MUS 3995. Major Project. ( ; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)

Required of music majors in senior year of the B.A. program. Research paper on topic of student's choice in consultation with faculty mentor. Sign up in Undergraduate Studies office one term in advance. prereq: Undergrad music major in B.A. program, instr consent, dept consent

MUS 4502. 18th-Century Counterpoint. ( ; 3 cr. ; A-F or Audit; Periodic Fall)

Harmony and voice-leading. Advanced chromatic practices. Analysis of music from late 18th/early 20th centuries. Ear-training, sight-singing. prereq: [3501, 3508] or pass basic skills exam

MUS 4504. Intensive Theory and Analysis of 20th-Century Music. ( ; 2 cr. ; A-F or Audit; Every Spring)

Theory and analysis of art music in various styles developed in 20th century. prereq: [3501, 3511] or instr consent

MUS 4505. Jazz Theory. ( ; 3 cr. ; A-F or Audit; Spring Even, Spring Odd Year)

Analysis of jazz and its musical techniques. Emphasis on discovery of jazz as a musical phenomenon. prereq: [3501, 3511] or instr consent

MUS 5101. Piano Pedagogy I. ( ; 2 cr. ; Student Option; Periodic Fall)

Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels. prereq: 8 cr in MusA 1301 or MusA 1401 or instr consent

MUS 5102. Piano Pedagogy II. ( ; 2 cr. ; Student Option; Periodic Fall & Spring)

Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

MUS 5150. Body Awareness in Activity: The Alexander Technique for Musicians. (2 cr. ; max 8 cr.) ; Student Option; Every Fall & Spring)

Alexander technique with specific applications to music performance. Emphasis on body/mind awareness to promote technical ease and freedom.

MUS 5151. Organ Literature I. ( ; 3 cr. ; A-F or Audit; Periodic Fall)

Organ literature from the 14th century to the mid-18th century. Influence of organ design of various periods and national schools on the literature and its performance. prereq: 3502, 3603, sr or grad or instr consent

MUS 5152. Organ Literature II. ( ; 3 cr. ; A-F or Audit; Periodic Fall)

Organ literature of J. S. Bach and of other 19th- and 20th-century composers. Influence of organ design of various periods and national schools on the literature and its performance. prereq: 3502, 3603, sr or grad or instr consent

MUS 5153. Organ Pedagogy. (2 cr. ; A-F or Audit; Spring Odd Year)

Familiarization with materials and techniques for teaching playing the pipe organ. Through their study, students are to gain knowledge of organ methods and various aspects of teaching and learning to play the King of Instruments.

MUS 5181. Advanced Piano Literature I. ( ; 2 cr. ; A-F or Audit; Fall Even, Spring Odd Year)

Literature for piano from late Baroque period to mid-20th century. prereq: grad piano major or instr consent

MUS 5182. Advanced Piano Literature II. ( ; 2 cr. ; A-F or Audit; Periodic Spring)

Literature for piano from late Baroque period to mid-20th century. prereq: grad piano major or instr consent

MUS 5230. Chorus. ( ; 1-2 cr. ; max 16 cr.) ; Student Option; Every Fall & Spring)

University Women's Chorus, Men's Chorus, Concert Choir and Choral Union. Choirs participate in a variety of programs exploring both Western and non-Western repertoire from the Middle Ages through the 20th century. Concerts include touring, and collaborative campus and community performances. prereq: Choral and/or instrumental music background; audition, instr consent

MUS 5240. University Singers. ( ; 1 cr. ; max 8 cr.) ; A-F or Audit; Every Fall & Spring)

Mixed chorus with members of former chamber singers and concert choir. Programs exploring
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

Western/non-Western repertoire from Middle Ages through 20th century. Concerts include touring and collaborative campus/community performances. prereq; Audition, instr consent
MUS 5241. Vocal Literature I. ( 3 cr. ; A-F or Audit; Periodic Fall)
Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice. prereq; [12 cr in MusA 1304, grad music student] or instr consent
MUS 5242. Vocal Literature II. ( 3 cr. ; A-F or Audit; Periodic Spring)
Vocal literature of major and minor composers from 17th century to present; structure, style, and performance practice. prereq; 12 cr in MusA 1104 or MusA 1304, grad music major or instr consent
MUS 5250. Opera Workshop and Ensemble. ( 2 cr. [max 16 cr. ]; A-F or Audit; Every Fall & Spring)
Preparation and performance of operatic arias, choruses, and scenes. Participation in fully staged or workshop productions of music theatre repertoire. prereq; audition, instr consent
MUS 5271. Diction for Singers I. ( 2 cr. ; A-F or Audit; Every Fall)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used. prereq; 12 cr MusA 1304 or grad music major or instr consent
MUS 5272. Diction for Singers II. ( 2 cr. ; A-F or Audit; Periodic Spring)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used. prereq; 12 cr MusA 1304 or grad music major or instr consent
MUS 5275. Vocal Pedagogy I. ( 3 cr.; Student Option; Every Spring)
Advanced study of mind/body preparations for singing, anatomy, and physiology of the vocal mechanism. Voice use and care, historical and comparative pedagogy, learning theories, models and guidelines for teaching, instructional techniques, and diagnosing and solving vocal problems. prereq; Sr vocal major or instr consent
MUS 5276. Vocal Pedagogy II. ( 3 cr. ; A-F or Audit; Periodic Spring)
History of solo vocal performance; selection and preparation of beginning level solo vocal repertoire; development of vocal performance skills (interpretation, expression, artistry), rectal programming, and vocal career counseling. prereq; Sr vocal major or instr consent
MUS 5280. Opera Theatre. ( 2 cr. [max 16 cr. ]; A-F or Audit; Every Fall & Spring)
Preparation and performance of fully-staged operatic production. Major involvement in singing, acting, and technical aspects of opera. prereq; audition, instr consent
MUS 5331. Jazz Improvisation I. ( 2 cr. ; A-F or Audit; Periodic Summer)
Rudiments, analysis. Improvisation on blues in three major keys and on standard American popular jazz compositions from swing era to early bebop. Applications of major/minor scales. Ear training. prereq: Music major or instr consent
MUS 5333. Post-tonal Theory and Analysis II. ( 3 cr. ; A-F only; Spring Even Year)
Art music composed since 1945. Develop skills in analyzing and interpreting this literature.
MUS 5336. Jazz Arranging. ( 3 cr. ; A-F or Audit; Every Fall & Spring)
Beginning techniques of arranging for jazz combo and jazz ensemble; vocal and instrumental. prereq; 3502 or instr consent
MUS 5340. Jazz Ensemble. ( 1 cr. [max 6 cr. ]; A-F or Audit; Every Fall & Spring)
A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium. prereq; audition, instr consent
MUS 5400. University and Campus Bands. ( 1 cr. [max 10 cr. ]; Student Option; Every Fall & Spring)
Lab course.
MUS 5410. University Wind Bands. ( 1 cr. [max 14 cr. ]; A-F or Audit; Every Fall & Spring)
Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate. prereq; audition, instr consent
MUS 5420. Orchestra. ( 1 cr. [max 8 cr. ]; A-F or Audit; Every Fall & Spring)
Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate. prereq; audition, instr consent
MUS 5423. Suzuki Pedagogy Practicum. ( 1 cr. [max 2 cr. ]; A-F or Audit; Every Fall & Spring)
Supervised teaching of both individual and group lessons. Instructor provides periodic critiques from observation of live or videotaped lessons. Prereq [(& 5424 or & 5425), grad music student] or instr consent, grad consent.
MUS 5426. Final project Suzuki Pedagogy. ( 1 cr.; A-F or Audit; Periodic Spring)
Research project.
MUS 5427. Violin Pedagogy I. ( 2 cr. ; A-F or Audit; Periodic Fall)
Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques. prereq; Violin or viola major or instr consent
MUS 5430. Contemporary Music Workshop. ( 1 cr. [max 8 cr. ]; A-F or Audit; Every Fall & Spring)
Generation/performance of new chamber works set within context to situate musical works within dynamic field of historical, philosophical, and expressive import. prereq; instr consent
MUS 5440. Chamber Ensemble. ( 1 cr. [max 8 cr. ]; A-F or Audit; Every Fall & Spring)
Performance of chamber music; duos, trios, quartets, quintets, and other ensemble combinations for instruments and/or voices. prereq; audition, instr consent
MUS 5450. Orchestral Repertoire. ( 1-3 cr. [max 9 cr. ]; A-F or Audit; Every Fall & Spring)
Investigation of practical and performance problems in standard orchestral repertoire with regard to style and interpretation. prereq; instr consent
MUS 5460. World Music Ensemble. ( 1-2 cr. [max 16 cr. ]; Student Option; Every Fall & Spring)
Afro-Brazilian/Afro-Caribbean popular repertories. Samba, bossa nova, salsa, merengue, mambo. Planned master classes/clinics with local artists to complement regularly scheduled rehearsals/performances. No audition required.
MUS 5461. Guitar Literature. ( 2 cr.; Student Option; Fall Odd Year)
This course is principally intended for guitar majors (graduate and undergraduate students). The main focus of this course is to introduce students to guitar literature, through the historical overview of the repertoire, classical guitar composers, and performers. It will also introduce students to method books, in chronological order (through an examination of specific styles and “performance practices”) and teaching methods through the history of guitar and guitar literature intended for technique development (studies, exercises, etc.).
MUS 5464. Cello Pedagogy. ( 2 cr.; A-F or Audit; )
Concentrated study of cello teaching methods. Provides students with the strategies for teaching cello privately, develops analytical skills, and increases knowledge of cello repertoire. Designed for practical application in conjunction with the string technique class.
MUS 5466. Guitar Pedagogy. ( 2 cr.; A-F or Audit; Fall Even Year)
Intended for guitar performance majors. This course will introduce basic teaching concepts/methods/philosophies and examine method books, studies, and methodology through the history of classical guitar. Other topics (e.g., starting a studio, developing promotional material/website, contemporary teaching methods) will be addressed. prereq; Guitar performance major or instr consent
MUS 5480. University Brass Choir. ( 1 cr. [max 8 cr. ]; Student Option; Every Fall & Spring)
The University Brass Choir is an ensemble of 16 brass and percussion players exploring unique literature that spans 400 years. From the rich antiphonal music of Giovanni Gabrieli (1557-1612) to the works of the 20th century. The Brass Choir performs in Twin Cities churches and concert halls. prereq; audition, instr consent
MUS 5481. Trumpet Pedagogy. ( 2 cr.; Student Option; Fall Odd, Spring Even Year)
Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids. prereq; Sr or grad in music or instr consent
MUS 5485. Transcription for Winds. (2 cr.; Student Option; Periodic Fall) Principles of music manuscript and examination of transcription examples. Transcription projects with score and parts. Smaller projects that involve arrangements and original compositions. prereq: 3502 or instr consent

MUS 5490. Percussion Ensemble. (1 cr. [max 10 cr.]; A-F or Audit; Every Fall & Spring) Practice and performance of standard and contemporary compositions for percussion instruments in various combinations. prereq: instr consent

MUS 5541. 16th-Century Counterpoint. (3 cr.; A-F or Audit; Periodic Fall & Spring) Polyphonic counterpoint in modal style of Renaissance. Writing exercises in species counterpoint and in two, three, and four parts. Cantus firmus techniques, mixed values, invertible counterpoint, canon. Representative works by Josquin, Lassus, Palestrina, Victoria, and others. Renaissance treatises by Artusi, Banchieri, Diruta, Morley, Zarlino, and others. prereq: [3501, 3506] or pass basic skills exam

MUS 5550. Class Composition. (2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Original works in various forms. Development of individual compositional style in a post-tonal idiom. Various forms, performing forces, techniques. prereq: [4504, 4514] [with C- or better] or instr consent

MUS 5561. Orchestration I. (3 cr.; A-F or Audit; Every Fall) Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries. prereq: 3502

MUS 5562. Orchestration II. (3 cr.; A-F or Audit; Every Spring) Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries. prereq: 3502

MUS 5571. Schenkerian Analysis for Performers. (3 cr.; A-F or Audit; Periodic Fall & Summer) Theory/analysis of tonal music using principles developed by Heinrich Schenker. Basic concepts/notation, their application to excerpts/short pieces from 18th/19th centuries. prereq: 3502

MUS 5573. Analysis of Late-Romantic Orchestral Literature. (3 cr.; A-F or Audit; Periodic Spring) Advanced tonal analysis. Dramatic music by Wagner, Strauss, Tchaikovsky, Rimsky-Korsakov, Moussorgsky, and Rachmaninoff as focus for projects/discussions related to chromatic harmony, form, and orchestration. prereq: 3502 or Theory IV Exam or instr consent; [4504 or equiv] recommended

MUS 5574. Wagner's Ring: Conception, Coherence, Consequence. (3 cr.; A-F or Audit; Spring Even Year) Enrich process of listening to Wagner's Ring by providing analytic insight into Wagner's compositional technique and the dramatic, tonal, and motivic structure of the work. Analytic approach broadened with a number of interdisciplinary forays. prereq: 3502 or equiv

MUS 5591. Introduction to Music Information Technology. (3 cr.; A-F or Audit; Every Fall) Principles of acoustics, electronic sound generation/manipulation, digital signal processing techniques. Programming languages for digital sound synthesis. Editing software, MIDI applications. prereq: Music grad student or instr consent

MUS 5592. Music Informatics Seminar. (3 cr.; A-F or Audit; Every Spring) Filtering, transform synthesis, reverberation techniques, additive synthesis. Interactive MIDI applications. prereq: 5591 or instr consent

MUS 5597. Music and Text. (3 cr.; A-F or Audit; Every Fall) Designed for music majors only. Introduction to analysis of music with texts. Songs/operas.

MUS 5611. Resources for Music Research. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Development of skills in identifying, locating, and evaluating resources for research in music. Computer-searching techniques, acquaintance with basic reference sources in the field, preparation of the music research paper. prereq: 3603

MUS 5620. Topics in Opera History. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Study of specific operas. Development of opera in context of other artistic, social, cultural, political events, movements, changes. Periodic countries vary each semester.

MUS 5624. Music of J. S. Bach. (3 cr.; A-F or Audit; Every Spring Even Year) Issues of musical style, historical context. Moves chronologically through Bach's career. Relationships between his duties and works he composed. Genesis, function, relationship of a work to genre and performing forces. Lectures, presentations, research/analysis assignments. prereq: Grad student in music or instr consent

MUS 5647. 20th-Century European/ American Music. (3 cr.; A-F or Audit; Periodic Spring) Emphasizes major artistic movements, stylistic turning points, social roles of music, interactions between high art, popular, ethnic musics; contributions of men and woman as composers and performers. prereq: 3603 or equiv, 5501 or equiv, 12 undergard cr in music history

MUS 5701. Music, Disability, and Society. (3 cr.; A-F only; Spring Even Year) Study of intersection of music/disability in culture from perspective of interdisciplinary disability studies. Musician's injuries, "adaptive music" accommodations, participation in music/music education as human/civil right. Universal Instructional Design pedagogy. prereq: Grad student in music or instr consent

MUS 5731. Jazz and Modernism. (3 cr.; A-F or Audit; Spring Even Year) Critical consideration of the mutual impact and cross-influences of jazz practices and modernist aesthetics. Contextualizes the emergence of styles including ragtime, swing, bebop, cool, third-stream, modal, and avant-garde jazz within the broader aesthetic currents of 20th-century art and popular music cultures. prereq: Graduate student in music or instr consent

MUS 5732. Free Jazz: From Structure to Gesture. (3 cr.; A-F only; Spring Odd Year) Discuss musical form of free jazz comprising flow expressivity, collaborative interaction, gestural communication from theoretical/practical point of view. Major representatives such as Ornette Coleman, Cecil Taylor, Archie Shepp, The Art Ensemble of Chicago, John Coltrane. Sound material include classical recordings but also recent free jazz CDs/DVDs. prereq: Grad student in music or instr consent

MUS 5790. Topics in Music. (1-4 cr.; max 15 cr.; Student Option; Every Fall, Spring & Summer) Each offering focuses on a single topic. Topics specified in Class Schedule.

MUS 5993. Directed Studies. (1-4 cr.; max 12 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.

MUS 8110. Sonata Seminar. (2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Performance in standard Baroque, Classical, and Romantic sonatas for piano and violin, cello, viola, flute, clarinet, or oboe. prereq: Accompanying emphasis, strings and winds by audition, instr consent

MUS 8112. Instrumental Repertoire: Reduction and Realization. (2 cr. [max 12 cr.]; A-F or Audit; Every Fall & Spring) Reducing orchestra scores, representing orchestral reductions at piano, working with conductors. Conductors join course in mid-semester. prereq: Grad student in accompanying/conducting

MUS 8131. Advanced Keyboard Skills. (2 cr.; A-F or Audit; Periodic Fall) Diatonic/chromatic tonal harmony applied to keyboard. Emphasizes harmonization, transposition, and improvisation. Open score and clef reading using alto, tenor, and soprano clefs. prereq: Grad student in music or instr consent

MUS 8133. Seminar in Basso Continuo. (3 cr.; A-F or Audit; Periodic Fall) Realization of figured basses (bass lines annotated with Arabic numerals indicating harmony) and performance of continuo parts in European concerted music from 17th/18th centuries at keyboard. Emphasizes developing stylistic accomplishment skills at harpsichord/organ. prereq: Grad student in Music or instr consent

MUS 8151. Seminar in Organ Repertoire. (3 cr.; A-F or Audit; Periodic Fall) Repertoire for pipe organ. Readings/presentations on selected areas of repertoire
of 15th through 20th centuries. Organ design/construction of various European and American schools, as well as relevant performance practices. prereq: Grad student in music or instr consent

MUS 8170. Advanced Vocal Accompanying Skills and Repertoire. (2 cr.; [max 8 cr.]; A-F or Audit; Periodic Fall) Advanced performance (Lieder, melody, opera) emphasizing coaching techniques and performance skills of pianists and singers. prereq: [French, German, Italian dictio], accompanying or DMA voice emphasis or MM voice emphasis by audition

MUS 8171. Song Repertoire and Performance for Pianists and Singers: German Lieder. (2 cr.; A-F or Audit; Periodic Spring) Surveys standard German-language song repertoire: Mozart, Schubert, Schumann, Brahms, Strauss, Wolf. prereq: [Grad student with major in vocal performance or in accompanying or in piano], instr consent

MUS 8181. Operatic Accompaniment Skills and Repertoire. (2 cr.; A-F or Audit; Every Fall & Spring) Development of skills required in operatic accompanying/coaching work. Standard opera arias, cultivation of orchestral sound at the piano, stylistic traditions, working with conductors. prereq: Grad student with major in accompanying or in conducting

MUS 8182. Opera History in Context: Monteverdi and Mozart. (3 cr.; A-F only; Every Fall) Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas. prereq: Grad student in music or instr consent

MUS 8183. Opera History in Context: Verdi and Britten. (3 cr.; A-F only; Every Spring) Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas. prereq: Grad student in music or instr consent

MUS 8237. Score Study: Choral. (3 cr.; A-F or Audit; Every Fall) Analysis of various choral scores ranging from Renaissance through 20th century. Reading of choral and orchestral scores at piano, including scores with C clefs and transposing instrument. prereq: instr consent

MUS 8255. Choral Literature: Baroque Era to the Present. (3 cr.; A-F or Audit; Every Spring) Survey of sacred and secular choral works. prereq: instr consent

MUS 8299. Performance in Choral Conducting. (3 cr.; A-F or Audit; Every Fall & Spring) Preparation and performance of choral conducting recital, with supporting paper. prereq: instr consent

MUS 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

MUS 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

MUS 8450. Graduate Seminar in Conducting. (3-4 cr.; [max 32 cr.]; A-F or Audit; Every Fall & Spring) Development of musicianship, conducting, rehearsal, and analytical skills. Repertoire, gesture, score study, interpretation, pedagogy, and performance presentation in wind band, orchestral, and choral conducting. Students meet twice weekly in group seminar, and prepare and participate in weekly conducting labs scheduled with all major University ensembles. prereq: Grad student in conducting or instr consent

MUS 8479. Performance and Document: Wind Ensemble/Band Conducting. (2 cr.; A-F or Audit; Every Fall & Spring) Preparing and performing full wind ensemble or band conducting program with supporting document. prereq: 8472, instr consent

MUS 8489. Performance and Document: Orchestral Conducting. (3 cr.; A-F or Audit; Every Fall & Spring) Preparing and performing full orchestral conducting program with supporting document. prereq: instr consent

MUS 8501. Music Theory Pedagogy. (3 cr.; A-F or Audit; Periodic Fall & Spring) Comparison of pedagogical philosophies/methods in music theory, Pedagogical literature, practice teaching, curriculum design. prereq: Grad student in music or instr consent

MUS 8550. Composition. (3 cr.; [max 12 cr.]; A-F or Audit; Every Fall & Spring) Creation of original musical works in various instrumental and vocal forms; advanced development of writing and realization of musical ideas. prereq: instr consent

MUS 8560. Readings in Music Theory. (3 cr.; [max 12 cr.]; A-F or Audit; Periodic Fall) Seminars on major theoretical text or group of interrelated texts. Pre-tonal, tonal, post-tonal, or non-Western focus in individual offerings. prereq: instr consent

MUS 8570. Seminar in Composition. (2 cr.; [max 4 cr.]; A-F or Audit; Periodic Fall) Aesthetic and professional issues in composition. Survey of professional activities, including [re][sum][e] and grant writing and concert production, prereq: Composition emphasis or instr consent

MUS 8571. Composers’ Laboratory. (3 cr.; [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Preparing original music composition to specification for possible radio/TV/theatre/film use. Analytic projects based on research into current practice of music criticism/music journalism. Philosophical and sociological research into creative process. prereq: 8570

MUS 8580. Topics in Tonal Analysis. (3 cr.; [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Seminar. Sample topics: string quartets of Beethoven, chamber music of Brahms, significant works by tonal composers. prereq: instr consent

MUS 8581. Schenkerian Theory and Analysis I. (3 cr.; A-F or Audit; Periodic Fall) Analysis and critical readings pertaining to theory of tonal music developed by Heinrich Schenker. Application of his method to representative repertoire from 18th and 19th centuries. Contrapuntal writing modeled after presentation in Schenker’s [Counterpoint]. prereq: instr consent

MUS 8582. Schenkerian Theory and Analysis II. (3 cr.; A-F or Audit; Spring Even Year) Application of Schenkerian theory to 18th-/19th-century music, coordinated with critical study of major music treatises from that era. prereq: 8581 or instr consent

MUS 8584. Current Issues in the Analysis of 19th-Century Music. (3 cr.; A-F or Audit; Spring Even Year) Recent analytic approaches to 19th-century music. Students demonstrate fluency with methods and current issues. In-class discussions, short written analytical projects, two longer papers. prereq: [(3502, 3512) or equiv placement exam], instr consent; grad-level Schenkerian analysis recommended

MUS 8590. Topics in 20th-Century Analysis. (3 cr.; [max 12 cr.]; A-F or Audit; Every Fall & Spring) Seminar explores literatures of 20th-century art music.

MUS 8631. Seminar: Music in Medieval Europe. (3 cr.; A-F or Audit; Periodic Fall) Selected genres of polyphonic and monophonic music, 9th-14th centuries, for analysis and cultural criticism. Social roles of music and performance traditions; current musicological issues. prereq: Undergrad music degree

MUS 8632. Seminar: Music in Early Modern Europe. (3 cr.; A-F or Audit; Periodic Fall) Transformation of chanson, madrigal, mass, and motet from 1400 to 1580. Analysis and cultural criticism: social roles of music and performance traditions; current musicological issues. prereq: Undergrad music degree

MUS 8640. Seminar in Musicology. (3 cr.; [max 12 cr.]; A-F or Audit; Every Fall & Spring) Topics vary: readings, research, strategies, and methods. prereq: Musicology or theory emphasis or instr consent

MUS 8644. Seminar: Advanced Research in Historical Musicology. (3 cr.; A-F or Audit; Periodic Fall) Major reference and research materials in musicology and related disciplines, including databases. Historical methods and historiography. Locating and interpreting primary sources of music and archival documents. Developing research strategies for degree papers and theses. Forms of

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
MUSA 1101. Piano: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1103. Organ: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1104. Voice: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1105. Violin: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1106. Viola: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1108. Double Bass: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1109. Flute: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1111. Oboe: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1112. Clarinet: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1113. Saxophone: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1115. French Horn: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1116. Trumpet: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1117. Trombone: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1121. Percussion: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 1123. Guitar: Elective (non-major in music). (2-4 cr. [max 32 cr.]; A-F or Audit; Every Fall & Spring)

Private instruction. prereq: dept consent

MUSA 1201. Piano: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1204. Voice: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1205. Violin: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1206. Viola: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1207. Cello: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1209. Flute: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1211. Oboe: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1212. Clarinet: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1213. Saxophone: Music Ed and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1214. Bassoon: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

MUSA 1215. French Horn: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: [Music education or BA applied] major, dept consent

Music Applied (MUSA)

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu. 394
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<td>MUSA 1219</td>
<td>Tuba: Music Education and BA</td>
<td>Private instruction. prereq: Music education or BA applied major, dept consent</td>
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<td>MUSA 1221</td>
<td>Percussion: Music Ed and BA</td>
<td>Private instruction. prereq: [Music education or BA applied] major, dept consent</td>
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<td>MUSA 1222</td>
<td>Harp: Music Education and BA</td>
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<td>MUSA 1223</td>
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<tr>
<td>MUSA 1301</td>
<td>Piano: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<td>MUSA 1302</td>
<td>Harpsichord: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<td>MUSA 1303</td>
<td>Organ: Music Major.</td>
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<td>MUSA 1304</td>
<td>Voice: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<td>MUSA 1305</td>
<td>Violin: Music Major.</td>
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<td>MUSA 1306</td>
<td>Viola: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1307</td>
<td>Cello: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1308</td>
<td>Double Bass: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1309</td>
<td>Flute: Music Major.</td>
<td>Private instruction. prereq: [Music education or BA applied] major, dept consent</td>
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<tr>
<td>MUSA 1311</td>
<td>Oboe: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1312</td>
<td>Clarinet: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1313</td>
<td>Saxophone: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1314</td>
<td>Bassoon: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1315</td>
<td>French Horn: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<td>MUSA 1316</td>
<td>Trumpet: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<td>MUSA 1317</td>
<td>Trombone: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<td>MUSA 1318</td>
<td>Euphonium: Music Major.</td>
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<tr>
<td>MUSA 1319</td>
<td>Tuba: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1321</td>
<td>Percussion: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1322</td>
<td>Harp: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1323</td>
<td>Guitar: Music Major.</td>
<td>Private instruction. prereq: Audition, dept consent</td>
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<tr>
<td>MUSA 1401</td>
<td>Piano: Music Major Secondary (undergraduate).</td>
<td>Private instruction. prereq: [Music education or BA applied] major, dept consent</td>
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(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1907. Cello: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1911. Oboe: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1912. Clarinet: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1913. Saxophone: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1917. Trombone: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1919. Tuba: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1921. Percussion: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1922. Harp: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 1923. Guitar: Music Major Transfer.  
(2-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction for transfer students. One semester only. prereq: Audition, dept consent  

MUSA 2201. Piano: Music Ed and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: [Music education or BA applied] major, dept consent  

MUSA 2204. Voice: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2206. Viola: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2207. Cello: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2208. Bass: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2209. Flute: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2211. Oboe: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2212. Clarinet: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2213. Saxophone: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2214. Bassoon: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2215. French Horn: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2216. Trumpet: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2217. Trombone: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2219. Tuba: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2221. Percussion: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2222. Harp: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

MUSA 2223. Guitar: Music Education and BA.  
(2 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)  
Private instruction. prereq: dept consent  

(2-4 cr. [max 16 cr.] ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction. prereq: Audition, dept consent  

(2-4 cr. [max 16 cr.] ; A-F or Audit; Every Fall, Spring & Summer)  
Private instruction. prereq: Audition, dept consent  

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Private instruction. prereq: Audition, dept consent  

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Private instruction. prereq: Audition, dept consent  

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Private instruction. prereq: Audition, dept consent

MUSA 2313. Saxophone: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2314. Bassoon: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2315. French Horn: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2316. Trumpet: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2317. Trombone: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2318. Euphonium: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2319. Tuba: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2320. French Horn: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2321. Harp: Music Major. (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 2322. Guitar: Elective (non-major in music). (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3105. Violin: Elective (non-major in music). (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3101. Piano: Elective (non-major in music). (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3103. Organ: Elective (non-major in music). (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3104. Voice: Elective (non-major in music). (2-4 cr. [max 16 cr.]; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3107. Flute: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3207. Cello: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 3301. Piano: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3319. Tuba: Music Education and BA. (2 cr. [max 16 cr.]; A-F only; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 3302. Harpsichord: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3303. Organ: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3304. Voice: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3305. Violin: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3306. Viola: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3307. Cello: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3308. Double Bass: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3309. Flute: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 3311. Oboe: Music Major. (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Private instruction.
MUSA 3312. Clarinet: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3313. Saxophone: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3314. Bassoon: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3315. French Horn: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3316. Trumpet: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3317. Trombone: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3318. Euphonium: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3319. Tuba: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3321. Percussion: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3322. Harp: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 3323. Guitar: Music Major. (3; 2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 5101. Piano: Elective (graduate non-major in music). (2; 2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: dept consent

MUSA 5103. Organ: Elective (graduate non-major in music). (2; 2 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: dept consent

MUSA 5104. Voice: Elective (graduate non-major in music). (2; 2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: dept consent

MUSA 5105. Violin: Elective (graduate non-major in music). (2; 2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: dept consent

MUSA 5106. Viola: Elective (graduate non-major in music). (2; 2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: dept consent

MUSA 5113. Saxophone: Elective (graduate non-major in music). (2; 2 cr. [max 8 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: dept consent

MUSA 5115. French Horn: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: Audition, dept consent

MUSA 5116. Trumpet: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: Audition, dept consent

MUSA 5117. Trombone: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall, Spring & Summer) Private instruction. prereq: Audition, dept consent

MUSA 5401. Piano: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: Audition, dept consent

MUSA 5405. Violin: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: Audition, dept consent

MUSA 5408. Double Bass: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: Audition, dept consent

MUSA 5409. Flute: Music Major Secondary (graduate). (2-4 cr. [max 24 cr.]; A-F or Audit; Every Fall & Spring) Private instruction. prereq: Audition, dept consent

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MUED 3417. Style, Pedagogy, and Diction in the Choral Music Classroom I. (2 cr.; A-F only; Every Fall)
Vocal styles. Lyric diction, vocal pedagogy. Performance in vocal jazz, musical theater, and classical styles. How to apply style concepts in school setting. SMARTMUSIC software.
prereq: Music education major, two semesters of applied voice at college level

MUED 3418. Style, Pedagogy, and Diction in the Choral Music Classroom II. (2 cr.; A-F only; Every Spring)
Vocal styles. Lyric diction, vocal pedagogy. Performance in vocal jazz, musical theater, and classical styles. How to apply style concepts in school setting. SMARTMUSIC software.
prereq: Music education major, two semesters of applied lessons at college level

MUED 3419. Advanced Conducting and Repertoire (Choral). (2 cr.; A-F only; Every Fall)
Conducting/baton technique, non-verbal communication skills, rehearsal techniques, score study habits. Aural/diagnostic skills necessary to effectively rehearse an instrumental ensemble. Selection of quality, age-appropriate repertoire. prereq: 3517, MUS 3502, MUS 3512, music education major, dept consent

MUED 3802. Guitar I for Music Education and Music Therapy Majors: Developing Group Songleading Skills. (2 cr.; A-F only; Every Fall)
How to play standing up, accompany oneself, cue/prompt, move around room while playing, sight-read chords, read tablature. Open chords, tuning, keys that facilitate group singing. Eye contact. Simple 2-5 chords songs. Teaching guitar to novice players. prereq: [Music therapy or music education major], dept consent

MUED 3803. Guitar II for Music Education and Music Therapy Majors: Developing Group Songleading Skills. (2 cr.; A-F only; Every Spring)
Students play guitar, accompany themselves as they sing songs, and role play live music
therapy and music education settings. How to play in various styles using open chords and different rhythmic accompaniments. prerequisite: 3802 with grade of at least C-, [music therapy or music education major], dept consent

MUED 3807. Percussion Techniques for Music Therapists. (2 cr.; A-F or Audit; Every Spring) Design, implement, and facilitate percussion into music therapy session. Variety of music therapy percussion instruments/how to successfully implement them into clinical practice with children, adolescents, and adults who are differently-abled.

MUED 5101. Improvisation and Creativity in the Music Classroom. (2 cr.; A-F only; Every Fall) This course will address issues of improvisation, composition, and creativity of critical importance to musicians and music educators, with a strong emphasis on music-theoretical and socio-cultural modes of understanding the meanings and functions of music. Students will gain experience with the creative practices characteristic of a variety of Western and non-Western forms, including those of jazz and Minnesota American Indian music. The workshop format of the class will challenge students to improvise and compose works, present and perform them to their peers, provide and receive constructive feedback, engage and respond to this feedback with reference to clearly articulated statements of artistic intent, and revise the works accordingly. Students will apply insights derived in this manner in final research projects focused on the development of lesson and unit plans. prerequisite: At least C- in MUS 4504

MUED 5301. General Music I. (3 cr.; A-F or Audit; Every Spring) Materials, strategies and the field experience for planning and implement instruction for global arts understanding among early childhood and lower elementary school children. Experiential learning, for integrating international music and culture perspectives while planning and implementing sequential elementary music instruction. prerequisite: MUED 1201, MUS 4504, MUS 4514, [music education major or instr consent], successful completion of soph proficiency exam

MUED 5302. General Music II. (3 cr.; A-F only; Every Fall) Materials, strategies and an extensive field experience with expert general music teachers for planning and implementing sequential upper elementary, middle and high school music instruction for global arts understanding. Includes interdisciplinary connections, performance, and applications of academic technologies. prerequisite: MUED 5301, MUED 1201, MUS 4504, and MUS 4514 with a grade of at least C-

MUED 5350. Student Teaching in Classroom Music. (4-8 cr.; A-F or Audit; Every Fall & Spring) Supervised teaching and observing of classroom and general music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs. prerequisite: Music ed major, instr consent

MUED 5415. Choral/Vocal Methods and Materials I. (3 cr.; A-F only; Every Spring) Choral/vocal methods and materials as part of licensure to work in K-12 settings per legislated standards. Sight-singing, classroom management, warm-ups, adolescent voice, choral conducting skills, repertoire, and rehearsal techniques. 25 hours of practicum at the middle school level. Applications of technology. First of two required semesters. prerequisite: MUED 1201, MUS 4504, MUS 4514, [music education major or instr consent], successful completion of soph proficiency exam

MUED 5416. Choral/Vocal Methods and Materials II. (3 cr.; A-F only; Every Fall) Choral/vocal methods and materials as part of licensure to work in K-12 settings per legislated standards. Choral conducting skills, rehearsal techniques, and interpretation of choral compositions. Methods, materials, and curriculum for high school choral ensembles. 20 hours of practicum at the high school level. Second of two required semesters. prerequisite: MUED 5415, MUED 1201, MUS 4504, and MUS 4514 with grade of at least C-, [music education major or instr consent], completion of the Music Education sophomore proficiency exam

MUED 5450. Student Teaching in Vocal Music. (4-8 cr.; A-F or Audit; Every Fall & Spring) Supervised teaching and observing of vocal music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs. prerequisite: Music ed major, instr consent

MUED 5516. Instrumental Methods and Materials I. (3 cr.; A-F only; Every Spring) Instrumental methods and materials as part of licensure to work in K-12 settings per legislated standards. Sight-singing, classroom management, adolescent development, instrumental conducting skills, repertoire, and rehearsal techniques. 25 hours of practicum at the middle school level. Applications of technology. First of two required semesters. prerequisite: MUED 1201, MUS 4504, and MUS 4514 with a grade of C- or better, music education major, successful completion of Music Education sophomore proficiency exam

MUED 5517. Instrumental Methods and Materials II. (3 cr.; A-F only; Every Fall) Instrumental methods and materials as part of licensure to work in K-12 settings per legislated standards. Sight-singing, classroom management, adolescent development, instrumental conducting skills, repertoire, and rehearsal techniques. 25 hours of practicum at the middle school level. Applications of technology. Second of two required semesters. prerequisite: MUED 5517, MUED 1201, MUS 4504, and MUS 4514 with a grade of C- or better, music educ major, completion of the Music Education sophomore proficiency exam

MUED 5550. Student Teaching in Instrumental Music. (4-8 cr.; A-F or Audit; Every Fall & Spring) Supervised teaching and observing of instrumental music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs. prerequisite: Music ed major, instr consent

MUED 5650. Student Teaching Seminar. (2 cr.; A-F or Audit; Every Fall & Spring) Reflective practice during student teaching. Developing materials for professional employment (e.g., resume, portfolio). prerequisite: At least C- in all required [music, music education, professional education] courses

MUED 5669. Psychology of Music. (3 cr.; A-F or Audit; Every Fall) Basic study of the psychology and psychoacoustics of music including hearing, music perception and cognition, values and preferences, musical abilities, musical systems, media music effects, the influence of music on human behavior, and psycho-socio-physiological processes involved in musical behavior. prerequisite: Psy 1001 or Psy 3604 or instr consent

MUED 5750. Topics in Music Education. (1-4 cr.; max 16 cr.) A-F or Audit; Every Fall, Spring & Summer) Focuses on single topic, specified in Class Schedule.

MUED 5800. Group Music Leadership Skills. (3 cr.; A-F or Audit; Every Spring) Role of group music experiences in human development. Relations specific to music therapy. Students develop repertoire of music applications/techniques for various age groups/populations. Standards for group leadership. Precision teaching skills. prerequisite: [[Completion of [MUS 1151, MUS 1152] or MUS 1155], music therapy major] or instr consent

MUED 5803. Therapeutic Music in Music Settings. (4 cr.; A-F only; Every Fall) Cognitive behavioral methodology related to music therapy and music education settings. Prepares students to complete case studies mandated for internship completion set forth by American Music Therapy Association. prerequisite: [5804, 5805] or instr consent

MUED 5804. Music Therapy Methods and Procedures I. (4 cr.; A-F or Audit; Every Fall) Methods/procedures for developing basic music therapy competencies/professionalism. Music therapy populations, their clinical needs. How to use music therapy in an evidence-based approach to meet client objectives. prerequisite: 5800 or instr consent

MUED 5805. Music Therapy Methods and Procedures II. (4 cr.; A-F only; Every Spring) Second course in professional sequence for music therapy. Topics include psychotherapy techniques and other music therapy
approaches. Practicum in the community, in-class lab, prerequisite: 5804 or instructor consent

MUED 5806. Career Preparation. (4 cr.; A-F or Audit; Every Spring)
Ethics, grant writing, resume/CV preparation, supervision, board certification, professional responsibilities. Students design evidence-based research-based music therapy program, present their proposals to class/community. prerequisite: 5805 or instructor consent

MUED 5807. Psychiatric Music Therapy. (3-4 cr.; A-F only; Every Fall)
Psychiatric populations. How music therapy can be implemented as evidence-based practice. Students design original research and role-play music therapy interventions for psychiatric populations. Practicum component on designing music therapy interventions. Graduate students registering for this course should enroll for 4 credits. Undergraduate students registering for this course should enroll for 3 credits. prerequisite: Grad music therapy student or instructor consent

MUED 5808. Medical Music Therapy. (3-4 cr.; A-F only; Every Spring)
Role/scope of music therapy in medical treatment. Medical diagnoses. How to program appropriate music therapy interventions to address patient needs. prerequisite: Grad music therapy major or instructor consent

MUED 5855. Music Therapy Internship. (1-13 cr.; S-N or Audit; Every Fall & Spring)
Six-month resident internship in music therapy at an affiliated, approved hospital or clinic. prerequisite: Music therapy major, instructor consent

MUED 5991. Independent Study. (1-4 cr.; max 8 cr.; A-F or Audit; Every Fall, Spring & Summer)
Independent study project organized by the student in consultation with the appropriate instructor. prerequisite: Music ed or music therapy major or grad, instructor consent, department consent

MUED 8112. Introduction to Research Methods and Design in Arts Education. (3 cr.; A-F or Audit; Fall Odd, Spring Even Year)
Methods and research designs employed in investigating education issues in the arts. Reporting results. Proposal development. Bibliographic skills for conducting a review of related research literature. Common analytical techniques. prerequisite: Grad student in [music or music education], department consent

MUED 8115. Assessment in Arts Education. (3 cr.; A-F or Audit; Fall Odd, Spring Even Year)
Methods for assessing unique challenges in artistic achievement: performances, products, and other artistic achievements. Assessment design. Interpretation for large/small-scale assessments in performance, classroom, and clinical settings. prerequisite: Grad student in [music or music education], department consent

MUED 8118. Qualitative Research in Arts Education. (3 cr.; A-F or Audit; Fall Even, Spring Odd Year)
A theoretical, practical and systematic approach to qualitative research in arts education. Students participate in a joint field exploration or work in a setting relevant to their long-term research interests. prerequisite: Grad student in [arts or education], department consent

MUED 8119. Advanced Applications of Research Methods. (3 cr.; A-F only; Spring Even Year)
Application of research methods/design. Emphasizes both quantitative and qualitative methods. Contemporary procedures/theories of data collection, management, analysis, and interpretation. prerequisite: Grad music education student or instructor consent

MUED 8210. Advanced Music Teaching Seminar. (1 cr.; max 3 cr.; A-F only; Every Fall & Spring)
Advanced music teaching techniques. Assessment, comprehensive musicianship, action research, international education. Readings/assignments vary depending on topic. Focus on promising practices with immediate application in music classroom. prerequisite: Grad student in music education or with music teaching license

MUED 8211. Foundations of Music Education. (3 cr.; A-F or Audit; Every Fall & Summer)
Major historical, philosophical, sociological, and psychological foundations of music education. Primary literature in the field. Role and current state of music education. prerequisite: Grad student in [music or music education] or instructor consent

MUED 8212. Curriculum Design in Music Education. (3 cr.; A-F only; Every Fall & Spring)
Examine/analytically curricular models from multiple perspectives, consider influence on music teaching/learning. Design/construct curricula with view towards promoting musical growth. prerequisite: Grad student in music education or instructor consent

MUED 8280. Seminar: Current Trends in Music Education. (3 cr.; max 30 cr.; A-F only; Every Fall, Spring & Summer)
Current issues/trends in music education: philosophical, historical, psychological, and pedagogical. Course's focus varies, reflecting the dynamic nature of the field. prerequisite: department consent

MUED 8284. Seminar: Research and Scholarly Issues. (3 cr.; A-F or Audit; Spring Even Year)
Scholarly/professional expectations of music educators and music therapists in academia and other positions of leadership. Writing for a variety of professional purposes/publications. prerequisite: Doctoral student in music or music education or instructor consent

MUED 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(Optional) prerequisite: Master's student, advisor and DGS consent

MUED 8880. Master's Research Project. (3-6 cr.; max 12 cr.; A-F only; Every Fall, Spring & Summer)
Individual projects for MM in Music Education emphases (Research/Pedagogical). prerequisite: Grad music ed major, instructor consent

MUED 8900. Seminar: Music Education Doctoral Seminar. (1 cr.; max 8 cr.; A-F only; Every Fall & Spring)
Research-oriented collaboration between students and faculty. Models the manner in which research is conceived, primary literature evaluated, methods designed, and research projects carried through to completion. prerequisite: department consent

MUED 8994. Directed Research. (1-8 cr.; A-F or Audit; Every Fall, Spring & Summer)
TBD prerequisite: instructor consent

NPSE 8001. Introduction to Nanoparticle Science and Engineering. (3 cr.; A-F or Audit)
A broad, interdisciplinary overview of the emerging field of nanoparticle science and engineering. This introductory course, designed for students with diverse backgrounds in science and engineering, covers a wide spectrum of topics—from the synthesis of nanoparticles, to nanoparticle growth and transport, to characterization methods for nanoparticles, to novel nanoparticle-based materials and devices.

NPSE 8002. Nanoparticle Science and Engineering Laboratory. (3 cr.; A-F or Audit; Periodic Summer)
Practical exposure to computational and experimental techniques in nanoparticle research. Required for Ph.D. students minoring in nanoparticle science and engineering. prerequisite: 8001, [CSE grad student or instructor consent]

NPSE 8101. Nanoparticle Science and Engineering Seminar. (1 cr.; S-N or Audit; Every Fall & Spring)
Broad overview of current research in nanoparticle science and engineering. Topics include areas of nanoparticle synthesis, nanoparticles characterization, nanoparticle-based materials and devices, environmental impact of nanoparticles, and instrumentation for nanoparticle research. Speakers from the University of Minnesota as well as external experts. prerequisite: CSE grad student or instructor consent

NR 5021. Statistics for Agriculture and Natural Resource Professionals. (3 cr.; Student Option; Every Spring)
The primary audience for this course is graduate students in the agricultural, environmental, natural resources, and other related programs that need competence in statistics. The subject matter will be approaches and applications involving analysis of data using common statistical methods, e.g., describing and visualizing data, the design of single factor experiments, linear modeling, and the ability to examine journal articles in their field and assess their content in a critical
manner. prereq: College algebra or consent of instructor.

NR 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

NR 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

NR 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr. dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NR 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

NR 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (no description) prereq: Max 18 cr per semester or summer; 24 cr required. Must be doctoral student with advisor's consent to register.

Naval Science (NAV)

NAV 1000. Professional Training in Naval Science. (1 cr.; S-N or Audit; Every Fall & Spring) Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies. prereq: Soph enrolled in NROTC

NAV 2201. Ship Systems I: Naval Engineering. (3 cr.; A-F or Audit; Every Fall & Spring) Detailed study of ship characteristics/types. Design, hydrodynamic forces, stability, compartmentation, propulsion, electrical/auxiliary systems, damage control, administration. Basic concepts of theory/ design for steam, gas turbine, diesel, nuclear propulsion.


NAV 3000. Professional Training in Naval Science. (1 cr.; S-N or Audit; Every Fall & Spring) Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies. prereq: Jr enrolled in NROTC

NAV 3301. Navigation I: Piloting and Celestial Navigation. (3 cr.; A-F or Audit; Every Fall) Great military leaders of history. Development of warfare, from dawn of recorded history to present. Focuses on effect of major military theorists, strategists, tacticians, technological developments.


NAV 3310. Evolution of Warfare. (3 cr.; A-F or Audit; Periodic Fall) Great military leaders of history. Development of warfare, from dawn of recorded history to present. Focuses on effect of major military theorists, strategists, tacticians, technological developments.

NAV 4000. Professional Training in Naval Science. (1 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring) Instruction and training in basic military subjects and professional development, including military leadership, close order drill, marksmanship, honors and ceremonies, personnel inspections, and computer-based war game simulations. Classes and small group seminars on leadership and ethical issues with case studies. prereq: Sr enrolled in NROTC

NAV 4401W. Leadership and Management I. (WI; 3 cr.; A-F or Audit; Every Fall) Advanced study of organizational behavior/management. Major behavioral theories examined in detail. Practical applications. Exercises, case studies, seminar discussions.

NAV 4402W. Leadership and Ethics. (CIV, WI; 3 cr.; A-F or Audit; Every Spring) Junior officer role. Responsibilities faced as leader, manager, professional officer of Naval Services. Develops specific competencies in areas of leadership, management, professional administration, development. Emphasizes Naval Service ethics, core values. prereq: NAV 4401W

NAV 4410. Amphibious Warfare. (3 cr.; A-F or Audit; Fall Even Year) Development of amphibious doctrine, its expansion in Pacific Campaign of World War II. Detailed case studies of Tarawa, Iwo Jima, Okinawa illustrate amphibious planning.

Neurology (NEUR)

NEUR 5121. Descriptive Neurology. (2 cr.; O-N or Audit; Every Spring) Central and peripheral nervous system. Correlation of neuroanatomy, neurophysiology, clinical neurology, and pathology of the nervous system. prereq: enrolled OT or PT

NEUR 5230. Cerebrovascular Hemodynamics and Diseases I. (4 cr.; A-F only; Every Fall) Principles of cerebrovascular disease/pathophysiology, hemodynamics, diagnostic imaging, and endovascular devices. Bench-to-bedside experiments. Clinical trials, including design constraints and biostatistics, prereq: [PHSL 3051 or PHSL 3063], [MATH 1271 or MATH 1371], [MATH 1272 or MATH 1372], [PHYS 1201W or PHYS 1301W], [PHYS 1202W or PHYS 1302W], or [grad student, PHSL 5061 or instr consent]

NEUR 5240. Cerebrovascular Hemodynamics and Diseases II. (4 cr.; A-F only; Every Spring) Principles of cerebrovascular disease/pathophysiology, hemodynamics, diagnostic imaging, and endovascular devices. Bench-to-bedside experiments. Clinical trials, including design constraints and biostatistics. Treatment options, endovascular devices, design of new clinical studies. prereq: 5230, instr consent

NEUR 7120. Selected Problems in Neurology. (1-15 cr.; H-N or Audit; Every Fall & Spring) Students are eligible to participate in clinical or basic science research programs conducted by members of the Department of Neurology at the Fairview-University Medical Center or affiliated hospitals. The specific nature of the project is decided upon by the student and the faculty member who agrees to supervise the student for that 3-, 4- or 6-week period. The student is responsible for making their own arrangements with the faculty member. However, prior to entering the course, the
student and the faculty member should contact Dr. Day and Sheila McGinley for final approval.

NEUR 7124. Sleep Disorders Medicine - Externship. (2 cr.; H-N or Audit; Every Fall, Spring & Summer)
The Minnesota Regional Sleep Disorders Center (MRSDC) is one of the most active clinical sleep centers in the country, evaluating approximately 1,000 patients annually. The student sees patients with a wide variety of sleep disorders, including insomnia, excessive daytime sleepiness, sleep/wake cycle abnormalities, and parasomnias, under the supervision of the multidisciplinary staff of the MRSDC (adult/pediatric neurology, adult/pediatric psychiatry, pulmonology, otolaryngology, and pediatrics). The student attends staffing meetings and explores the pertinent literature. There is ample opportunity to observe testing procedures in the sleep laboratory.

NEUR 7300. Interventional Neurology Elective. (2-4 cr.; H-N only; Every Fall, Spring & Summer)
Rotation with the interventional neurology team: observe procedures, see patients in clinic, participate in research projects. Prereq: 7510.

NEUR 7510. Externship in Clinical Neurology. (2 cr.; H-N or Audit; Every Fall, Spring & Summer)
Student is assigned to externship site according to preferences expressed at registration. (If a site is overbooked, assignment is randomly made.) Diagnosis/management of neurological problems. Small group teaching. Case studies. Required reading in the textbook Clinical Neurology, latest edition (Simon RP, Aminoff MJ, Greenberg DA, Appleton & Lange), supplemented by recommended/selected articles.

NEUR 7520. Pediatric Neurology Elective. (3-4 cr.; H-N only; Every Fall & Spring)
Three week (4 weeks if student has available time/strong interest) selective for 3-4 year medical students. Interact with Child Neurologists with varying focuses of practice including developmental, neuromuscular, movement, epilepsy, miscellaneous neurogenetic/neuro-metabolic disorders. Prereq: The ideal candidate for this elective would have completed both their neurology/pediatric required clerkships. As ensuring completion of this step may be difficult given limited clerkship availability, requests will be considered if at least one of the prerequisites has been completed. Alt: Required: (NEUR 7510, "Externship in Clinical Neurology")

NEUR 7542. Pediatric Neurology. (4 cr.; H-N or Audit; Every Fall & Spring)
Successful completion of this rotation satisfies the neurology requirement (Neur 7-510). Pediatric neurology patients have a variety of problems ranging from coma, muscular dystrophy, epilepsy to learning disabilities; from inborn errors of metabolism, metabolic neurologic dysfunction to behavior disorders. Patients are seen both on service and in consultation in the hospital and in the outpatient clinic which meets three times weekly. Students will function as part of the group of physicians who evaluate and suggest therapy for these children. There will be close supervision and tutorial sessions with the senior pediatric neurology fellows as well as scheduled rounds with pediatric neurology staff members at least three times weekly. There is no night call, routinely. A teaching conference is held weekly and students are encouraged to participate during the rotation.

NEUR 7545. Neuromuscular Diseases. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
Students participate in all aspects of diagnosis/management of patients with neuromuscular disease. Rotation includes neuromuscular and Muscular Dystrophy Association clinics, clinical electrophysiology laboratory evaluations of patients, nerve/muscle biopsy histological interpretation, and clinical/electromyography conferences. Diseases seen include carpal tunnel syndrome, radiculopathies, polyneuropathies, muscular dystrophy, amyotrophic lateral sclerosis, myasthenia gravis. Molecular basis of inherited neuromuscular disease. Students may participate in clinical research projects.

NEUR 7555. Neurology Clinical Subspecialty Elective. (2-4 cr.; H-N only; Every Fall, Spring & Summer)
Students are exposed to various neurological subspecialty outpatient clinics. Neurological clinical findings. Management of common neurological problems. Subspecialties include neurosurgery, dementia, or Huntington's clinics. Prereq: 7510

NEUR 7599. Subinternship in Clinical Neurology. (4 cr.; H-N or Audit; Every Fall, Spring & Summer)
Students perform inpatient consultations under supervision of a senior resident or staff neurologist. Prereq: 7510

NEUR 7600. Epilepsy Diagnosis and Treatment. (2 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student works with MINcep epilepsy care epileptologist in inpatient/outpatient settings. Emphasis is on learning diagnosis, pharmacological and surgical treatment, and the social and psychological consequences to care for the needs of epilepsy patients.

NEUR 7910. Neurology Medical Residency. (6 cr.; max 120 cr.); No Grade Associated; Every Fall, Spring & Summer
Neurology medical residency.

NEUR 7930. Neurology Medical Fellowship. (6 cr.; max 120 cr.); No Grade Associated; Every Fall, Spring & Summer
Neurology medical fellowship.

NEUR 8201. Clinical Pediatric Neurology. (1-15 cr.; Student Option; ; 2 cr.; A-F or Audit; Fall Odd Year)
Cognitive, computational, and neuroscience perspectives on visual perception. Color vision, pattern vision, image formation in eye, object recognition, reading, impaired vision. Course is biennial; offered fall of odd years. Prereq: Psy 3031 or Psy 3051 or instr consent

NSC 5040. Brain Networks: From Connectivity to Dynamics. (4 cr.; A-F or Audit; Fall Odd Year)
Brain networks. Application of emerging science of complex network studies to studies of the brain. Network approaches that provide fundamental insights into the integrative nature of brain function and its relation to the brain structure. Organization of brain networks and dynamics at multiple spatial scales, ranging from the microscale of single neurons and synapses, to mesoscale of anatomical cell groupings and their projections, and to the macroscale of brain regions and pathways. Experimental studies, including electrophysiology, voltage-sensitive dye imaging, electrocorticography, magnetoencephalography, and functional magnetic resonance imaging, that allow mapping network elements and structural/functional connectivity between them at different temporal and spatial scales will be considered. Experimental/theoretical perspectives.

NSC 5202. Theoretical Neuroscience: Systems and Information Processing. (3 cr.; Student Option; Every Spring)

NSC 5203. Basic and Clinical Vision Science. (3 cr.; Student Option; Fall Odd Year)
Basic and clinical vision science. Prereq: instr consent

NSC 5461. Cellular and Molecular Neuroscience. (4 cr.; A-F or Audit; Every Fall)
Lectures by team of faculty, problem sets in important physiological concepts, discussion of original research papers. Prereq: NSC grad student or instr consent

NSC 5462. Neuroscience Principles of Drug Abuse. (2 cr.; Student Option; Periodic Spring)
Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years. Prereq: instr consent

NSC 5540. Survey of Biomedical Neuroscience. (2 cr.; A-F or Audit; Every Summer)
Current topics in biomedical neuroscience, accompanied by supporting, fundamental

Neuroscience (NSC)
recording of single neuron activity in nonhuman primates. Functional neuroimaging/magnetoencephalography in humans. prereq: instr consent

NSC 8207. Seminar: Psychopharmacology. (.1-3 cr.; max 12 cr.; Student Option; Every Fall & Spring)
Faculty and postdoctoral fellows interested in psychotropic drugs and chemicals participate. Some seminars devoted to biomedical ethics. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables. prereq: instr consent

NSC 8208. Neuropsychopharmacology. (.3 cr.; A-F or Audit; Fall Even Year)
Methodologies to study relationships between drugs and biochemical, behavioral, and neurophysiological consequences. Functional biogenic amine, peptidergic, other pathways. How manipulations alter neuronal function or behavior. Feedback mechanisms, induction, inhibition. Reinforcement of, tolerance to, or dependence on drugs of abuse: stimulants, hallucinogens, depressants, opiates. Student presentations. prereq: [5212, 6112, PSY 5021, PSY 5061] or instr consent

NSC 8211. Neurobiology of Disease. (.2-3 cr.; S-N or Audit; Fall Even Year)
Basic clinical/pathological features, pathogenic mechanisms. Weekly seminar course. prereq: instr consent

NSC 8214. Small RNA Biology. (.2 cr.; A-F or Audit; Every Spring)
Small RNAs as major regulators of gene/protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Small RNAs and their role in health and disease. prereq: BIOIC 8002 or MICA 8004 or equiv or instr consent

NSC 8206. Neuro-Immune Interactions. (.3 cr.; Student Option; Periodic Fall & Spring)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Course is offered fall of even-numbered years. prereq: 5561, MCB 4131

NSC 8207. Seminar: Psychopharmacology. (.1-3 cr.; max 12 cr.; Student Option; Every Fall & Spring)
Faculty and postdoctoral fellows interested in psychotropic drugs and chemicals participate. Some seminars devoted to biomedical ethics. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables. prereq: instr consent

NSC 8212. Neurobiology of Pain and Analgesia. (.3 cr.; Student Option; Periodic Fall & Spring)
Pain and analgesia. Course is triennial. prereq: instr consent

NSC 8222. Central Regulation of Autonomic Function. (.3 cr.; A-F or Audit; Every Fall & Spring)
Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Course is offered fall of odd-numbered years. prereq: 5561

NSC 8247. Anatomy and Physiology of Hearing and Balance. (.3 cr.; Student Option; Every Spring)
Structure/function of auditory/vestibular systems. Network analysis of middle/inner ear mechanics, hair cell biophysics, auditory nerve/CNS electrophysiology, information processing, neural mechanisms subserving balance/gaze, cellular morphology, and computer models.

NSC 8248. Directed Readings in Auditory Physiology. (.1-2 cr.; Student Option; Every Fall & Spring)
Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.

NSC 8320. Readings in Neurobiology. (.1-4 cr.; Student Option; Every Fall & Spring)
Topics in neurobiology and neurophysiology.

NSC 8321. Career Skills and Understanding Responsibilities as a Neuroscientist. (.5 cr.; max 2 cr.; S-N or Audit; Every Fall & Spring)
Information that falls outside of core neuroscience academic curriculum. Areas of practical value for graduate school and career development. Career skills, writing skills, responsible conduct in research. prereq: Neuroscience grad major or instr consent

NSC 8333. FTE: Master's. (.1 cr.; No Grade Associated; Every Fall & Summer)
FTE: Master's prerq: Master's student, advisor approval

NSC 8334. Laboratory Neuroscience. (.1-3 cr.; max 10 cr.; S-N or Audit; Every Fall & Spring)
Guided research. prereq: Grad NSc major

NSC 8411. Teaching in Neuroscience. (.1 cr.; max 4 cr.; S-N or Audit; Periodic Spring)
Grad students serve as primary instructors in 4151 and work with fellow students and faculty mentors to design curriculum, classroom sessions, exams, and course evaluations. prereq: instr approval

NSC 8444. FTE: Doctoral. (.1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

NSC 8481. Advanced Neuropharmaceutics. (.4 cr.; A-F or Audit; Fall Even Year)
Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS. prereq: instr consent

NSC 8666. Doctoral Pre-Thesis Credits. (.1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NSC 8777. Thesis Credits: Master's. (.1-18 cr.; max 50 cr.; No Grade Associated; Every Fall & Summer)
Theory Credits: Master's

NSC 8888. Thesis Credit: Doctoral. (.1-24 cr.; max 100 cr.; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
NSCI 1001. Fundamental Neuroscience: Understanding Ourselves. (TS; 3 cr.; A-F only; Every Fall & Spring) Assessing objectively the neuroscience information presented to public at-large across various media outlets. Explaining the potential importance of these discoveries.

NSCI 1002. Social Neuroscience: Understanding Others. (3 cr.; A-F only; Every Spring) The field of neuroscience makes a special contribution to our understanding of the human condition, as it can both help us understand ourselves and also how we interact in a world of other individuals. Historically, there has been a dichotomy between disciplines that identify the abstract principles of the social world we live in and the biology of the organ (i.e., the central nervous system) we use to identify and coordinate those abstract principles as we function in our daily lives. By merging these disciplines and studying our interactions with the world on many layers of analysis, from genes to social dynamics, we can develop a richer understanding of who we are as people. prereq: None

NSCI 2100. Human Neuroanatomy. (BIOL; 4 cr.; Student Option; Every Fall) Introduction to the nervous system. Structure/function of neurons and the major anatomical parts of the nervous system. Processes that underlie many bodily functions and diseases. Lectures/lab exercises.

NSCI 3001W. Neuroscience and Society. (CIV,WI; 4 cr.; A-F only; Every Spring) Ethical implications. Readings, personal reflections, class discussions, debates, and formal writing. Development of logical arguments, writing skills, oral presentation skills, and teamwork. Students present/argue both their own personal views and those of others. What it is like to have altered mentation, both their own personal views and those of others. What it is like to have altered mentation, both their own personal views and those of others. Understanding Ourselves.

NSCI 3100. Mind and Brain. (3 cr.; Student Option; Every Spring) New view of cognition that has recently emerged based on how neuroscience instantiates mental processes in physical process of brain. Topics range from the mechanisms of decision-making, to topics of emotion, memory, imagination, self-control, addiction, morality, consciousness. prereq: no prereq (1001, 1100, or other broad neuroscience course recommended)

NSCI 3101. Introduction to Neurobiology I: Molecular, Cellular, and Systems. (3 cr.; A-F or Audit; Every Fall) Basic principles of cellular/molecular neurobiology. Nervous systems. prereq: BIOL 3021 (can be taken concurrently) or BIOL 4331

NSCI 3102W. Introduction to Neurobiology II: Perception and Behavior. (WI; 3 cr.; A-F or Audit; Every Spring) Organization of neural systems/subsystems underlying sensory/motor aspects of behavior. Writing intensive. prereq: 3101, grade of at least B+ in 3101 recommended

NSCI 4100. Development of the Nervous System: Cellular and Molecular Mechanisms. (3 cr.; A-F only; Every Fall) How nervous system develops. General cellular/molecular mechanisms. Experimental data demonstrating mechanisms. prereq: BIOL 3021 or BIOL 4331

NSCI 4105. Neurobiology Laboratory I. (3 cr.; A-F or Audit; Every Fall) Principles, methods, and laboratory exercises for investigating neural mechanisms and examining experimental evidence. prereq: 3101, instr consent

NSCI 4151. Advanced Topics in Neuroscience. (3 cr. [max 9 cr.]; A-F or Audit; Periodic Spring) In-depth study of aspects of neurodevelopment, neurochemistry/molecular neuroscience, sensory systems, motor control, and behavioral neuroscience. Primarily for undergraduates majoring in neuroscience or related areas.

NSCI 4167. Neuroscience in the Community. (1-3 cr.; A-F or Audit; Every Fall & Spring) A service learning experience in which a student is paired with a middle school science teacher who has completed the BrainU program in neuroscience. Student observes and assists in implementing previously developed neuroscience educational activities and designs and implements a new classroom activity to teach concepts of neuroscience to middle school learners. prereq: instr consent

NSCI 4793W. Directed Studies: Writing Intensive. (WI; 1.6 cr. [max 42 cr.]; S-N or Audit; Every Fall, Spring & Summer) Individual study of selected topics. Emphasis on readings, use of scientific literature. Writing intensive. prereq: instr consent, dept consent; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements

NSCI 4794W. Directed Research: Writing Intensive. (WI; 1.6 cr. [max 42 cr.]; S-N or Audit; Every Fall, Spring & Summer) Lab or field investigation of selected areas of research. Writing intensive. prereq: instr consent, dept consent; no more than 7 cr of [4793, 4794, 4993, 4994] may count toward major requirements

NSCI 4993. Directed Studies. (1-7 cr.; S-N or Audit; Every Fall, Spring & Summer) Individual study of selected topics with emphasis on selected readings and use of scientific literature. prereq: instr consent, dept consent; max of 7 cr of 4993 and/or 4994 may count toward major requirements

NSCI 4994. Directed Research. (1-6 cr. [max 42 cr.]; S-N or Audit; Every Fall, Spring & Summer) Lab or field investigation of selected areas of research. prereq: instr consent, dept consent; max of 7 cr of 4993 and/or 4994 may count toward major requirements

NSCI 5101. Introduction to Neuroscience for Graduate Students. (3 cr.; A-F or Audit; Every Fall & Spring) Basic principles of cellular/molecular neurobiology and nervous system. A term paper supplements lectures. Multiple-choice exams. prereq: [BioC 3021 or BioC 4331], instr consent; intended for grad students outside neuroscience program who require comprehensive intro

NSCI 5110. Dental Neuroscience for Graduate Students. (2 cr.; A-F or Audit; Every Spring) Structure/function of human nervous system. Lectures and reading assignments emphasize topics pertinent to dentistry. prereq: Credit will not be granted if credit has been received for: 6110; BioC 3021, Biol 4004, instr consent; intended for grad students who require a comprehensive grad-level neuroscience course

NSCI 5111. Medical Neuroscience for Graduate Students. (5 cr.; A-F or Audit; Every Spring) Survey of molecular, cellular, and systems neuroscience as related to medicine. Lecture/lab. prereq: Credit will not be granted if credit has been received for: 6110; BioC 3021, Biol 4004, instr consent; intended for grad students who require a comprehensive medically-oriented neuroscience course

NSCI 5300. Biological Microscopy & Digital Imaging. (3 cr.; Student Option; Every Spring) Optical microscopy is among the most powerful available to biologists. Course introduces graduate students and advanced undergrads/honors students to its uses, to the principles that underlie its use, and to the appropriate use of resulting digital images. Students ideally will have access to a microscope in a research laboratory. prereq: Required: BIOL 1001 or BIOL 1009 or BIOL 2002 or BIOL 2003; AND PHYS 1101 or PHYS 1201 or PHYS 1301 or PHYS 1401 Recommended: PHYS 2303; PHYS 2403; PHYS 2503

NSCI 5913. BrainU 101: Neuroscience in the Classroom. (3 cr.; A-F or Audit; Every Fall & Spring) Two-week summer workshop. Week one focuses on training teachers in neuroscience through lectures, activities, and discussion sessions. Week two focuses on designing inquiry-based classroom investigations based on neuroscience education given during week one. Follow-up activities held during the academic year include BrainU staff/faculty classroom presentations and use of training materials. prereq: [Elementary or middle school or high school or preschool] teacher, instr consent, application


NSCI 6110. Neuroscience for Dental Students. (2 cr.; A-F or Audit; Every Spring) Structure/function of the human nervous system. Lectures, reading assignments. prereq:
Neurosurgery (NSU)

NSU 5667. Neurobiology of Disease. (2-3 cr.; Student Option; Every Fall) Basic clinical/pathological features, pathogenic mechanisms. Weekly seminar.

NSU 7200. Surgical Specialty: Neurosurgery. (2-4 cr.; P-N or Audit; Every Fall & Spring) The student evaluates patients in the outpatient clinic, learns about basic disease processes and is encouraged to spend time in the operating room observing neurosurgical procedures. The student also participates in daily teaching rounds and should attend regularly scheduled conferences held within the department. The Duluth site offers an experience in community neurosurgery with time spent in the emergency room, inpatient setting, and office practice.

NSU 7400. Surgical Specialty: Neurosurgery Elective, Duluth. (2-4 cr.; H-N or Audit; Periodic Fall & Spring) Students evaluate patients in outpatient clinic. Basic disease processes. Students spend time in operating room, observing neurosurgical procedures, and in emergency room, inpatient setting, pain clinic, inpatient setting, and office practice.

NSU 7500. Externship at the Fairview-University Hospital. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) During the externship, the student acts as a junior member of the house staff. Night and weekend call is required in order to give the student a first-hand experience of the off hours, demands, and time commitments required in neurosurgery. Regular participation in ward rounds and the outpatient clinics along with attendance at departmental conferences is expected.

NSU 7510. Externship at the VA Medical Center. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) During this externship, the student attends daily ward rounds and participates in the evaluation and treatment in the outpatient department. Each student is expected to attend neurosurgical, neuroradiological and neuropathology weekly conferences.

NSU 7511. Neurosurgical Externship at Hennepin County Medical Center. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Student is an integral part of the neurosurgical team, participating closely with the other house staff in patient care and decision-making processes. Regular teaching sessions and conferences are held with the neurology and neurosurgical staff. During the final week of the rotation the student is expected to do independent study on a topic and present this to the neurosurgical team.

NSU 7520. Neurosurgical Investigation. (1-15 cr.; H-N or Audit; Every Fall) Designed to provide exposure to research in the neurological sciences for the student interested in specializing in the neurosciences. The student is expected to undertake either a circumscribed project or a library research project requiring a final paper as well as scheduled tutorials. Research may be clinical, in applied and basic neuroscience. There are opportunities to work on a range of laboratory projects.

NSU 7910. Neurosurgery Medical Residency. (6 cr. [max 150 cr.]: No Grade Associated; Every Fall, Spring & Summer) Neurosurgical medical residency.

NSU 7930. Neurosurgery Medical Fellowship. (6 cr. [max 150 cr.]: No Grade Associated; Every Fall, Spring & Summer) Neurosurgical medical fellowship.

NSU 8318. Neuroradiological Conference. (1 cr.; S-N or Audit; Every Fall, Spring & Summer) Neuroradiological conference.

NSU 8320. Neurosurgical Conference. (1 cr.; S-N or Audit; Every Fall, Spring & Summer) Neurosurgical conference.


Norwegian (NOR)

NOR 1001. Beginning Norwegian. (5 cr.; Student Option; Every Fall) Emphasis on working toward novice-intermediate low proficiency in all four language modalities (listening, reading, speaking, writing). Topics include everyday subjects (shopping, directions, family, food, housing, etc.).

NOR 1002. Beginning Norwegian. (5 cr.; Student Option; Every Spring) Continues the presentation of all four language modalities (listening, reading, speaking, writing) with a proficiency emphasis. Topics include free-time activities, careers, and Norwegian culture. Prereq: 1001

NOR 1003. Intermediate Norwegian. (5 cr.; Student Option; Every Fall) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments. Prereq: 1002

NOR 1004. Intermediate Norwegian. (5 cr.; Student Option; Every Spring) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments. Prereq: 1103

NOR 4001. Beginning Norwegian for Graduate Research. (5 cr.; Student Option; Every Fall) Continues the presentation of all four language modalities (listening, reading, speaking, writing) with a proficiency emphasis. Topics include free-time activities, careers, and Norwegian culture. Meets concurrently with 1001.

NOR 4002. Beginning Norwegian for Graduate Research. (5 cr.; Student Option; Every Spring) Continues the presentation of all four language modalities (listening, reading, speaking, writing) with a proficiency emphasis. Topics include free-time activities, careers, and Norwegian culture. Meets concurrently with 1002.

NOR 4003. Intermediate Norwegian for Graduate Research. (5 cr.; Student Option; Every Fall) Emphasis on intermediate proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is combined with authentic readings and essay assignments. Meets concurrently with 1003.

NOR 4004. Intermediate Norwegian for Graduate Research. (5 cr.; Student Option; Every Spring) Emphasis on developing intermediate mid-high proficiency in listening, reading, speaking, and writing. Contextualized work on grammar and vocabulary is supported by work with authentic readings and essay assignments. Meets concurrently with 1004. Prereq: 1004 in another language or passing score on LPE or grad student

Nursing (NURS)

NURS 777. School of Nursing Professional Active Status. (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Limited to two enrollments during school career. Prereq: instr consent

NURS 1020. Challenge of Nursing. (1 cr.; S-N or Audit; Every Fall) Profession of nursing overview. Contemporary nursing and its historical roots/structures. Career opportunities and challenges.

NURS 1030. Nursing Guarantee Student Seminar. (1 cr.; Student Option; Every Fall) Overview of profession of nursing, including historical roots, current roles/scope, potential future evolution. Explore career opportunities/challenges in nursing. Prereq: Freshmen guarantee student, instr consent

NURS 1910W. Freshman Seminar. (WI; 3 cr.; A-F only; Every Fall)
NURS 2001. Human Growth and Development: A Life Span Approach. (3 cr.; Student Option; Every Fall & Spring) Theoretical, personal, and culturally determined theories on life span development, from prenatal period through death/dying. Psychoanalytical, behaviorism, cognitive, sociocultural, and epigenetic categories of biobehavioral, cognitive, and psychosocial domains.

NURS 3115. Health Informatics and Information Technology. (TS; 3 cr.; A-F only; Every Fall & Spring) Examine health informatics and information technology from consumer, clinical, and public health perspectives. Develop skills in using information technology to communicate, manage knowledge, mitigate error, and support decision-making.

NURS 3690. Life Span, Growth, and Development I. (2 cr.; Student Option; Every Fall, Spring & Summer) An introductory, multimedia course that incorporates biological, sociological, and psychological perspectives of human life span development for the period of young adulthood. Prereq: 3690, one general psychology and one general biology course or instructor consent.

NURS 3691. Life Span, Growth, and Development II. (1 cr.; Student Option; Every Fall, Spring & Summer) Application of nursing theory/research to utilization of research in practice. Prereq: Undergrad nursing.

NURS 3703. Assessment and Beginning Interventions: Nursing Lab 1. (3 cr.; A-F only; Every Fall) Psychomotor skills/interventions with focus on therapeutic interventions. Experiential learning activities used to build skill in assessment, planning/implementation of select nursing interventions. Theoretical foundations of nursing interventions. Prereq: Admitted to Nurs BSN program.

NURS 3705. Nursing Interventions. (2 cr.; A-F or Audit; Every Spring) Psychomotor skills/interventions with focus on therapeutic interventions. Experiential learning activities used to build skill in assessment, planning, implementation of select nursing interventions. Prereq: 3703, enrolled in School of Nursing.

NURS 3710. Statistics for Clinical Practice and Research. (MATH; 3 cr.; Student Option; Every Fall) Numerical reasoning, measurement principles. Vital statistics, rates, data description. Probability. Hypothesis testing/confidence intervals for tests on means. Proportions, correlations, linear regression. Prereq: [High school algebra or instr consent], students enrolled in School of Nursing must take A-F option.

NURS 3801. Patient Centered Care of Adults and Older Adults I. (3 cr.; A-F only; Every Fall & Spring) Person-centered evidence based nursing care for adults, including physical/mental health promotion, acute/chronic illness management. Critical analysis of patient needs/planning nursing care. Prereq: Admitted to Nurs BSN program.

NURS 3802. Patient Centered Care: Nursing Care of Families I. (3 cr.; A-F only; Every Fall & Spring) Introduction to nursing care of childbearing/childrearing families. Family theory, family-centered care, and family culture in the context of home and community settings. Prereq: Enrolled in School of Nursing.

NURS 3802H. Nursing Care of Families I Honors. (4 cr.; A-F only; Every Fall & Spring) Nursing care of childbearing/childrearing families. Family theory, family-centered care, family culture in the context of home and community settings and therapeutic communication between nurse and patients/families. Prereq: Enrolled nursing student.

NURS 3803. Application of Genetics in Nursing. (2 cr.; A-F or Audit; Every Spring) Application of genetics to the practice of professional nursing. Prereq: Enrolled in nursing major.

NURS 3806. Nurse as Professional. (2 cr.; A-F or Audit; Every Fall & Spring) Basic nursing concepts, role development, competencies, therapeutic use of self, and communication skills for person-centered care and professional teamwork; beginning development of own nursing philosophy; career exploration. Prereq: Admitted to nursing BSN program.

NURS 3806H. Nurse as Professional: Honors. (3 cr.; A-F only; Every Fall) Basic nursing concepts, role development, competencies, therapeutic use of self, and communication skills for person centered care/professional teamwork. Develop own nursing philosophy. Explore careers/qualitative research methods while interviewing School of Nursing alumni. Prereq: [Undergrad nursing student, honors] or instructor consent.

NURS 3999. Clinical Internship. (0-3-3 cr.; S-N or Audit; Every Summer) Application of nursing theory/research based knowledge in clinical practice. Prereq: Completed jr yr of baccalaureate nursing program, accepted into approved clinical internship program.

NURS 4104. Ethical Sensitivity and Reasoning in Health Care. (2 cr.; A-F only; Every Fall) Developing sensitivity to range/complexity of ethical issues/dilemmas in health care. Ethical principles/theories. Key ethical concepts in addressing morally troubling issues in health care settings. Prereq: Nursing undergrad student.

NURS 4106. Nurse as Collaborator. (1 cr.; A-F only; Every Fall) Examination of evidence-based teamwork systems and processes to improve communication and collaboration among health care professionals. Prereq: Enrolled in nursing program.

NURS 4205V. Honors: Nursing Theory and Research. (WI; 3 cr.; Student Option; Every Spring) Knowledge basic to discipline/practice of nursing. Relationships among research, theory, practice. Introduction to research process, with attention to use of research in practice. Students develop honors research proposal. Prereq: Nurs honors.

NURS 4205W. Nursing Theory and Research. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Knowledge basic to discipline/practice of nursing. Relationships among research, theory/theoretical formulations, and practice. Research process is introduced with attention to utilization of research in practice. Prereq: Undergrad in nursing.

NURS 4301. Person Centered Care of Adults and Older Adults I. (4 cr.; A-F only; Every Fall & Spring) Person-centered evidence based nursing care for adults with complex physical and mental health illnesses. Critical analysis of multiple complex patient needs. Planning nursing care. Prereq: 3801, 3802, 3703, 3705, enrolled in School of Nursing.

NURS 4303. Practicum: Person Centered Care of Adults in Acute Care. (3 cr.; A-F only; Every Fall & Spring) Clinical reasoning is applied to the nursing care of young through older adults in acute care. Evidenced based practice and clinical reasoning to provide person centered care within the health system environment. Prereq: 3703, 3705, 3801, 3802 or 3802H, enrolled in nursing.

NURS 4305. Practicum: Community-based Care of Families Across Life Span. (3 cr.; A-F only; Every Fall & Spring) Examine an evidence-based teamwork system to improve communication and teamwork skills among health care professionals. Prereq: 3703, 3705, 3801, 3802 or 3802H, enrolled Nurs student.

NURS 4312. Patient Centered Care: Nursing Care of Families II. (4 cr.; A-F only; Every Fall & Spring) Family centered care theory applied to care of childbearing, childrearing families in acute care setting. High risk pregnancy. Child response to illness/hospitalization. Prereq: 3802, enrolled nursing student.


NURS 4324. Transcultural Nursing and Global Health. (GP; 3 cr.; Student Option; Every Fall & Spring)
Influence of culture on nursing care delivery/role of nurse in providing culturally appropriate care for increasingly diverse populations. Global health issues and factors affecting the health status of populations, of care for increasingly diverse populations. Global health issues and factors affecting the health status of populations.

**NURS 4402. Taking Ethical Action in Health Care.** (CIV: 1 cr.; A-F only; Every Fall) Ethical dimensions/role obligations of health care professionals related to selected social issues with legal consequences. prereq: Senior undergraduate nursing student, [4104 or instr consent]

**NURS 4404V. Honors: Applied Research and Research Utilization.** (WI; 3 cr.; A-F only; Every Fall) Systematic inquiry in interpreting/evaluating research. Implement study proposed in NURS 4405V. Write scholarly research report, which will serve as honors research thesis. prereq: Honors student in School of Nursing, NURS 4205V, upper division statistics course

**NURS 4430. Immunization Tour.** (1 cr.; S-N or Audit; Every Fall) Nursing/pharmacy students operate influenza immunization clinics for faculty, staff, students. Inter-professional collaboration, public health principles, interventions. Logistics, screening, aseptic technique, emergency response strategies, syncpe, needle sticks/mass immunization. Includes practicum in a supervised community immunization clinic.

**NURS 4432. Epidemiology and Management of Seasonal Influenza.** (1 cr.; A-F only; Every Fall) This course will focus on public health principles and interventions related to influenza: logistics, screening, aseptic technique, emergency response, strategies for anaphylaxis, syncope, needle sticks and mass immunization. Includes practicum in a supervised community immunization clinic.

**NURS 4703. Specialty Focused Practicum I.** (4 cr.; A-F only; Every Fall) Person-centered nursing care that is safe, effective, holistic, culturally sensitive. prereq: Nursing student in School of Nursing

**NURS 4704. Continuum of Care Practicum.** (2 cr.; A-F only; Every Fall) Care coordination/relationship of acute, home, community services. Populations may include chronically ill, all ages (aging adults, pediatric), culturally diverse/healthy communities. prereq: Nursing Student in School of Nursing

**NURS 4705. Specialty Focused Practicum II.** (6 cr.; A-F or Audit; Every Spring) Synthesis of previous learning while providing to high quality nursing care that is safe, ethical, evidence-based, holistic, culturally sensitive, and person-centered in selected clinical specialty. Application of professional nursing values to clinical practice. Preceptor led. prereq: 4703, sr in good standing in BSN

**NURS 4706. Transition to Practice.** (1 cr.; A-F or Audit; Every Fall & Spring) Professional and legal issues necessary to the transition into nursing practice; strategies for lifelong learning and nursing career trajectories in preparation for entry into practice in a complex health care system. prereq: Sr in BSN program

**NURS 4707. Nursing Leadership: Professional Practice in Complex Systems.** (2 cr.; A-F only; Every Spring) Leadership skills for safe effective practice as a new graduate nurse; issues affecting nursing practice; leadership attributes, e.g., creating effective teams, confident interaction with others, resolving conflict, managing resources, leadership for assuring patient safety and quality care. prereq: Sr enrolled in BSN program

**NURS 4777W. Senior Project in the Nursing Major.** (WI; 3 cr. [max 9 cr.]; A-F only; Every Fall & Spring) Fundamental skills in systematic inquiry, interpretation, evaluation of research. Scholarly exploration of clinical problem or system issue affecting nursing practice/patient outcomes. Development/presentation of project. prereq: NURS 4205W or 4205V

**NURS 4800. Nursing Topics.** (0-16 cr.; A-F only; Every Fall & Spring) Exploration of a topic to meet individual student needs. prereq: instr consent

**NURS 4801. Research Topics.** (1-16 cr.; A-F only; Every Fall & Spring) Exploration of research topic to meet individual student needs.

**NURS 5010. Foundations of Interprofessional Communication and Collaboration.** (1 cr.; S-N only; Every Fall) Exploration of nature/need for interprofessional communication among health care professionals. Qualities of successful interprofessional teams/interactions. Introduction to professional identity, ethics, integrity, values. Strategies for communication/decision making. prereq: Nursing student

**NURS 5011. Interprofessional Diabetes Experience.** (2 cr.; A-F only; Every Spring) Explore diabetes mellitus through active, hands-on learning in an interprofessional environment. Week-long simulated experience of living with diabetes. Online learning activities focused on interprofessional teamwork for optimal care to patients with diabetes. prereq: 2nd or 3rd year in nursing curriculum prereq: 2nd or 3rd year in nursing curriculum

**NURS 5012. Phillips Neighborhood Clinic: Interprofessional Service.** (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Apply for position as nursing student volunteer at Phillips Neighborhood Clinic. Provide nursing care under guidance of licensed faculty mentors. Meet Board of Nursing requirements for nursing students engaged in direct patient care, prereq: Sophomore in School of Nursing, [2 year commitment or MN student]

**NURS 5014. Examining the Evidence: Forensic Health Care Practices and Opportunities.** (2 cr.; A-F only; Periodic Fall) Forensic health care, including sexual assault forensic examiners/death investigators. Examine current research regarding these roles. Opportunity for relevant community-based field experiences. prereq: Grad student or undergraduate senior or instr consent

**NURS 5016. Critical Reading of Scientific Literature in Adolescent Health.** (1 cr.; A-F or Audit; Every Fall) Develops skills for critically reading empirical literature within field of adolescent health. Written/oral critiques of core elements of research articles, including literature review, conceptual framework, research questions/hypotheses, methods, results, discussion, conclusions. prereq: [Grad-level research methods course, inferential statistics course] or instr consent

**NURS 5029. Introduction to Nursing Interventions.** (4 cr.; A-F only; Every Fall) Evidence-based interventions for safe, culturally appropriate, and ethical nursing practice. Experiential learning activities in laboratory and clinical settings build skills in assessment, planning, implementation, and evaluation. prereq: Admission to master of nursing (MN) program, concurrent registration is required (or allowed) in 5030

**NURS 5030. Foundational Concepts of Professional Nursing.** (3 cr.; A-F or Audit; Every Fall) Foundation of knowledge for culturally appropriate, ethical, evidence-based nursing practice across the life span. Research/theory that underlie the art/science of professional nursing. Concepts of person, environment, health, and nursing. prereq: Admission to master's in nursing program

**NURS 5031. Human Response to Health and Illness: Adults and Elders.** (4 cr.; A-F or Audit; Every Fall) Focus on individual responses to health and illness in the context of families and environments. The clinical component will emphasize the application of the nursing process in adult and older adult populations.

**NURS 5032. Human Response to Health and Illness: Children and Childbearing Families.** (5 cr.; A-F or Audit; Every Spring) Focus is on family responses to health and illness. Application of the nursing process in children and childbearing families is emphasized. The family as the unit of care is the focus of a seminar.

**NURS 5033. Population-Focused Health in Public Health and Mental Health Nursing.** (5 cr.; A-F or Audit; Every Summer) Focus on population- based public health and mental health nursing practice across the lifespan, with local to global perspectives. Emphasis on health equity, health promotion and levels of disease prevention. Apply theory and research to examine interventions and outcomes.

**NURS 5034. Transition to Professional Nursing Practice.** (3 cr.; A-F or Audit; Periodic Fall)
Critical analysis of current and emergent nursing care issues provides the basis for professional identity as a nurse and for transition to professional practice with an understanding of the essential role that nurses play in a complex health care system. prereq: Nrs 5033, Nrs 6200

NURS 5035. Practicum Nursing Care for Complex Health Conditions. (4 cr.; A-F or Audit; Every Fall) Clinical decision-making, comprehensive nursing care of clients with complex health problems. In collaboration with a clinical preceptor and a faculty adviser, students develop an individualized learning contract. prereq: Nursing postbaccalaureate certificate program or master of nursing program

NURS 5040H. Seeking Solutions to Global Health Issues. (GP; 3 cr.; A-F only; Every Fall) Global health issues from interdisciplinary perspective. Ethical/cultural sensitivity, complexities. Students propose realistic actions to resolve issues. prereq: Prereq junior or senior University Honors Program (UHP) student in nursing or other major, or graduate student, or instr consent; meets Lib Ed req of Global Perspectives; meets Honors req of Honors

NURS 5115. Interprofessional Health Care Informatics. (3 cr.; A-F or Audit; Every Fall & Spring) Implications of informatics for practice, including nursing, public health, and health care in general. Electronic health record issues. Ethical, legislative, political, and global/future informatics issues.

NURS 5116. Consumer Health Informatics. (1 cr.; A-F only; Every Fall & Spring) Examines issues from consumer's perspective in acquisition, understanding, use or provision of health information. Online strategies for improving health. Impact on consumer-provider relationships/ethical and legal issues. prereq: Grad student or instr consent

NURS 5117. Consumer Health Informatics Practicum. (1 cr.; S-N only; Every Fall) Apply student knowledge to analysis of health needs and consumer health principles, theories, and research to a consumer health informatics project. prereq: [Grad student, 5116 or concurrent registration is required (or allowed) in 5116] or instr consent

NURS 5120. Palliative Care for Children. (1 cr.; Student Option; Every Summer) Physical, psychosocial, and spiritual needs of children with life-limiting conditions. Family centered approach. Holistic assessment/intervention for child/family, within interdisciplinary health care team. prereq: instr consent

NURS 5170. Research Topics. (1-16 cr.; Student Option; Periodic Fall & Spring) Exploration of research topic to meet individual student needs.

NURS 5183. Scholarly Leadership. (1 cr.; S-N or Audit; Every Spring) Implications of dissertation research on advancing science, clinical practice, and leadership in nursing and health care. Principles of scholarly collaboration. prereq: Advanced doctoral nursing student, instr consent

NURS 5190. Essentials of Holistic Health Assessment. (3 cr.; A-F only; Every Fall & Spring) Health assessment knowledge/skills for nursing practice across life span. History taking, interviewing techniques, technical skills to perform complete, systematic health assessment, focused assessments for acute care settings. prereq: Admission to MN Program

NURS 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr.; A-F only; Every Fall & Summer) Health assessment knowledge/skills for advanced nursing practice with patients across age span, including pregnancy. Selected nursing interventions, complementary therapies for application to specific populations/illnesses. prereq: Admission to advanced practice nursing area of study (DNP or Post-Graduate certificate program), instr consent

NURS 5222. Advanced Human Physiology. (2 cr.; A-F only; Every Fall) This course will use a systems approach to human physiology and physiologic changes across life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing. prereq: Admitted Master of Nursing or Doctor of Nursing Practice student Undergraduate physiology/undergraduate pathophysiology or consent of instructor

NURS 5225. Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing. (3 cr.; A-F only; Every Fall & Spring) Advanced concepts in neuroscience, psychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders/symptoms. Application to problems in various clinical settings. prereq: 5228 or instr consent

NURS 5226. Advanced Human Pathophysiology. (2 cr.; A-F only; Every Spring) This course will use a systems approach to human pathophysiology across the life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing. prereq: Nrs 5222 or consent of instructor

NURS 5228. Pharmacology for Advanced Practice Nursing. (2 cr.; A-F or Audit; Every Fall) Overview of pharmacological principles for commonly used medication classes. Each drug class, related physiology. Pharmacodynamics and pharmacokinetics of drug classes and specific medications. prereq: Grad nursing student or instr consent

NURS 5229. Clinical Pharmacotherapeutics. (2-4 cr.; A-F only; Every Spring) Pharmacokinetics, pharmacodynamics, therapeutic dosages for various age groups. Client patterns of drug use. Prescriptive privileges. Prescription writing for advanced practice nurses. prereq: 5222, [5228 or PHAR 5800], DNP student, instr consent


NURS 5241. Nursing Leadership for Effective Practice. (2 cr. [max 3 cr.]; A-F or Audit; Every Fall) Analysis of leadership theory and application of leadership skills needed for safe and effective practice as a new graduate nurse. Exploration of system issues affecting nursing practice and patient outcomes. prereq: Final sem of MN Program

NURS 5501. Professional Issues in Nurse-Midwifery. (1-2 cr.; S-N or Audit; Every Spring) Analysis of professional issues that confront and impact the practice of certified nurse-midwives. History and development of the professional organization including certification, legislation, ethical dimensions, public policy, and clinical practice issues. prereq: Nurs grad major, instr consent

NURS 5505. Assessment and Support of Women in Labor. (2 cr.; S-N only; Every Spring) Self-directed study with goal of working with experienced labor nurses/learning knowledge/skills required to perform labor. Clinical experience. Completion of selected online modules related to nursing care of women in labor. prereq: Admission to DNP Program

NURS 5604. Advanced Health Assessment and Interventions with Adolescents. (2 cr.; Student Option; Every Summer) Integrates knowledge from nursing, public health, health behavior, and adolescent development as framework for developing health assessment/intervention strategies for clinical practice with adolescents. prereq: CPsy 5303 or equiv or instr consent

NURS 5800. Nursing Topics. (1-4 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Course allows students to study a topic not offered by the college. prereq: instr consent

NURS 5812. Global Health Through Study Abroad. (1-2 cr.; S-N only; Every Spring & Summer) Nursing as a global profession and the issues that impact health of populations worldwide. prereq: instr consent
NURS 5830. Advanced Clinical Nursing. ( ; 1-6 cr. ; Student Option; Every Fall, Spring & Summer) Independent study or faculty seminar on special clinical topic.

NURS 5925. Grant Writing and Critique. ( ; 1 cr. ; Student Option; Every Spring) Self-paced course. Online modular format. How to write/critique grants. Students select a research or program grant to critique, applying knowledge obtained through learning modules. prereq: Grad student or instr consent

NURS 6102. Family Health Theory. ( ; 2 cr. ; A-F only; Every Fall) Emerging theory in family nursing science, related theories. Research on family systems for structuring systemic framework to examine clinical problems related to family health care. Applies family health theories to selected phenomena of interest to health care. prereq: 6200 or instr consent

NURS 6105. Systems Analysis and Design. ( ; 3 cr. ; A-F or Audit; Every Spring) Role of information in interprofessional team for analysis and design of information systems. Concepts/theories of systems analysis, system life cycle, project management, system requirements, human factors. Evaluation of use of health information systems. prereq: 5115 or equiv or instr consent

NURS 6110. Epidemiology in Nursing. ( ; 2 cr. ; A-F only; Every Fall & Spring) For nurses in advanced practice and leadership positions to utilize basic epidemiological principles in assessing determinants of health and their outcomes in populations. Application of epidemiological concepts to nursing.

NURS 6200. Science of Nursing Intervention. ( ; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer) Examination/application of theories and conceptual frameworks to clinical practice problems. prereq: Admission to MN or DNP program

NURS 6210. Midwifery Care of the Childbearing Family. ( ; 3 cr. ; A-F only; Every Summer) Evidence-based models of midwifery practice for management/support of women/families during labor, birth, and immediate postpartum period. Care of newborn. prereq: instr consent

NURS 6211. Midwifery Care of the Childbearing Family Practicum. ( ; 2 cr. ; S-N only; Every Summer) Implement evidence-based models of midwifery practice in the management and support of women and families during labor, birth, the immediate postpartum period, and care of the newborn. prereq: 6305, 6306, concurrent registration is required (or allowed) in 6212

NURS 6213. Reproductive Healthcare for Women at Risk. ( ; 2 cr. ; A-F only; Every Fall) Evidence based, theoretical/epidemiologic basis for advanced practice nursing care of women with complex reproductive health problems requiring multidisciplinary interventions. Selected high-risk gynecologic/ perinatal conditions. prereq: [NM and WHNP] N6305, N6306, 6501, (NM only) 6210/6211, 6122 (WHNP only) 6502, 7504, 7505, 6929

NURS 6214. Reproductive Healthcare for Women at Risk Practicum. ( ; 2 cr. ; S-N only; Every Fall) Apply advanced assessment/management skills in care of women/infants at risk for medical/psychosocial problems. Gain experience in management of selected high-risk perinatal conditions. prereq: WHNP DNP student. N5222, 5228, 6305, 6306, 6925, 6926 Nurse-Midwife DNP student, N5222, 5228, 5229, 5200, 6305, 6306, 6925, 6921, 6210, 6211

NURS 6305. Women's Reproductive Health Care. ( ; 2-3 cr. ; A-F only; Every Fall) Application of theory/evidence to holistic practice in women's health. Emphasis placed on theoretical knowledge/skills related to caring for common reproductive health needs of women throughout life cycle. Sociopolitical context of women's lives integrated throughout. prereq: DNP student

NURS 6306. Women's Reproductive Health Practicum. ( ; 1 cr. ; S-N only; Every Fall) Clinical experience in women's reproductive health setting to develop basic skills in providing holistic, safe, competent care, including history taking, physical examination, patient education specific to women's reproductive health issues across lifespan. prereq: [6305 or concurrent registration is required (or allowed) in 6305]

NURS 6307. Women's Health Care Practicum. ( ; 1 cr. ; S-N only; Every Summer) Application of theory and evidence-based knowledge in advanced practice for adult/gerontological nurse practitioner students to develop skill in assessing and managing women's gynecological and sexual health issues across the adult age spectrum. prereq: 5200, 5224, 5228, 6305

NURS 6308. Women's Primary Care Practicum. ( ; 1-2 cr. ; S-N only; Every Spring) Practice in women's reproductive and primary health care settings to continue development of basic skills in providing holistic, safe, competent care, including history taking, physical examination, patient education specific to reproductive and primary healthcare issues across lifespan. prereq: 5200, 5222, 5228, 5229, 6501, 6305, 6306

NURS 6405. Advanced Practice CNS Roles Across the Lifespan. ( ; 3 cr. ; A-F only; Every Fall) Develop expertise and leadership in the clinical nurse specialist roles within the three spheres of influence (patient, nursing, organization), using current evidence. prereq: 5200, 7103, 7900

NURS 6406. Advanced Practice CNS Roles Across the Lifespan: Practicum. ( ; 1 cr. ; S-N only; Every Fall) Students analyze/evaluate roles of CNS within the context of their families and different care settings. Independent/collaborative roles of the advanced practice nurse in different settings. prereq: [5200, 5222, 5224, 5228, 6500, 6501, 7504, 7505] or instr consent

NURS 6408. Advanced Nursing Care of Older Adults Practicum. ( ; 1-2 cr. ; S-N only; Every Fall) Application of theory and evidence-based knowledge for advanced practice nursing students to develop skill in assessing and managing health issues commonly experienced by older adults in a variety of care settings. prereq: [5200, 5222, 5224, 5228, 6500, 6501, 7504, 7505] or instr consent

NURS 6501. Assessment and Management of Health for Advanced Practice Nurses, I. ( ; 3 cr. ; A-F only; Every Fall) Advanced practice nursing. Health promotion and data-based assessment/management of common acute and stable chronic conditions for the primary care populations. Role of the advanced practice nurse, process of clinical reasoning and decision-making, and independent and collaborative practice health care plans, utilizing evidence-based practice. prereq: DNP student or instr consent

NURS 6502. Assessment and Management of Health for Advanced Practice Nurses, II. ( ; 2-3 cr. ; A-F only; Every Spring) Advanced practice nursing. Health promotion and data-based assessment/management of patient's acute and chronic health conditions. Physical, psychosocial, and pharmacological intervention. Age-related variation. prereq: N5228

NURS 6504. Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing. ( ; 2 cr. ; A-F only; Every Spring) Apply advanced concepts from nursing theory and research, social sciences, neuropsychology, and neurophysiology in the differentiation and explanation of psychiatric symptoms and disorders across the age continuum.

NURS 6505. PMH/APN Prac II:Assessing, Managing Psychiatric Disorders in Adv Pract Psychiatric-Mental Health Nurs. ( ; 2 cr. ; S-N only; Every Spring) Diagnostic interviewing skills to conduct a comprehensive psychiatric assessment for patients across the lifespan. In collaboration with an interdisciplinary team and patient, students develop an initial evidence-based, integrative treatment plan. prereq: [5200, 5222, 5224, 5228, 6604, 6605, CSH 5101, concurrent registration is required (or allowed) in 6404

NURS 6600. Health Systems and Care Models. ( ; 3 cr. ; A-F only; Every Spring) Current/emerging care delivery systems and nursing models are analyzed as to how they meet dynamic, social, economic, technological, political trends. Impact of...
disruptive technologies, business models, value networks, designing better models.

NURS 6802. PMH Advanced Practice Nursing: Group as a Health Care Intervention. (2 cr.; A-F only; Every Fall)
Thoretical concepts/research findings from areas of group theory, group dynamics, group therapy applied in development of model for utilizing group as intervention for various client populations. prereq: 6802, 6803, concurrent registration is required (or allowed) in 6603

NURS 6603. PMH APN Practicum IV: Group as a Health Care Intervention. (2 cr.; S-N only; Every Fall)
Develop new competencies in conducting group therapy. Diagnostic interviewing/assessment skills. Evidence-based management plans with individuals/families at risk of psychiatric disorders/mental health problems. prereq: concurrent registration is required (or allowed) in 6602, 6802, 6803

NURS 6604. Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing. (2 cr.; A-F only; Every Fall)
Examine concepts, theories, and paradigms foundational to psychiatric and mental health nursing practice and inter-professional integrative mental health care. Develop critical thinking methods that elicit a client’s health narrative and facilitate the therapeutic relationship. Promotes beginning skill in reflective clinical practice. prereq: concurrent registration is required (or allowed) in 6605, 5200, 5222, 5228, 5229, CSH 5101

NURS 6605. Psychiatric/Mental Health Advanced Nursing Practice Practicum I. (1 cr.; S-N only; Every Fall)
First clinical course in advanced practice psychiatric/mental health nursing. Mental health promotion/mental illness risk reduction. Clinical interviewing, holistic health assessment, integrative mental health care management. prerequisite: concurrent registration is required (or allowed) in 6604, 5200, 5222, 5228, 5229, CSH 5101

NURS 6702. Nursing Leadership Seminar: Introduction to Innovation and Leadership. (3 cr.; A-F only; Every Fall)
Leadership and organizational culture and leadership competencies in context of current trends. Applying design thinking/insights from nursing leaders. Innovation and expansion of nursing leadership into new settings and roles.

NURS 6703. Nursing Leadership Seminar: Organizational Culture and Leadership. (2 cr.; A-F only; Every Spring)
Evaluate the evidence base for nurse executive practices and the relationships between leadership and organizational culture and performance. prereq: Grad student or instr consent

NURS 6704. Nursing Leadership Practicum: Organizational Culture and Leadership. (1-2 cr.; S-N only; Every Spring)
Implement evidence-based models through projects with preceptor in area of organizational environment and culture through experiential activities, including conferences, intensive clinical experiences, clinical conferences, and simulation. prerequisite: concurrent registration is required (or allowed) in 6703

NURS 6705. Nursing Leadership Seminar: Quality and Change Management. (2 cr.; A-F only; Every Fall)
Comprehensive background in the science of patient safety, quality improvement, error management, and change implementation. prerequisite: [6702, 6703] or instr consent, concurrent registration is required (or allowed) in 6704

NURS 6706. Nursing Leadership Practicum: Quality and Change Management. (1-2 cr.; S-N only; Every Fall)
Gain experience in implementing evidence-based model of change related to safety promotion, quality improvement, or error management in collaboration with preceptor or designee. prerequisite: 6705

NURS 6707. Health Care Design and Innovation Practicum. (2 cr.; S-N only; Every Fall & Spring)
A health care design and innovation practicum experience to support integration of knowledge, skills and abilities related to human-centered thinking and an experienced based design innovation: product, service, or system innovation delivery change. prerequisite: Students in Health Care Design and Innovation certificate program or DNP students who have completed, NURS 7610, CSPh 5711, HUMF 5874.

NURS 6802. Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families. (2 cr.; A-F only; Every Summer)
Evaluate selected theories/models, research, clinical evidence, therapeutic use of self for developing/Implementing psychotherapeutic interventions used to promote mental health/assist individuals. prerequisite: 6102, 6604, 6605

NURS 6803. Psychiatric/Mental Health Adv Pract Nurs Practicum III: Psychotherapy With Individuals,Families. (1 cr.; S-N only; Every Summer)
Theories, research, clinical evidence. Psychotherapeutic interventions/therapeutic use of self to promote mental health/advance treatment, management, recovery from bio/psycho/social sequelae of psychiatric illnesses. prerequisite: concurrent registration is required (or allowed) in 6802, 6102, 6504, 6505

NURS 6895. Adult Acute Care Holistic Health Assessment. (2 cr.; A-F only; Every Fall)
Provides nurse anesthesia students and other interested APRN students with the cognitive and psychomotor skills necessary to perform an advanced health assessment for adult acute patients and/or those in need of a preoperative assessment. prerequisite: Nurse anesthesia DNP student or instr consent

NURS 6900. Introduction to Principles of Anesthesia. (6 cr.; A-F only; Every Spring)
First in a series of four courses that introduces the nurse anesthesia student to the safe and effective principles of nurse anesthesia. prerequisite: Doctorate of nursing practice program

NURS 6901. Basic Nurse Anesthesia Principles. (3 cr.; A-F only; Every Fall)
Examination/application of basic principles of anesthesia to formulate nurse anesthesia care plans for care of adults undergoing anesthesia. prerequisite: 6900, 6910, concurrent registration is required (or allowed) in 6911

NURS 6902. Nurse Anesthesia Care: Cardiothoracic Disease. (2 cr.; A-F only; Every Spring)
Principles of nurse anesthesia used to deliver anesthesia to complex patients/populations. Anesthesia for patients undergoing cardiovascular and thoracic procedures. prerequisite: 5222, 5228, 6900, 6901, concurrent registration is required (or allowed) in 6912, PHSL 5115

NURS 6903. Nurse Anesthesia Care: Special Populations. (2 cr.; A-F only; Every Summer)
Examine/apply principles used to deliver anesthesia by nurse anesthetists to special populations: pediatric, trauma, obstetric/gynecologic, and acute and chronic pain patients. prerequisite: 6900, 6901, 6902, concurrent registration is required (or allowed) in 6912, admission to BSN-DNP nurse anesthesia specialty

NURS 6910. Introduction to Nurse Anesthesia Practicum I. (1 cr.; S-N only; Every Spring)
Basic skills in nurse anesthesia practice. Equipment safety checks, room set up, pre-operative assessment, basic airway skills, intravenous fluid replacement, positioning of patient/management of emergence. prerequisite: Grad Student in Doctorate of Nursing Practice Program, concurrent registration is required (or allowed) in 6900

NURS 6911. Basic Nurse Anesthesia Principles II. (2 cr.; S-N only; Every Summer)
Develop proficiency in nurse anesthesia practice including basic equipment safety checks, room set up, pre-operative assessment, basic airway skills, intravenous fluid replacement, positioning of patient/management of emergence. prerequisite: N6910, concurrent registration is required (or allowed) in N6901. Grad student in Doctorate of Nursing Practice Program

NURS 6912. Nurse Anesthesia Care: Cardiothoracic Disease Practicum. (3 cr.; S-N only; Every Spring)
Develop proficiency in nurse anesthesia practice. Basic equipment safety checks, room set up, pre-operative assessment, basic airway skills, intravenous fluid replacement, positioning of patient and managing emergence. prerequisite: concurrent registration is required (or allowed) in 6902, DNP-nurse anesthesia specialty student

NURS 6913. Nurse Anesthesia Care: Special Populations Practicum. (4 cr.; S-N only; Every Summer)
Develop proficiency in nurse anesthesia practice for special populations, including pediatrics, obstetrics/gynecology, trauma, and
patients with acute and chronic pain. prereq: Grad student in doctorate of nursing practice program nurse anesthesia specialty; concurrent registration is required (or allowed) in 6903

NURS 6914. Basic Nurse Anesthesia Principles Practicum III. (3 cr.; S-N only; Every Fall)
Develop progressive proficiency in nurse anesthesia practice including basic equipment safety check, room set up, pre-operative assessment, basic airway skills, intravenous fluid replacement, positioning of patient, management of emergence. prereq: N6910, concurrent registration is required (or allowed) in N6901

NURS 6920. Primary Care: Assessment of Health and Care of Well Children. (; 3 cr.; A-F only; Every Spring)
Age specific, family-centered, assessment, prevention and health promotion services for infants through adolescents. Comprehensive health supervision. Critical thinking and advanced practice nursing interventions. prereq: 5200, 5222, 5229, concurrent registration is required (or allowed) in 6921, instr consent

NURS 6921. Assessment of Health and Care of Well Children: Primary Care Practicum. (; 1-2 cr.; S-N only; Every Spring)
Age-specific, family-centered nursing assessment and interventions to promote wellness for infants through adolescence. Compiling and evaluating advanced nursing interventions for disease prevention and health promotion. Models of primary prevention. prereq: 5200, 5222, 5229, concurrent registration is required (or allowed) in 6921, instr consent

NURS 6922. Primary Care: Assessment and Management of Common Conditions Affecting Children. (; 3 cr.; A-F only; Every Fall)
Research-based evaluation and management of common conditions affecting children from infancy through adolescence. Theories and models used to explain and predict physiologic and psychological adaptation of children and their families. prereq: 6920, 6921, concurrent registration is required (or allowed) in 6923, instr consent

NURS 6923. Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children. (; 2 cr.; S-N only; Every Fall)
Age-specific, family-centered nursing assessment and intervention of acute and chronic conditions of children within the family context. Nursing intervention strategies including diagnostics, therapeutics, education, and follow-up evaluation of outcomes. prereq: 6920, 6921, concurrent registration is required (or allowed) in 6922, instr consent

NURS 6924. Assessment and Interventions for Children and Youth With Special Health Care Needs. (; 2 cr.; A-F only; Every Fall)
Children and youth with special health care needs. Growth and development, pathophysiology, and specific conditions within a holistic, family-centered, community based, culturally competent, coordinated approach to assessment and intervention. prereq: instr consent

NURS 6925. Advanced Concepts in Women's Health Care I. (1-3 cr.; A-F only; Every Spring)
The course builds on foundational theoretical and evidence-based content to develop advanced assessment and care planning competencies in working with patients with complex gynecological and pregnancy-related conditions. prereq: 6305, 6306, 6501

NURS 6926. Advanced Concepts in Women's Health for WHNP Practicum I. (; 1 cr. [max 2 cr.]; S-N only; Every Spring)
Develop advanced women's health assessment/planning skills. Experience working with women who have complex gynecological/pregnancy-related conditions. prereq: WHNP DNP student, concurrent registration is required (or allowed) in 6925, 5222, 5228, 5229, 5200, 6305, 6306

NURS 6927. Advanced Concepts in Women's Health II. (; 2 cr.; A-F only; Every Summer)
Advanced concepts in gender-specific health care over adult lifespan and common primary health care issues. Utilization of evidence-based integrative therapies and inter-professional practice competencies to promote positive outcomes in women's health populations. prereq: 6305, 6306, 6925, 6926, concurrent registration is required (or allowed) in 6928, CSPH 5101, current DNP WHNP student

NURS 6928. Adv Concepts in Women's Health II WHNP Pract. (; 1 cr.; S-N only; Every Summer)
Expands on advanced assessment/management skills in women's health through individualized patient centered care that encompasses primary health issues utilizing integrative approaches/interprofessional practice to promote positive outcomes in women's health populations. prereq: 6305, 6306, 6925, 6926, concurrent registration is required (or allowed) in 6927, CSPH 5101, DNP WHNP student

NURS 6929. Advanced Nursing Care of Children with Acute Illness Practicum for PCNS. (; 2 cr.; S-N only; Every Fall)
Synthesis/application of theory, research, and evidence-based practice to implement pediatric clinical nurse specialist role. Comprehensive care management across settings, role implementation, contextual factors affecting health care for families of children with special health needs. prereq: [6405, grad student in Nursing admitted to pediatric clinical nurse specialist area] or instr consent

NURS 6930. Foundations of Advanced Public Health Nursing Practice. (; 3 cr.; A-F or Audit; Every Fall)

NURS 6931. Health Equity and Social Justice. (1 cr.; A-F only; Every Fall)
Complex relationships among social determinants of health, health disparities, population health status. Analyze/ critique both evidence-based/untested strategies for reducing health disparities. prereq: 6930 or instr consent

NURS 6934. Population-focused Assessment and Prioritization. (; 1 cr.; A-F or Audit; Every Fall)
Principles of community-based participatory methods used to conduct population-focused assessments. Review literature/identify gaps in knowledge. prereq: 6930 or instr consent

NURS 6942. Health Equity and Social Justice Practicum. (2 cr.; S-N only; Every Fall)
Practicum experiences at community site serving populations with compromised health status related to health disparities. Collaborate with agency staff/community partners to identify health disparities relevant to populations served. Develop social justice conceptual framework/proposals to improve population health. prereq: instr consent

NURS 6944. Population-focused Assessment & Prioritization Practicum. (1 cr.; S-N only; Every Fall)
Population-focused assessment in collaboration with community partners. Identify key informants. Develop community partnerships. Use multiple approaches to data collection/analyses. Prioritize community assets, needs, contributing factors. prereq: 6930 or instr consent

NURS 7000. DNP Proseminar. (; 1 cr.; A-F only; Every Fall)
Historical, regulatory, and professional underpinnings of advanced specialty nursing practice within a clinical doctoral framework. prereq: Admission to Post-BSN Doctorate of Nursing Practice Program

NURS 7004. Nurse Anesthesia Practicum A. (; 5 cr.; S-N only; Every Fall)
First in a series of three clinical courses that focus on developing proficiency in nurse anesthesia practice, management. prereq: 5920

NURS 7005. Nurse Anesthesia Practicum B. (; 5 cr.; S-N only; Every Spring)
Second in a series of three clinical courses that develop proficiency in nurse anesthesia practice. prereq: 7004

NURS 7006. Nurse Anesthesia Practicum C. (; 5 cr.; S-N only; Every Summer)
Third in a series of three clinical courses that develop proficiency in nurse anesthesia practice. prereq: 7004, 7005

NURS 7110. Quality Improvement and Implementation Science in Health Care. (; 2 cr.; A-F only; Every Fall)
Study of improvement and implementation science with emphasis on integration of quality improvement models, guidelines, and strategies to drive evidence-based change and improve patient outcomes in the context of health care systems and healing environments.
NURS 7101. DNP Seminar II. (3 cr.; A-F only; Every Spring & Summer)
Analysis of organizational culture, integration of theory and evidence-based change, and examination of components of the leadership project implementation and management within the context of the health care system and healing environment. prereq: 7100 or instr consent

NURS 7102. DNP Seminar III. (2 cr.; A-F only; Every Fall, Spring & Summer)
Synthesis of DNP leadership project components with emphasis on program evaluation, role transformation, dissemination of scholarly work, and the effect of the DNP on the health care systems and policy. prereq: [7100, 7101] or instr consent

NURS 7105. Knowledge Representation and Interoperability. (2 cr.; A-F only; Every Summer)
Conceptual/operational aspects of knowledge representation structures in nursing, including standards and interoperability. Representation of clinical work in the electronic health record. Critical analysis of interoperability, ethical issues, and values. prereq: NURS 5115 or instr consent

NURS 7106. Knowledge Representation and Interoperability Practicum. (2 cr.; S-N only; Every Summer)
Knowledge representation and interoperability principles/standards to improving knowledge in clinical or public health settings. Applied knowledge representation to nursing. prereq: [NURS 5115 or instr consent], [NURS 7105 or concurrent registration is required (or allowed) in NURS 7105]

NURS 7108. Population Health Informatics. (2 cr.; A-F only; Every Fall)
Standards, interoperability, and integration of information systems for population health are examined. Population health use cases are analyzed for potential benefits, legal, ethical, and practical issues related to the development of population health information systems. prereq: [5115 or [HINF 5430, HINF 5431]] or instr consent

NURS 7109. Population Health Informatics Practicum. (2 cr.; S-N only; Every Fall)
Apply principles, theories, and standards to integration of components to solve a particular population health problem. prereq: [5115, [7108 or concurrent registration is required (or allowed) in 7108] or [HINF 5430, HINF 5431]] or instr consent

NURS 7110. NURS 7110 DNP Project Practicum. (1-3 cr. [max 12 cr.]; S-N only; Every Fall, Spring & Summer)
Directed application of a quality improvement process, change theory, and inter-professional collaboration through the development, implementation, evaluation and dissemination of an evidence-based intervention (DNP Project) within the context of health, a health care system and/or healing environment.

NURS 7111. DNP Project Direction II: Implementation. (1 cr.; S-N only; Every Fall, Spring & Summer)
Directed application of quality improvement process/change theory. Inter-professional collaboration through leadership/implementation of scholarly clinical leadership project. Health care system/healing environment.

NURS 7112. DNP Project Direction III: Evaluation. (1 cr.; S-N only; Every Fall, Spring & Summer)
Directed application of program evaluation and analysis. Interpretation of project data, dissemination of findings during evaluation phase of DNP Leadership Project. Health care system and healing environment.

NURS 7113. Clinical Decision Support: Theory. (2 cr.; A-F only; Every Spring)
Principles and concepts of knowledge management and decision making for support of clinical practice. Students design a clinical decision support intervention and examine the legal, ethical, and practical issues related to its implementation and maintenance of CDS interventions. prereq: 5115 or HINF 5430/5431 or instr consent

NURS 7114. Clinical Decision Support Practicum. (2 cr.; S-N only; Every Spring)
Apply clinical decision support knowledge to the development and application of a clinical decision support intervention. prereq: [5115, [7113 or concurrent registration is required (or allowed) in 7113] or [HINF 5430, HINF 5431]] or instr consent

NURS 7118. Human Factors and Human-Computer Interaction in Health Informatics. (3 cr.; A-F or Audit; Every Spring)
Principles of human factors and human-computer interaction to optimize research/practice in nursing and health informatics. Interactive system design that accommodates/enhances capabilities of user. prereq: Biostatistics or instr consent

NURS 7200. Economics of Health Care. (3 cr.; A-F or Audit; Every Spring & Summer)
Economic theories of health care in relation to health disparities and global health. Financing strategies, payment systems, and their effect on doctor/nursing practice. prereq: Admission to DNP program

NURS 7202. Moral and Ethical Positions and Actions in Nursing. (2 cr.; A-F or Audit; Every Fall & Spring)
Normative ethics and theoretical underpinnings for positions taken. Implications for subsequent action. Morally defensible positions on health-related issues, corresponding actions from perspective of nursing.

NURS 7209. Integrative Health and Healing. (1 cr.; A-F only; Every Spring)
Foundational course for advanced nursing practice. Scholarship, research, and theory underlying integrative therapies and advanced holistic nursing practice. prereq: 5101, 5200, 5222, 6200, 7000, instr consent

NURS 7210. Integrative Health and Healing Practicum I. (1 cr.; S-N only; Every Spring)
Foundation clinical course in advanced nursing practice for integrative health and healing. Development of clinical competencies in holistic health assessment, management, and evaluation. prereq: 5101, 5200, 5222, 6200, 7000, beginning level skill in one integrative therapy, instr consent

NURS 7211. Integrative Health and Healing Practicum II. (1 cr.; A-F only; Every Fall)
Foundational course for advanced nursing practice. Scholarship, research, and theory underlying integrative therapies and advanced holistic nursing practice within the context of disease prevention, health promotion, and teaching/learning. prereq: 5101, 5200, 5222, 6200, 7000, 7209, 7210, 7900, CSH 5701, beginning level skill in two integrative therapies, instr consent

NURS 7212. Integrative Health and Healing Practicum II. (2 cr.; S-N only; Every Fall)
Foundational clinical course in advanced nursing practice for integrative health/healing. Development of clinical competencies in holistic health assessment, teaching/learning, and understanding the role of other CAM providers. prereq: 5101, 5200, 5222, 6200, 7000, 7209, 7210, 7211 or concurrent registration is required (or allowed) in 7211), 7900, CSH 5701, beginning level skill in two integrative therapies, instr consent

NURS 7213. Midwifery Clinical and Professional Integration. (3 cr.; S-N only; Every Spring)
Integration of clinical role of nurse midwife. Role in leadership, legislation, and policy. prereq: Nurse midwifery DNP student in final semester, no incomplete cr, instr consent

NURS 7214. Integrative Health and Healing Practicum III. (2 cr.; S-N only; Every Spring)
Programs of integrative therapies and healing practices in a variety of clinical/organizational settings. Creation of holistic nursing health care models, sustainable business plans, and the application of leadership skills. prereq: 7211 or instr consent

NURS 7215. Integrative Health and Healing Practicum III. (2 cr.; S-N only; Every Spring)
Application of leadership competencies in developing, implementing, and evaluating integrative health and healing services and programs. prereq: 7212 or instr consent

NURS 7300. Program Evaluation. (3 cr.; A-F or Audit; Every Fall & Spring)
Evaluation methods best suited for professionals in leadership roles. Evaluation standards, planning, designs, approaches. Engaging stakeholders. Influence of program environment. How to interpret/disseminate findings. prereq: Admission to DNP program or instr consent

NURS 7310. WHNP Clinical and Professional Integration. (2 cr.; S-N only; Every Spring)
Integration of the clinical and professional role of the women’s health nurse practitioner, including understanding of the role of the WHNP in leadership, legislation, and policy. prereq: WHNP DNP student in final semester, passed all courses, no incomplete credits

NURS 7400. Health Policy Leadership. (3 cr.; A-F or Audit; Every Fall)
Acquisition of policy leadership and advocacy principles and skills and engagement in the process of organizational and governmental health policy development to transform health care delivery, promote equitable distribution of health care resources, address health disparities, and improve population health. prereq: Admission to DNP program

NURS 7401. Health Policy Leadership Practicum. (0.5-1 cr.; S-N only; Every Spring) Translation of nursing, health, and political science and application of health policy advocacy knowledge and skills to improve health care delivery, address health disparities, or advance population health.

NURS 7406. Advanced Nursing Practicum in Adult-Gerontology Health. (2 cr.; S-N only; Every Spring) Final clinical course developing proficiency in the advanced practice specialty role. Focus is on applying/evaluating evidence for clinical practice and achieving a level of competency as a clinical nurse specialist or nurse practitioner in adult-gerontology health. prereq: [5222, 5228, 5224, 5200, 6407, 6501, 7505, not [ANP or GPA]] or [5222, 5228, 5224, 5200, 6407, 6501, 6505, 7504, 7505] [ANP or GPA] or instr consent

NURS 7500. Health Care of Children for the Family Nurse Practitioner. (3 cr.; A-F only; Every Fall) Application of mid-range theories, models, concepts, and research in designing age-specific plans for the promotion, maintenance, and restoration of the health of infants, children, and adolescents within the context of their families and communities. prereq: 5200, 7503, 7504, concurrent registration is required (or allowed) in 6102, concurrent registration is required (or allowed) in 7501, concurrent registration is required (or allowed) in 7506, instr consent

NURS 7501. Health Care of Children for the Family Nurse Practitioner Practicum. (1 cr.; S-N only; Every Fall) Nursing theory, research, and evidence-based practice standards in evaluating/implementing safe and effective interventions to promote health and prevent illness in infants, children, and adolescents. Evaluation of evidence-based outcomes. prereq: 5200, 5222, 5228, 5229, 6501, 7504, 7505, instr consent

NURS 7503. Reproductive Health Care of Women Practicum for Family Nurse Practitioners. (1 cr.; S-N only; Every Spring) Application of holistic health histories and physical assessments of women. Synthesize/use knowledge and research in clinical decision making to formulate health care management plans related to women’s reproductive and sexual health throughout the life cycle. prereq: 5200

NURS 7504. Assessment and Management of Health for Advanced Practice Nurses, Practicum I. (1-2 cr.; S-N only; Every Fall) Application of holistic health histories and physical assessments by advanced practice nurses to formulate and implement individualized patient-centered health care management plans to support positive health outcomes in primary care populations experiencing acute and stable chronic conditions. prereq: 5200, 5222, 5224, 5229, 6501

NURS 7505. Assessment and Management of Health for Advanced Practice Nurses Practicum II. (1-2 cr.; S-N only; Every Spring) Comprehensive advanced nursing assessment/management for acute and chronic health conditions of the primary care population across the life span. Synthesis/application of nursing theory and evidence-based implementation/evaluation of safe and effective therapeutic interventions to promote, maintain, and restore health. prereq: 5200, 5222, 5224, 5229, (6501 or concurrent registration is required (or allowed)) in 6501, (6502 or concurrent registration is required (or allowed)) in 6502

NURS 7506. Family Practice Practicum III: Assessment and Management of Health for the Family Nurse Practitioner. (1 cr.; S-N only; Every Fall) Evaluation of theories and research to support the development of holistic nursing practice models and clinical decision-making for health promotion, disease prevention and intervention. Evaluation of patient outcomes using nursing standards and criteria. prereq: 5200, 5222, 5228, 5229, 6501, 7504, 7505, instr consent

NURS 7507. Assessment Management of Health Practicum IV: Community Health Leadership for Family Nurse Prac. (1 cr.; S-N only; Every Spring) Application of principles of health policy and interdisciplinary collaboration while synthesizing and utilizing knowledge and evidence-based research to formulate a proposal for organizational, institutional, community, or governmental arenas to address needs related to access, health disparities, or health promotion issues. prereq: 7400 or concurrent registration is required (or allowed) in 7400, 7506

NURS 7508. Health Care of the Elderly for the Family Nurse Practitioner Practicum. (1 cr.; S-N only; Every Summer) Synthesis and application of nursing theory, research and evidence-based practice standards in the evaluation and implementation of safe, effective interventions to promote health and prevent illness in elder patients from family- and patient-centered contexts. Evaluation of evidence-based outcomes. prereq: 7504, 7505

NURS 7509. Assessment and Management of Health Practicum VI: Primary Care for the Family Nurse Practitioner. (1 cr.; S-N only; Every Spring) Managing health across the lifespan in primary care settings. Health promotion, disease prevention, intervention. Implementing holistic, culturally-sensitive comprehensive, collaborative nursing practice models. Theories, ethical principles, research. prereq: 5200, 5222, 5228, 5229, 6501, 7504, 7505, concurrent registration is required (or allowed) in 7507, concurrent registration is required (or allowed) in 7508


NURS 7516. Health Care of Children for the Family Nurse Practitioner: Acute and Chronic Management. (2 cr.; A-F only; Every Fall) Identifying diagnostic criteria for common acute/chronic pediatric conditions. Apply mid-range theories, research, models of care to restore health of newborns, infants, children, adolescents. prereq: 5200, 7515, 7504, 7505

NURS 7518. Health Care of the Elder Patient for the Family Nurse Practitioner. (1 cr.; A-F only; Every Summer) The application of mid-range theories, models, and concepts applicable to the promotion, maintenance, and restoration of the health of elderly patients within the context of their families and communities. Current research is evaluated and used as the basis for designing age-specific interventions for elderly patients and their families. prereq: Nurs 6502

NURS 7600. Nursing Research and Evidence Based Practice. (2-4 cr.; A-F only; Every Fall & Spring) Examination of evidence based nursing including types and levels of evidence, research process, critique and synthesis of research studies. Science of implementation. prereq: Completion of or concurrent enrollment in a 3 credit inferential statistics course

NURS 7604. Executive Leadership Seminar: Boundary Spanning Leadership. (2 cr.; A-F only; Every Spring) Boundary spanning leadership for solving problems, driving innovation, and transforming healthcare organizations to advance the common good and improve health care by employing strategies that engage people from outside the organization in collaborative teams. prereq: [6705, 6706] or instr consent

NURS 7605. Executive Leadership Practicum: Boundary Spanning Leadership. (1-2 cr.; S-N only; Every Spring) Apply boundary spanning leadership in comparison to other leadership theories for solving problems, driving innovation, and transforming healthcare organizations to a specific healthcare setting/organization by implementing strategies that engage people from outside the organization in collaborative teams. prereq: [6704, 6706] or instr consent

NURS 7606. Relationship-Based Leadership and Management. (3 cr.; A-F only; Every Spring) Concepts, theories, and practices that support relationship-based leadership and management. Framework/set of tools to provide leadership in an empowered
NURS 7608. Health Care Finance and Resource Management. (3 cr.; A-F or Audit; Every Fall) Financial planning, budgeting, reimbursement and decision-making concepts and strategies are applied to health care and service organizations. Emphasis is on conceptualizing resources broadly, particularly nursing, and translating practice relevant concepts and priorities into actions valued by organizational decision makers. prereq: Grad student or instr consent

NURS 7610. System Leadership and Innovation. (3 cr.; A-F only; Every Fall & Spring) Health innovation and leadership, integrating whole systems thinking, relevant theories and generative leadership to advance innovation and achieve sustainable change in contemporary health settings.

NURS 7612. Psychiatric/Mental Health Advanced Practice Nursing: Professional Seminar. (1 cr.; S-N only; Every Spring) Psychiatric/mental health advanced practice nursing: professional seminar. prereq: 6802, 6803

NURS 7613. Psychiatric/Mental Health Advanced Practice Nursing: Practicum V. (2 cr.; S-N only; Every Spring) Final course provides opportunities for refinement of PMH APN roles and integration of DNP activities into clinical experiences. Providing evidence-based nursing care to persons experiencing or at risk of experiencing psychiatric disorders to positively influence health care delivery. prereq: [6802, 6803] or instr consent

NURS 7705. The Adult and Gerontological Clinical Nurse Specialist in Acute Care. (2 cr.; A-F only; Every Summer) Development of advanced clinical reasoning, assessment of clinical outcomes, quality improvement and research based care for adult and elder patients with acute illness. Use of theory and research in the role of the CNS. prereq: 5200, 5222, 5224, 5228, 6100, 6405, 7103, 7900

NURS 7706. Implementing the Role of the Clinical Nurse Specialist in Acute Care. (1 cr.; S-N only; Every Summer) Development of clinical expertise of CNS in provision of advanced nursing care for adults/elders. Students will utilize theory/research to implement roles of CNS. prereq: N5222, N5228, N5224, N7103, N5200, N7900, N6100, 7705 (co-requisite)

NURS 7800. Advanced Topics in Professional Nursing. (1-6 cr. [max 36 cr.]; Student Option; Every Fall, Spring & Summer) Methods, theory, or advanced topics, including supervised projects. prereq: instr consent

NURS 7900. Scholarly Teaching and Learning in Nursing. (3 cr.; A-F only; Every Spring & Summer) Elements of effective teaching/learning. Designing teaching-learning models, creating educational experiences that facilitate achievement of desired learner outcomes.

NURS 7902. Advanced Scholarly Teaching and Learning in Nursing. (1 cr.; S-N only; Every Fall) Exploration of teaching-learning theory and evidence as applied to the design, development, implementation, and evaluation of effective teaching in a variety of settings.

NURS 7904. Nursing Education Practicum. (2 cr.; S-N only; Every Spring) Development, implementation, and evaluation of evidence-based, scholarly teaching and learning in various education contexts. Analysis of select nursing program in relation to meeting standards for accreditation and various other expected outcomes of nursing programs. prereq: Graduate student in nursing or NURS 7900 or equivalent.

NURS 7925. Systems of Care for Children and Youth With Special Health Care Needs Practicum. (2 cr.; S-N only; Every Spring) Research-based evaluation/management of psychologic and physiologic responses to chronic illness of children and youth. Developing theory-based systems of nursing care that are holistic, family-centered, community-based, culturally-competent, and coordinated. prereq: 6924 or instr consent

NURS 7926. Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs. (2 cr.; A-F only; Every Spring) In-depth, systemic, and theory-based study of family health assessment methods/intervention models. Assess, intervene, and evaluate intervention models related to patterns of functioning in families of children with complex health care needs. prereq: [6102 or equiv family theory course, 6200, concurrent registration is required (or allowed) in 7925] or instr consent

NURS 7927. Adv Assessment, Intervention in Families of Children and Youth With Special Health Care Needs Pract. (1 cr.; S-N only; Every Spring) Assess, intervene, and evaluate intervention models related to patterns of functioning in families of children with complex health care needs. Prepares nurses to become members of an interdisciplinary team, working with families with special health care needs from diverse cultural backgrounds. prereq: [6102 or equiv family theory course, 6200, concurrent registration is required (or allowed) in 7925, concurrent registration is required (or allowed) in 7926] or instr consent

NURS 7930. Public Health Nursing Leadership Practicum. (2 cr.; S-N only; Every Spring) Synthesis of advanced public health nursing research. Theory/application to health policy leadership, management, administration within public health nursing leadership situations. prereq: 6930


NURS 7940. Application of Behavior Change Theory to Population Health. (1 cr.; A-F only; Every Spring) Review of selected theories of health behavior change for individuals, groups, organizations, communities, systems. Synthesize/apply theories appropriately/effectively to guide public health nursing practice. prereq: 6930, [PubH 6020 or instr consent]

NURS 7942. Application of Behavior Change Theory to Population Health Practicum. (2 cr.; S-N only; Every Spring) Clinical application/synthesis of selected theories of health behavior change for individuals, groups, organizations, communities, systems in population-based setting. prereq: 6930, PubH 6020

NURS 8121. Health Behaviors and Illness Responses. (3 cr.; A-F or Audit; Periodic Fall & Spring) Theories of health behaviors and responses to illness are analyzed/critiqued. Multivariate research designs. Specification of testable, descriptive, dynamic models for health/illness that incorporate culture, biology, environment, and health systems for diverse individuals, families, communities, and populations. prereq: Doctoral student or instr consent

NURS 8134. Interventions and Outcomes Research. (3 cr.; A-F or Audit; Every Spring) Design/evaluation of intervention/outcomes research. Use of advanced experimental design and multivariate statistical approaches to evaluate theory-based interventions with longitudinal outcomes in context. prereq: 8121, PhD student, instr consent

NURS 8152. Scholarship in Health Care Ethics. (3 cr.; A-F only; Every Fall) Analyze the underlying values in the concepts and discourses of health/disease. Evaluate ethical frameworks regarding their capability to address issues in health care. Analyze/discuss issues related to the responsible and ethical conduct of research. prereq: Doctoral student or instr consent

NURS 8171. Qualitative Research Design and Methods. (3-4 cr.; Student Option; Every Spring) Overview and comparative analysis of selected qualitative research methods and analytic strategies. Focuses on developing rigorous qualitative designs that contribute to development of nursing and health care knowledge for diverse populations. prereq: 8170 or equiv

NURS 8172. Theory and Theory Development for Research. (3 cr.; Student Option; Periodic Fall & Spring) Paradigms in nursing/health, associated methods of scientific/scholarly inquiry. Inductive/deductive techniques for theory development Theory-testing using data obtained under controlled conditions. prereq: Doctoral student
NURS 8173. Principles and Methods of Implementing Research. (3 cr.; Student Option; Every Spring)
Integrates scientific, statistical, and practical aspects of research. Inter-relationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences required. prereq: 8114 or other 8xxx grad research methods course, 2 grad stat courses;

NURS 8175. Quantitative Research Design and Methods. (3 cr.; A-F or Audit; Every Fall)
Designs for quantitative description and quasi-experimental/experimental evaluation of scientific problems across domain of nursing. Evaluation of logic of design/attribute of causality from health and social science perspectives. prereq: [PhD student in nursing, advanced applied statistics] or instr consent

NURS 8177. Advanced Nursing Research Practicum. (2 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students collaborate with research team under supervision of faculty mentor in designing/conducting a health-related research project. prereq: PhD nursing student, instr consent, adviser consent

NURS 8179. Biophysiological Measurement and Instrumentation in Clinical Research. (3 cr.; Student Option; Every Fall)
Critical issues in measurement and instrumentation for clinical research. Methodological issues and critical appraisal of instruments in the study of biophysiological phenomena. Field observation experiences. prereq: [8173, 8175 or equiv, advanced level stat] or instr consent

NURS 8180. Doctoral Proseminar I: Scholarly Development. (1 cr.; S-N or Audit; Periodic Fall & Spring)
Transition to doctoral study. Begins socialization process to role of nursing scholar/scientist. Career trajectories of nursing scholars who have pursued various roles. prereq: Doctoral nursing student

NURS 8185. Qualitative Data Analysis for Health Care Research. (3-4 cr.; Student Option; Every Summer)
Techniques for descriptive, interpretive, and analytic data. Data preparation, management, and analysis. Transforming data from multiple texts to theoretical conceptualizations. Writing, dissemination of findings. prereq: 8171 or grad course in qualitative research methods

NURS 8190. Critical Review in Health Research. (2 cr.; A-F or Audit; Every Spring)
Skills needed to critique a body of scientific literature in focused areas of nursing research and related fields. Construction of literature reviews for planning research projects and for research utilization. prereq: Advanced statistics course, instr consent

NURS 8193. Special Topics in Nursing Research. (1-6 cr.; Student Option; Every Fall, Spring & Summer)

Seminar and/or individual study of research design, methodologies, or instruments. prereq: instr consent

NURS 8195. Mixed Methods in the Social, Behavioral, and Applied Health Sciences. (3 cr.; A-F only; Every Spring)
Integrates qualitative strategies with quantitative approaches in research designs. Strengths/challenges of using mixed-methodological frameworks when studying the etiology of phenomena or evaluating clinical interventions. prereq: instr consent

NURS 8360. Advanced Clinical Nursing. (1-6 cr.; Student Option; Every Fall, Spring & Summer)
Independent study or faculty seminar on special clinical topic when interest exists. prereq: Grad nurs major, instr consent

NURS 8361. Special Topics in Nursing. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Students select and study a topic of interest.

NURS 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

NURS 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NURS 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

NURS 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Nutrition (NUTR)

NUTR 5622. Vitamin and Mineral Biochemistry. (3 cr.; Student Option; Every Spring)
Nutritional, biochemical, and physiological aspects of vitamins and essential minerals in human and experimental-animal models. prereq: BioC 3021, Phsl 3051, FSCN 4612

NUTR 5624. Nutrition and Genomics. (2 cr.; Student Option; Every Fall)
Overview of gene-diet interactions and relevant technologies used to study such interactions. Nutrigenomics, epigenetics, transcriptomics, proteomics, metabolomics. Examples of gene-diet interactions, implications. Current issues. prereq: Biochemistry

NUTR 5625. Nutritional Biochemistry. (3 cr.; Student Option; Every Fall)
Overview of biochemical molecules and pathways important in nutritional events. prereq: BioC 3021 or instr consent

NUTR 5626. Nutritional Physiology. (3 cr.; A-F or Audit; Every Spring)
Whole body macronutrient metabolism as it relates to etiology of metabolic diseases. Signaling between tissues to control homeostasis. How dysregulation of crosstalk can lead to metabolic diseases. How diet, exercise, or starvation impact metabolism. Regulation of food intake and energy expenditure. Designing/analyzing/interpreting research data. prereq: NUTR 5625

NUTR 5627. Nutritional and Food Toxicology. (3 cr.; A-F only; Every Spring)
Toxic agents, organisms, and toxic effects that are important in the toxic events, with a focus on food toxicants and nutrient-toxicant interaction. prereq: BioC 3021; designed for students majoring in [nutrition or food science or toxicology]

NUTR 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

NUTR 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

NUTR 8611. The Role of Nutrition in Cancer Caution and Prevention. (2 cr.; A-F only; Every Fall)
This is a lecture and seminar based course that covers issues in nutrition and cancer, with an emphasis on the role of nutritional factors in the etiology and prevention of cancer and how nutrition research is translated into dietary recommendations for cancer prevention. During the seminars, students will discuss current epidemiological, clinical and laboratory evidences on modulation of cancer risk by dietary factors; prereq: FScN 1112 (Principles of Nutrition), FScN 4612 (Advanced Human Nutrition), NUTR 5626 (Nutritional Physiology), Toxicology, Advanced Biology/Biochemistry/Genetics/Molecular Biology

NUTR 8620. Advances in Nutrition. (2 cr.; Student Option; Every Fall & Spring) Recent research or special topics (e.g., obesity, vitamin biochemistry, nutrition education). prereq: M.S. or Ph.D. student, two semesters in the nutrition program

NUTR 8621. Presentation Skills. (1 cr.; S-N or Audit; Every Fall)
Orientation to nutrition graduate program. Presenting scientific seminars, using electronic presentation programs/equipment. prereq: dept consent

NUTR 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for...
OBST 7211. Advanced Obstetrics and Gynecology III. (1-15 cr.; No Grade Associated; Every Spring) Advanced obstetrics and gynecology III. prereq: 7210

OBST 7500. Externship in Obstetrics, Gynecology and Women's Health: The Primary Health Care of Women. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) This is the core clinical course in Obstetrics/Gynecology for years three and four students. Six-week experience in clinical obstetrics and gynecology in hospitals such as Fairview-University, Hennepin County, Regions, North Memorial St. John's, Waconia and Duluth. prereq: regis med

OBST 7520. Advanced Externship in Ob/Gyn. (3 cr.; H-N or Audit; Every Fall & Spring) Three-week rotation focusing on the management of gynecologic oncology patients. Students serve as junior interns, work up cases, and participate in rounds and case discussion conferences. prereq: 7500

OBST 7521. Advanced Externship in Ob/Gyn. (3 cr.; H-N or Audit; Every Fall, Spring & Summer) Each student is under preceptorship of member(s) of full-time faculty. Areas of study may include general obstetrics/gynecology, maternal/fetal medicine, high risk obstetrics, benign gynecology, and reproductive endocrinology. prereq: 7500, instr consent

OBST 7530. Advanced Externship in Ob/Gyn. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer) N/A prereq: 7500, instr consent

OBST 7540. Advanced Externship in Ob/Gyn. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) Six-week rotation focusing on the management of gynecologic oncology patients. Students serve as junior interns, work up cases, and participate in rounds and case discussion conferences. prereq: 7500

OBST 7541. Advanced Externship in Ob/Gyn. (2-6 cr.; H-N or Audit; Every Fall & Spring) Each student is under preceptorship of member(s) of full-time faculty. Areas of study may include general obstetrics/gynecology, maternal/fetal medicine, high-risk obstetrics, benign gynecology, and reproductive endocrinology. prereq: 7500, instr consent


OBST 7560. Research in Reproduction. (3-6 cr.; H-N or Audit; Every Fall & Spring) This is an individually designed course, with topics selected for each student. Most members of the Ob/Gyn staff are available for this one-to-one experience depending upon the establishment of joint interests with the student. prereq: 7500

OBST 7575. Gynecological Pathology and Diagnostic Cytology. (3-6 cr.; H-N or Audit; Every Fall & Spring) The student participates in the diagnostic practice with the gynecologic pathology staff. Includes diagnostic cytology of pap smears encountered in actual practice and participation in working conferences. To be arranged in advance with the Ob/Gyn Education office. prereq: 7500

OBST 7591. Women's Health Rotation. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Multidisciplinary exploration of women's health issues. Clinical experience/academic perspectives in gynecology/reproductive health, internal medicine, adolescent medicine, and psychology. Culture, economics, psycho-social status, and life span in women's health care delivery. prereq: 7500, Med 5500

OBST 7910. Obstetrics and Gynecology Medical Residency. (6 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer) Obstetrics and gynecology medical residency.

OBST 7930. Obstetrics and Gynecology Medical Fellowship. (6 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer) Obstetrics and gynecology medical fellowship.

OBST 8224. Gynecological Endocrinology I. (1-15 cr.; Student Option; Every Fall & Spring) N/A prereq: prereq 8223

OBST 8225. Gynecological Endocrinology II. (1-15 cr.; Student Option; Every Fall & Spring) N/A prereq: prereq 8224

OBST 8226. Obstetrical Physiology and Anesthesiology. (1-15 cr.; Student Option; Every Fall & Spring) N/A prereq: prereq 8225

OBST 8227. Preceptorship in Clinical Practice. (1-15 cr.; Student Option; Every Fall, Spring & Summer) N/A prereq: prereq 8226

OBST 8240. Human Gametes and Fertilization. (3 cr.; Student Option; Every Fall & Spring)

OBST 8241. Human Gametes and Fertilization Laboratory. (2 cr.; Student Option; Every Fall & Spring)

OBST 8243. Topics in Family Planning. (2-8 cr.; [max 12 cr.]; Student Option; Every Fall, Spring & Summer)

OT 1003. Introduction to Occupational Therapy. (1 cr.; A-F only; Every Fall, Spring & Summer) Introduction to career of occupational therapy. Overview of profession's domain/process. Work settings, populations served, approaches used by occupational therapist.

OT 5121. Issues in Mental Health. (1 cr.; S-N or Audit; Every Fall) Psychiatric/neuropsychological assessment/treatment. Issues related to medical/community management and to roles of OT/PT with respect to clients with mental health needs. Interaction between physical/mental health and disability. prereq: One course gen psych, one course abnorn psych.

OT 5122. Descriptive Neurology. (2 cr.; A-F or Audit; Every Fall) Relates neuroanatomical/neuropsychological principles to neurological conditions commonly seen in occupational/physical therapy practice. prereq: OT student or instr consent

OT 5161. Theory of Physical Medicine and Rehabilitation Applied to Medical Sciences. (2 cr.; A-F or Audit; Every Fall) Diagnostic procedures. Medical, surgical, and rehabilitation management of patient problems in orthopedics, surgery, pediatrics, dermatology, medicine, cancer, and speech. Correlation to current practice. Presentation of patients. prereq: OT student or instr consent

OT 5182. Functional Neuroanatomy and Neurophysiology. (4 cr.; A-F or Audit; Every Spring) Neuroanatomical structures as functional systems, basic neurophysiologic concepts. Emphasizes applications for understanding/treating physical dysfunctions. prereq: Registered occupational therapy student or instr consent

OT 5300. Concepts for Occupational Therapy Practice. (4 cr.; A-F or Audit; Every Fall) Critical thinking, ethics, professional resources/oranizations, patient-therapist relationship. Level I fieldwork experience. prereq: enrolled OT student or instr consent

OT 5313. Therapeutic Occupation. (4 cr.; A-F or Audit; Every Fall) Occupational therapy philosophy, history, and frames of reference. Activity analysis applied to
OT 5341. Introduction: Evaluation and Intervention I. (4 cr.; A-F or Audit; Every Fall)
Assessment concepts/techniques. Application to patient populations with both mental health/physical disabilities. Treatment planning/ documentation. prereq: 5393 or instr consent

OT 5342. Compensatory Rehabilitation: Evaluation and Intervention II. (4 cr.; A-F or Audit; Every Spring)
Assessment of daily living performance areas; adaptation techniques to compensate for performance deficits. Level I fieldwork experience. prereq: 5300, 5313 or instr consent

OT 5343. Specialty Topics: Evaluation and Intervention III. (4 cr.; A-F or Audit; Every Fall)
Applies critical thinking model to assessment/intervention of selected patient populations with mental/physical problems requiring specialized approaches. Focus on habilitation/rehabilitation of populations with multiple performance component deficits. Fieldwork. prereq: 5342 or instr consent

OT 5344. Neurorehabilitation: Evaluation and Intervention IV. (5 cr.; A-F or Audit; Every Spring)
Assessment/intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance component deficits. prereq: 5343 or instr consent

OT 5360. Dynamics of Group Models. (2 cr.; A-F or Audit; Every Fall)
Application of group/team dynamics in diverse professional settings. prereq: 5313 or instr consent

OT 5370. Theory of Occupation. (1 cr.; A-F or Audit; Every Fall)
Occupational therapy frames of reference, role of activity, and historical development of profession. prereq: enrolled OT student or instr consent

OT 5375. Community Resources and Healthcare Issues. (2 cr.; A-F or Audit; Every Fall)
Analysis of community health-care systems, including cultural/family influences on individual health and decision making. Students identify current trends in health care and determine responses to them at social, political, or legislative level. prereq: [5300, 5342] or instr consent

OT 5376. Adult Education and Planning. (1 cr.; A-F or Audit; Every Spring)
Skills needed to plan, implement, and evaluate adult educational programs/materials for patient/family education, peer/professional education, and education of others in order to carry out therapeutic interventions. Student teaching unit, community based activity. prereq: 5313 or instr consent

OT 5380. Management of Occupational Therapy Services. (3 cr.; A-F or Audit; Every Spring)
Administration/management of occupational therapy services within managed care environment. Issues in Medicare, HMOs, TQM, consultation, human resources, promotion of profession. Emphasizes program development in current organizational structures. prereq: [5360, 5375, 5376] or instr consent

OT 5391. Occupation Across the Life Span. (3 cr.; A-F or Audit; Every Spring)
The well elderly, school therapy, work-related injuries/industrial rehabilitation. Fieldwork. prereq: [5375, 5376] or instr consent

OT 5392. Research in Occupational Therapy. (3 cr.; A-F or Audit; Every Spring)
Analysis of scientific literature, development of research proposals. prereq: 5313 or instr consent

OT 5393. Functional Anatomy and Kinesiology. (4 cr.; A-F or Audit; Every Fall)
Gross human anatomy emphasizing skeletal, muscular, circulatory, and peripheral nervous systems of the extremities and trunk. Includes cadaver lab prosections. Analyzing functional human movement from a biomechanical perspective. prereq: enrolled OT student or instr consent

OT 5394. Orthotics. (3 cr.; A-F or Audit; Every Fall)
Analysis, design, and construction of orthotic devices. prereq: 5341 or instr consent

OT 5395. Independent Study in Occupational Therapy. (1-4 cr.; max 16 cr.)
Student Option; Every Fall, Spring & Summer)
Independent Study in Occupational Therapy prereq: Enrolled OT student or instr consent

OT 6100. Public and Professional Engagement I. (0.5 cr.; max 1 cr.; S-N only; Every Fall & Spring)
Working with an academic adviser, students establish personal/professional goals and design a series of experiences in natural setting, including a broad base of contexts/practice settings/clients across the lifespan.

OT 6101. Foundations of Occupational Science and Occupational Therapy. (4 cr.; A-F only; Every Fall)

OT 6102. Professional Identity: Behaviors and Attitudes. (2 cr.; S-N only; Every Fall)

OT 6103. Occupational Therapy Process for Society. (3 cr.; A-F only; Every Fall)
Influence of society on health, occupational participation, and practice of occupational therapy. Students analyze health care system through global comparisons and apply key concepts. Written assignments, experiential learning activities.

OT 6111. Foundations of Occupations as Therapy. (3 cr.; A-F only; Every Fall)
Students apply Occupational Therapy Practice Framework in an analyzing of a series of craft-based activities and representative daily occupations. How to grade/adapt activities to enhance performance.

OT 6113. Occupational Therapy Process for Community. (3 cr.; A-F only; Every Fall)
Application of occupational therapy process to wellness and health promotion activities in the community. Knowledge, skills, and attitudes necessary to understand influence of community health on health of individuals. Health behavior theories, program development/evaluation. Applying theoretical models to community health.

OT 6200. Public and Professional Engagement II. (0.5 cr.; max 1.5 cr.; S-N only; Every Fall, Spring & Summer)
Continuation of 6100. Students engage in professional/community activities that align with occupational therapy practice. prereq: 6100 or instr consent

OT 6201. Functional Anatomy and Kinesiology. (3 cr.; A-F only; Every Spring)
Gross human anatomy. Emphasizes skeletal, muscular, circulatory, and peripheral nervous systems of extremities, neck, and trunk. Online Anatomy TV, videotapes, cadaver lab prosections. Students analyze/evaluate human occupations tasks and activities from biomechanical perspective. prereq: OT student or instr consent

OT 6202. Occupational Therapy Process for Individuals: Occupation Through Compensation. (5 cr.; A-F only; Every Spring)
Compensatory approaches to enhance an individual's participation in occupations of daily living. OT practice framework applied to evaluation/intervention of individuals. Face-to-face labs, level I fieldwork. prereq: Registered OT student or instr consent

OT 6203. Occupational Therapy Process for Family. (2 cr.; A-F only; Every Spring)
Influence of family systems on health, well-being, and occupational participation of individual members. Family theories' influence on models of care. Non-standardized OT assessment in families of very young children and of elders with dementia. At-risk families. OT in home care settings. prereq: OT student or instr consent

OT 6213. Occupational Therapy Process for Individuals: Medical Contexts. (2 cr.; A-F only; Every Spring)
Overview of medical model systems/settings (e.g. inpatient acute, long-term care, partial hospitalization). Client assessment/intervention from medical model perspective. Reimbursement. Written/verbal communication. prereq: OT student or instr consent

OT 6301. Neuroscience. (5 cr.; A-F only; Every Summer)
 Neuroanatomic structures, functional systems, neurophysiologic concepts. Applications to evaluate/treat client conditions in all areas of physical, psychosocial, and cognitive dysfunction. prereq: Registered OT student or instr consent

OT 6302. Occupational Therapy Process for Individuals: Occupation Through Remediation. (4 cr.; A-F only; Every Summer)
Biomechanical approach to evaluation/treatment of clients with clinical conditions with loss of strength, endurance, range of motions, sensibility, and soft tissue integrity. Cases on how to apply OT process to specific clients. prereq: Registered OT student or instr consent

OT 6312. Occupational Therapy Process for Individuals: Psycosocial Approaches. (3 cr.; A-F only; Every Summer)
This course emphasizes concepts of occupation as a tool for support and recovery of mental health across the lifespan. Theory based evaluations: client centered interventions; and appropriate safety and documentation practices for addressing both psychological and psychosocial aspects of occupational engagement and performance are emphasized. prereq: Registered OT student or instr consent

OT 6322. Occupational Therapy Process for Individuals: Work Contexts. (2 cr.; A-F only; Every Summer)
Knowledge, skills, and attitudes needed to apply occupational therapy process with individuals injured at work settings or to promote injury prevention programs in work settings. Unique role of rehab. Includes consultant. prereq: Registered OT student or instr consent

OT 6402. Occupational Therapy Process for Individuals: Occupation Through Neurorehabilitative Approaches. (4 cr.; A-F only; Every Fall)
Major theories of sensory systems, vision, motor control/learning, perception, cognition. Evaluation/intervention of central nervous system disorders. Theories for non-CNS issues in expanded populations. prereq: Registered OT student or instr consent

OT 6403. Management of Occupational Therapy Services. (1 cr.; A-F only; Every Fall)
Management/human resource knowledge/skills to create, maintain, and evaluate occupational therapy services. Health care systems, contexts, practice. Marketing, staffing, supervision, quality improvement. prereq: Registered OT student or instr consent

OT 6412. Occupational Therapy Process for Individuals: Orthotics and Prosthetics. (3 cr.; A-F only; Every Fall)
Occupational therapy process using prosthetic/orthotic devices to treat selected conditions in children, adults, and elders. Lab emphasizes practical skills, critical appraisal. Physical agent modalities, wound care. Fieldwork. prereq: Registered OT student or instr consent

OT 6422. Occupational Therapy Process: Group Context. (2 cr.; A-F only; Every Fall)
Hybrid course. Therapeutic intervention to facilitate change in individuals in a group setting. Students analyze group process, generate constructive feedback, evaluate group effectiveness. Application to mental health treatment. prereq: Registered OT student or instr consent

OT 6432. Occupational Therapy Process for Individuals: Educational Context. (2 cr.; A-F only; Every Fall)
Occupational therapy assessment/intervention in early intervention. K-12 settings. Models of services delivery. Legislation that governs school-based practice. Performance areas addressed by occupational therapists in these settings. prereq: Registered OT student or instr consent

OT 7101. Foundations of Occupational Science and Occupational Therapy. (4 cr.; A-F only; Every Fall)
Online/independent study. Science of human occupation, theory development, six occupation-based theories. Examine in depth a theory, model, or approach pertaining to a select topic area. Students work closely with their research advisor. prereq: Grad student, instr consent

OT 7201. Scholarly Inquiry in Health Sciences. (4 cr.; A-F only; Every Spring)
How evidence-based practice is developed, disseminated, and utilized. Students in small groups write qualitative or quantitative scholarly proposal. Appraising literature. Assessment tools. Research design. Statistical analysis. prereq: OT student or instr consent

OT 7301. Neuroscience. (5 cr.; A-F only; Every Summer)
Neuroanatomic structures, functional systems, neurophysiologic concepts. Applications. Evaluating/treating client conditions in all areas of physical, psychosocial, and cognitive dysfunction. prereq: Registered OT student or instr consent

OT 7394. Scholarly Project in OT I. (2 cr.; S-N only; Every Summer)
Group or individual study of a question related to occupational therapy. Students plan, conduct, and evaluate mentored scholarly project, submit a written description, and defend through poster presentation or orally. prereq: Registered OT student or instr consent

OT 7402. Occupational Therapy Process for Individuals: Occupation Through Neurorehabilitative Approaches. (4 cr.; A-F only; Every Fall)
Major theories to explain sensory systems, vision, motor control/learning, perception, and cognition. Evaluation/intervention of central nervous system disorders. Theories with evidence, for use with non-CNS issues for expanded populations. prereq: Registered OT student or instr consent

OT 7494. Scholarly Project in OT II. (4 cr.; S-N only; Every Fall) 
Group or individual study of a question related to occupational therapy. Students plan, conduct, and evaluate mentored scholarly project, submit written description of project, and defend through poster presentation or orally. prereq: Registered OT student or instr consent

OT 7596. Occupational Therapy Level II Fieldwork I. (6 cr.; S-N only; Every Fall, Spring & Summer)
Guided, supervised OT practice in affiliated medical, educational, or community institutions. Application of client-centered, culturally-effective care during active engagement as student develops professional role. prereq: Registered OT student or instr consent

OT 7696. Occupational Therapy Level II Fieldwork II. (6 cr.; S-N only; Every Fall, Spring & Summer)
Guided, supervised OT practice in affiliated medical, educational, or community institutions. Application of client-centered, culturally-effective care during active engagement as student develops professional role. prereq: Registered OT student or instr consent

OT 7796. Occupational Therapy Level II Fieldwork III: Optional. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Supervised practice in clinic or community agency with specialty focus. Sample topics: hand therapy, school therapy, clinical research. Students apply critical thinking through supervised application of theory/skills. prereq: Registered OT student or instr consent

OT 8300. Research Seminar in Occupational Therapy. (1 cr.; S-N or Audit; Every Fall & Spring)
Critical review of research literature in occupational therapy. Issues related to ethical/successful conduct/publication of research. Development of Plan B project outline. prereq: 5392 or instr consent

OT 8310. Research Problems in Occupational Therapy. (1-6 cr.; S-N or Audit; Every Fall & Spring)
Individual, concentrated study of a problem in occupational therapy. Completion of Plan B project. prereq: [5392, Plan B OT student] or instr consent

OT 8320. Fieldwork Education in Occupational Therapy I. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Supervised clinical practice in affiliated hospitals and community agencies. Students apply critical thinking through supervised application of theory/skills. prereq: Occupational therapy student or instr consent

OT 8321. Fieldwork Education in Occupational Therapy II. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Supervised clinical practice in affiliated hospitals and community agencies. Students apply critical thinking through supervised application of theory/skills. prereq: Occupational therapy student or instr consent

OT 8322. Fieldwork Education in Occupational Therapy III: Optional. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Optional fieldwork experience involving supervised practice in clinic or community agency with specialty focus. Sample topics:

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hand therapy, school therapy, clinical research. Students apply critical thinking through supervised application of theory/skills. prereq: Occupational therapy student or instr consent

OT 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

OT 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**Off-Campus Study (OCS)**

OCS 550. NSE: National Student Exchange Plan A. (0-6 cr.; A-F only; Every Fall, Spring & Summer) Off-campus study program. prereq: dept consent

OCS 3000. Non-affiliated Domestic Program. (0-30 cr.; A-F only; Every Fall, Spring & Summer) Not printed in catalog. A registration mechanism for students pursing a unique off-campus study experience through either other educational institutions or through private non-credit granting agencies. Limited to students whose study is approved by University of Minnesota faculty who certify likely departmental credit for successfully completed study as specified by agreement forms signed by both student and faculty. prereq: instr consent

OCS 3550. NSE: National Student Exchange Plan B. (0-20 cr. [max 40 cr.]; A-F only; Every Fall, Spring & Summer) National Student Exchange: off-campus study. (Do not publish.) prereq: dept consent

**Office of Undergrad Education (OUE)**

OUE 1086. The First Year Experience: Fall. (2 cr.; A-F only; Every Fall) Awareness of roles, identity, needs, and interactions with diverse groups. Expectations, resources, and challenges associated with transition into college. Speakers, journals/portfolios, technology, reading/ writing assignments, classroom exercises/ experiences. prereq: 1st-yr student athletes

OUE 1087. The First Year Experience: Summer. (3 cr.; A-F only; Every Summer) Awareness of roles, identity, needs, and interactions with diverse groups. Expectations, resources, and challenges associated with transition into college. Speakers, journals/portfolios, technology, reading/ writing assignments, classroom exercises/ experiences. prereq: 1st-yr student athletes

OUE 1909W. Freshman Seminar. (GP;Wi; 3 cr.; A-F only; Periodic Spring) Freshman seminar.

OUE 1910W. Freshman Seminar. (Wi; 3 cr.; A-F only; Periodic Spring) Freshman seminar. Topics vary by semester.

**OUE 2100. Academic Planning and Exploration. (1 cr.; Student Option; Every Fall, Spring & Summer)** Undecided and competitive-major students engage in academic and career decision-making process. Students develop an exploratory action plan to help them discover/ declare a best-fit major matching their interests, values, and academic skills. Customized course assignments include self-assessment, reflective essays, and an action plan project. prereq: Ctr for Academic Planning and Exploration (CAPE) consent

OUE 3050. Introduction to Peer Education. (1 cr.; Student Option; Every Fall) Peer cooperative learning. Factors that enhance effectiveness of group learning, including facilitating learning process, integrating learning skill development/ content knowledge acquisition, application of appropriate theories of learning.

OUE 3310. Leadership Development for University Student Leaders. (3 cr.; S-N only; Every Spring) This course will provide an opportunity for student orientation leaders to translate theory to practice, using the University of Minnesota Orientation and Welcome Week experience as a learning laboratory. Students will build upon existing self-awareness to further examine their identity, biases, and strengths through the use of critical reflective models and leadership theory concepts. Guest lecturers will share expertise on the topics of leadership, communication, and diversity. Course participants will gain an advanced level of leadership self-awareness and responsibility vital to creating an inclusive and welcoming environment for incoming students and their families.

**Ojibwe (OJIB)**

OJIB 1000. Ojibwe Immersion. (3 cr. [max 5 cr.]; Student Option; Every Summer) Three week course designed to help students with little or no knowledge of Ojibwe language. Introduction to fundamentals of Ojibwe language. Taught primarily in Ojibwe with some grammatical description. Learn to read/write in Ojibwe language.

OJIB 1101. Beginning Ojibwe I. (5 cr.; Student Option; Every Fall) Speaking. Grammar. Writing systems.

OJIB 1102. Beginning Ojibwe II. (5 cr.; Student Option; Every Spring) Speaking. Grammar. Writing systems. prereq: 1101


**OJIB 3127. Ojibwe Language for Teachers. (3 cr.; A-F only; Every Spring)** How to teach Ojibwe outside classroom and teach it in formal/informal learning settings, including second language classrooms, immersion schools, language tables, and immersion camps. prereq: 1101

**OJIB 4101. Beginning Ojibwe I. (3 cr.; Student Option; Every Fall)** Speaking. Grammar. Writing systems. prereq: community member, see department for permission to enroll.

**OJIB 4102. Beginning Ojibwe II. (3 cr.; Student Option; Every Spring)** Speaking. Grammar. Writing systems. prereq: community member, see department for permission to enroll.

**OJIB 4103. Intermediate Ojibwe I. (3 cr.; Student Option; Every Fall)** Speaking. Grammar. Storytelling. Oral history. Translation projects. prereq: 1101, 3103, community member, see department for permission to enroll.

**OJIB 4104. Intermediate Ojibwe II. (3 cr.; Student Option; Every Spring)** Speaking. Grammar. Storytelling. Oral history. Translation projects. prereq: 1102, 3102, community member, see department for permission to enroll.

**OJIB 5106. Advanced Ojibwe Language I. (3 cr. [max 12 cr.]; A-F or Audit; Every Fall)** Focuses on immersion method.

**OJIB 5109. Advanced Ojibwe Language II. (3 cr. [max 12 cr.]; A-F or Audit; Every Spring)** Focuses on immersion method.

**OJIB 5202. Ojibwe Mastery I. (3 cr.; A-F or Audit; Every Fall)** The purpose of the first three years of the Ojibwe language courses at the University is to introduce students to the most common Ojibwe grammatical and conjugational systems, and to help develop their fluency through immersion. In this course and in the subsequent course in the winter semester, students will work towards Ojibwe language mastery by learning less frequent, but crucial aspects of the Ojibwe language and further working towards a more sophisticated level of talking.

**OJIB 5204. Ojibwe Mastery II. (3 cr.; A-F or Audit; Every Spring)** The purpose of the first three years of the Ojibwe language courses at the University is to introduce students to the most common Ojibwe grammatical and conjugational systems, and to help develop their fluency through immersion. In this course and in the subsequent course in the winter semester, students will continue refining their Ojibwe language ability by studying verb conjugational systems, more complex morphemes, reduplication, more grammar pattern study, and more opportunities to use and apply their language skills.

**Ophthalmology (OPH)**

OPH 1501. Ophthalmic Technician Externship. (15 cr.; S-N or Audit; Every Fall & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

**Externalship rotation. prereq: instr consent**

**OPH 1601. Oph Technician Externship. (15 cr.; S-N or Audit; Every Fall)**

Externalship rotation.

**OPH 1701. Oph Technician Externship. (15 cr.; S-N or Audit; Every Fall & Spring)**

Externalship rotation, prereq: instr consent

**OPH 5501. Orthoptics I. (4 cr.; S-N only; Every Summer)**

First semester of Orthoptics Certificate program, prereq: Admission to Orthoptics Certificate program

**OPH 5801. Orthoptics II. (5 cr.; S-N only; Every Fall)**

Second semester of Orthoptics training program, prereq: Enrollment in Orthoptics Certificate program

**OPH 5701. Orthoptics III. (5 cr.; S-N only; Every Spring)**

Third semester of Orthoptics certificate program.

**OPH 7180. Externship in Ophthalmology. (3 cr.; H-N or Audit; Every Fall & Spring)**

Nine lectures planned during first two days of rotation. Attendance required. The remaining two and one-half weeks is spent at one of the three Twin Cities teaching hospitals.

**OPH 7190. Ophthalmology Research Problems. (1-15 cr.; [max 30 cr.]; H-N or Audit; Every Fall, Spring & Summer)**

Introduction to research problems in ophthalmology. Particularly valuable to medical student planning career in ophthalmology. Self-directed with student obtaining research project independently.

**OPH 7910. Ophthalmology Medical Residency. (4 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)**

Ophthalmology medical residency.

**OPH 7930. Ophthalmology medical fellowship. (6 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)**

Ophthalmology Med Fellowship

**OPH 8101. Clinical Ophthalmology. (5 cr.; Student Option; Every Fall, Spring & Summer)**

**OPH 8103. Pediatric Ophthalmology, Strabismus, and Hereditary Disorders. (2 cr.; Student Option; Every Fall & Summer)**

**OPH 8106. Strabismus Management. (1 cr.; Student Option; Every Fall)**

N/A prereq: Med or grad in vet med

**OPH 8110. Optics, Refraction, and Contact Lens. (2 cr.; Student Option; Every Fall)**

**OPH 8111. Intraocular Inflammation, Uveitis, Ocular Tumors. (2 cr.; Student Option; Periodic Fall)**

N/A prereq: Grad physician or grad in vet science

**OPH 8112. Retina and Vitreous. (2 cr.; Student Option; Every Fall)**

**OPH 8113. Basic and Clinical Neuro-ophtalmology. (2 cr.; Student Option; Every Spring)**

**OPH 8116. Glaucoma, Lens, and Anterior Segment Trauma. (2 cr.; Student Option; Every Spring)**

N/A prereq: Grad physician or grad in vet science

**OPH 8117. Orbit, Plastics, and Trauma. (2 cr.; Student Option; Every Spring)**

N/A prereq: Physician or vet med student

**OPH 8118. General Medical Problems. (2 cr.; Student Option; Every Spring)**

N/A prereq: Grad physician or grad in vet science

**OPH 8119. Clinical Pathological Correlations in Ophthalmology. (1 cr.; Student Option; Every Spring)**

N/A prereq: Physician or vet med student

**OPH 8120. Scope of Ophthalmic Pathology. (1 cr.; Student Option; Every Spring & Summer)**

N/A prereq: Physician or vet med student

**OPH 8125. Diseases of the Cornea and External Eye. (2 cr.; Student Option; Every Spring & Summer)**

**OPH 8126. Diseases of the Cornea and External Eye. (2 cr.; Student Option; Every Spring & Summer)**

**OPH 8131. Practical Ocular Surgery. (2 cr.; Student Option; Every Fall, Spring & Summer)**

**OPH 8142. Ophthalmic Pathology Laboratory. (1 cr.; Student Option; Every Fall, Spring & Summer)**

**OPH 8155. Special Topics in Ophthalmology. (1-2 cr.; Student Option;)**

**OPH 8701. Neuro-ophtalmology. (1 cr.; Student Option;)**

**Oral Biology (OBIO)**

**OBIO 5001. Methods in Research and Writing. (2 cr.; Student Option; Every Fall)**

Skills necessary to begin a research project, including literature review, hypothesis formation, research design, and writing. Each student develops a research protocol.

**OBIO 5030. Virology Research Presentations. (1 cr. [max 10 cr.]; S-N only; Every Fall & Spring)**

This course is designed to enhance knowledge in virology through research presentations as well as the critical evaluation of presentations of other students and researchers. Presentation will includes current virology research, both individual research projects and critical reading, and presentation of current literature.

**OBIO 8018. Topics in Oral Pathobiology. (2 cr.; [max 4 cr.]; A-F or Audit; Every Fall)**

Clinical understanding of oral disease. Correlates about underlying basic mechanisms in microbiobiology, immunology, cancer biology, developmental biology, neuroscience. Dialog between clinic/bench to improve preventative/treatment modalities. prereq: All students must be degree-seeking graduate students or dental fellows and should hold a PhD or DDS. instr consent for 4th year dental students and PhD students. CDE available for practitioners.

**OBIO 8021. Oral Microbiology. (2 cr.; Student Option; Fall Odd Year)**


**OBIO 8022. Oral Neuroscience. (2 cr.; Student Option; Spring Odd Year)**

Background lectures and student presentations on current research topics to evaluate questions in general motor/sensory function related to oral/nasal structures. Taste, smell, and other chemical senses as they relate to those structures. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8023. Physical Biology of the Oral Cavity. (2 cr.; A-F or Audit; Spring Even Year)**

Structure/function of load-bearing components of human masticatory system from biophysical point of view. Mandibular form/movement. Infrastructure of hard tissues as related to occlusal wear and masticatory efficiency. Role of saliva and salivary pellicle in reduction of interocclusal friction. Computer simulation of jaw mechanics. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8024. Genetics and Human Disease. (1 cr.; Student Option; Every Spring)**

Principles of medical genetics. Emphasizes oral diseases. Twins, chromosomes, recombinant DNA, major gene traits, genes in populations, chromosomal abnormalities, complex traits, facial clefts, dental caries, periodontal diseases. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8025. Topics in Cariology. (2 cr.; A-F or Audit; Spring Even Year)**

Lectures, assigned readings, and discussions of basic epidemiological, biological, and chemical aspects of dental caries. Etiology, epidemiology, and pathogenesis of dental caries. Influence of dietary, salivary, plaque, and microbial factors on caries process. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8026. Salivary Glands and Secretions. (2 cr.; A-F or Audit; Fall Even Year)**

pellicle, salivary gland disease. Clinical studies, readings, student presentations. Each student develops a research proposal. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8027. Biomaterials in Regenerative Dentistry.** (2 cr.; A-F or Audit; Fall Odd Year) 
Describes most modern research strategies that are being developed by interdisciplinary groups to obtain revolutionary materials for its use in tissue engineering and regenerative medicine. The central role of biotechnology, nanotechnology, and biomimetics in these research strategies is highlighted. Focus on dental applications is provided. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8028. Molecular Basis of Cellular and Microbial Adhesion.** (2 cr.; A-F or Audit; Spring Odd Year) 
Biochemical basis of adhesion phenomena. Cells of immune system, development of organs, tissue formation, bacterial colonization of the human. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8030. Oral Biology Seminar.** (1 cr. [max 10 cr.]; S-N or Audit; Every Fall & Spring) 
Faculty and student discussion of current topics in oral biology. prereq: Dental specialist or oral research trainee or instr consent

**OBIO 8093. Tutorial in Oral Biology.** (1-2 cr.; S-N only; Every Fall & Spring) 
Semester-long apprenticeship with faculty members to familiarize students with faculty research interests. Individual study of selected topics. prereq: instr consent

**OBIO 8094. Directed Research.** (1-10 cr.; S-N or Audit; Every Fall & Spring) 
Prerequisite: Master's student, advisor and DGS consent

**OBIO 8333. FTE: Master's.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) 
(no description) prereq: Master's student, advisor and DGS consent

**OBIO 8371. Mucosal Immunobiology.** (3 cr.; A-F or Audit; Every Fall) 
Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal. prereq: MICA 8001 or equiv or instr consent

**OBIO 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) 
(no description) prereq: Doctoral student, advisor and DGS consent

**OBIO 8666. Doctoral Pre-Thesis Credits.** (1-6 cr.; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) 
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**OBIO 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) 
(no description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**OBIO 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) 
(no description) prereq: Max 18 cr per semester or summer; 24 cr required

**Oral and Maxillofacial Surgery (OSUR)**

**OSUR 5257. Ambulatory General Anesthesia for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Clinical rotation involving experience in outpatient management and using intravenous sedation and general anesthesia. prereq: Participation in oral and maxillofacial surgery training program.

**OSUR 5276. Medicine Rotation for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Clinical rotation at Fairview-University Medical Center under the direction of the Internal Medicine Department. Involves workup, admission, and daily management of patients on medical service, specifically cardiology and pulmonary. prereq: Participation in oral and maxillofacial surgery training program.

**OSUR 5277. Physical Diagnosis for Oral Surgery Residents.** (0-6 cr.; A-F or Audit; Every Spring & Summer) 
Six-week didactic course coupled with evaluation of patients. prereq: Participation in oral and maxillofacial surgery training program.

**OSUR 8250. Oral and Maxillofacial Surgery Rotation for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Rotations at assigned oral and maxillofacial surgery clinics and operating rooms at Fairview-University Medical Center, Hennepin County Medical Center, Veterans Administration Medical Center. prereq: Participation in oral and maxillofacial surgery training program.

**OSUR 8251. Oral and Maxillofacial Surgery Core Curriculum.** (0-2 cr.; S-N only; Every Fall, Spring & Summer) 
Standardized curriculum of fundamental concepts of surgery and medicine. Fourteen core curriculum topics covered in a two-year cycle. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8253. Case Presentations and Chief Conferences.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Topic-oriented journal reviews. Guest oral surgeons, specialists, or chief resident present topics in case-based format. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8254. Oral and Maxillofacial Surgery Resident Presentations.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Contemporary subjects researched and presented by current residents. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8255. General Surgery Rotation for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Clinical rotation on general surgery, neurosurgery, and surgical intensive care unit at Hennepin County Medical Center. Seminars, clinics, and operating room experience. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8256. Contemporary Anesthesia Literature Review.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Seminars and clinical presentations of current publications that address anesthesia management for the oral and maxillofacial surgery patient. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8260. Surgical Rounds for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Pre- and post-operative case discussions of patients currently being managed for surgery at all affiliated institutions. As they relate to individual patients, discussions will involve medical, anesthesia, surgical, and management of post-surgical and sequela complications. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8262. Plastic Surgery Rotation for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Clinical rotation at HealthPartners St. Paul Ramsey Medical Center under direction of reconstructive surgery faculty. Elective or transfacem cosmetic and esthetic surgery experience. prereq: Participation in oral and maxillofacial surgery training program

**OSUR 8267. Anesthesia Rotation for the Oral and Maxillofacial Surgeon.** (0-6 cr.; S-N only; Every Fall, Spring & Summer) 
Clinical rotation at Fairview University Medical Center under direction of anesthesia faculty. After a suitable period of supervision determined by anesthesia faculty, residents are assigned their own anesthesia room and are given responsibility for pre-operative patient evaluation and inter-operative management of patient's general anesthesia. prereq: Participation in oral and maxillofacial surgery training program

**Org Leadership, Policy & Dev (OLPD)**

**OLPD 1231. Technological Change and Workplace Learning: Past and Present.** (HIS; 3 cr.; Student Option; Every Fall & Spring) 
Within the historical context of the United States over the past 150 years, this course examines how we learn to be "good workers."
The impact of multiple technological changes on workplace learning and broader American society is the main thematic focus of the course. In other words, how have various technological changes continually re-made workers and disciplined them into being “good workers”? This course meets both the Historical Perspectives core and the Technology & Society theme of the Liberal Education requirements.

OLPD 1301W. Personal Leadership in the University. (WI; 3 cr.; A-F only; Every Fall, Spring & Summer) Students examine their own views of leadership, differences between personal/positional leadership, leadership ethics/values, and their own leadership strengths/skills.

OLPD 1302. Personal Leadership in the University. (3 cr.; A-F only; Every Fall, Spring & Summer) Students examine own views of leadership, differences between personal/positional leadership, leadership ethics/values, leadership strengths/skills.

OLPD 1461. Presentations in Work Settings: Business & Marketing Education and Human Resource Development. (CIV; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) This course prepares students to present information and hone their messages based on audience need in a variety of business, leadership, and workplace contexts. Students interested in majoring in Business and Marketing Education (BME), Human Resource Development (HRD), and other majors can take this course in order to develop the disciplinary practices used in training and development, as well as business and industry to convey vital and timely messages.

OLPD 1496. Supervised Career and Technical Education Teaching. (; 4 cr.; S-N or Audit; Every Fall & Spring) Supervised teaching for beginning teachers, or teaching activities for preservice teachers. prereq: college consent

OLPD 1801. Introduction to Career and Technical Education Teaching. (; 2 cr.; A-F or Audit; Every Fall, Spring & Summer) Entry-level skills to function as a teacher. Philosophy of technical education, planning of instruction, instructional methods, student evaluation, working with students who have special needs, ancillary duties of career/technical education faculty. Emphasizes microteaching and feedback. prereq: Occupational certifiable individual

OLPD 1909W. Freshman Seminar: International Perspectives and Writing Intensive. (GP;WI; 1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule. prereq: Fr

OLPD 2811. Societies of the Future: Changing Work Contexts. (TS; 3 cr.; A-F or Audit; Every Fall & Spring) Ongoing evolution of social contexts and work through the interdisciplinary lens of future studies.

OLPD 2811H. Societies of the Future: Changing Work Contexts, Honors. (TS; 3 cr.; A-F only; Every Fall & Spring) Ongoing evolution of social contexts and work through the interdisciplinary lens of future studies. prereq: Honors student

OLPD 3201. Adult Education Overview. (; 1 cr.; A-F or Audit; Every Fall & Spring) Theory/practice of adult learning/development.

OLPD 3202. Introduction to Strategies for Teaching Adults. (; 3 cr.; A-F or Audit; Every Fall, Spring & Spring) Theories of adult learning, learning/teaching styles, methods/perspectives of teaching, applications of teaching in various settings. prereq: Quality Matters certified

OLPD 3302. Leadership, You, and Your Community. (; 3 cr.; A-F only; Every Fall & Spring) How do effective leaders create positive systemic change within complex systems? What is community and how does it shape the work of leadership? Students examine leadership from a multi-dimensional and multicultural perspective and critically examine leadership theories in authentic, complex community settings.

OLPD 3305. Learning About Leadership Through Film and Literature. (; 3 cr.; Student Option; Every Fall) Readings from leadership studies, literature, and film. Ethical dilemmas. Different styles of leadership and their consequences. Intersection of public/private in exercising leadership. Competing loyalties/pressures felt by leaders/followers. Fundamental questions about nature/desirability of leadership.

OLPD 3306. Leadership Minor: Field Experience. (; 3 cr.; A-F only; Every Fall & Spring) Students apply and integrate leadership theory in a community experience, think critically about their positional leadership roles, extrapolate the experience to future leadership issues within their specific fields, and work through challenges of positional leadership.

OLPD 3310. Special Topics for Undergraduates. (; 1-3 cr.; max 9 cr.) Student Option; Every Fall, Spring & Summer) Inquiry into special topics related to organizational leadership, policy/development.

OLPD 3316. Field Experience: Intercultural Internship. (; 3 cr.; A-F only; Every Summer) Internship-based course focused on leadership principles and intercultural values that impact the work environment. For students in the undergraduate Leadership Minor, this is the opportunity to apply what they have learned in a real-life setting. Prior to departure for the on-site internship in the city location, students spend a week in class at the University studying the theoretical frameworks that will provide the foundation for the 6-week internship, reflection process, and living experience. The composition of the class cohort will include international and domestic students, which provides the opportunity to experience and reflect upon the internship and the designated city living experience through an intercultural lens. Upon completion of the internship, the class cohort will return to the University to complete a final week of class on campus.

OLPD 3318. Introduction to Project Management. (; 3 cr.; Student Option; Every Fall, Spring & Summer) Project management for business and industry. Project lifecycles, deliverables, and processes as they are commonly used in the workplace.

OLPD 3324W. Writing in the Workplace for Education and Human Development Majors. (WI; 4 cr.; Student Option; Every Fall & Spring) Explores professional communication. Research/analysis writing. Memos, reports, proposals, human resource-related documentation, letters or announcements, presentations. prereq: 60+ undergraduate credits, declared major

OLPD 3330. Global Identity: Connecting Your International Experience to Your Future. (1 cr.; Student Option; Every Fall, Spring & Summer) Reflect on activities/readings of study abroad experiences overseas. E-journaling, written activities, group interaction using various formats. prereq: [3320 or EDPA 3102 or instr consent], studying abroad the semester student is enrolled in course

OLPD 3336. Religion, Ethics, and Educational Policy. (CIV; 3 cr.; Student Option; Every Spring) American religious pluralism in relationship to ethics and educational policy. History of religious belief/expression in K-12 and higher education. Students interact with community leaders. Legal issues, religion/science, sexuality, religious alternatives, policy topics.

OLPD 3380. Developing Intercultural Competence. (; 3 cr.; A-F or Audit; Every Fall) Past/current research on intercultural leadership. Students share their understanding/ experiences within intercultural framework.

OLPD 3401. Teaching Marketing Promotion. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Materials, methods, and approaches to teaching marketing promotion. Advertising, promotion, public relations, direct selling, visual merchandising, and direct marketing.

OLPD 3424. Sales Training. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Strategies and techniques for developing effective sales people.

OLPD 3451. Technical Development: Advanced. (; 1-32 cr.; Student Option; Every Fall, Spring & Summer) Work experience in business/industry. prereq: instr consent

OLPD 3461. Professional Sales Management. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Examination of the sales manager’s role in training and mentoring sales representatives in strategic selling, customer-oriented
OLPD 3496. Profession and Practice of Business and Marketing Education. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
Application of theory to practice related to BME core coursework with integrative paper. prereq: Undergrad student. BME major. OLPD 3318, OLPD 3401, OLPD 3424, and OLPD 4426 completed or in progress.

OLPD 3601. Introduction to Human Resource Development. (3 cr.; A-F or Audit; Every Fall & Spring)
Human resource development theories, principles, concepts, and practices.

OLPD 3620. Introduction to Training and Development. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Processes to carry out theoretically sound training/development practices, within the context of systemic relationship with host organization or system.

OLPD 3640. Introduction to Organization Development. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Organization development theories, principles, concepts, and practices. How development is used to direct change in an organization.

OLPD 3693. Directed Study: Human Resource Development. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Open to qualified students. Opportunity to pursue study not available through regular coursework. In consultation with instructor, student develops prospectus/completes progress reports/final report on project. prereq: HRD major, instr consent

OLPD 3696. Profession and Practice of Human Resource Development. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
Course assists students with advancing career development skills, prepares them for HRD internship. prereq: Undergrad student, HRD major. 3 of following 4 courses need to be completed or in progress: 3202, 3601, 3620, 3640

OLPD 3801. Foundations of Philosophy and Practice of Career and Technical Education. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)

OLPD 3805. Introduction to Strategic Planning Through Human Resources. (3 cr.; A-F or Audit; Periodic Spring)
Processes organizations use when engaged in strategic planning. How to participate in planning, implementing, and evaluating strategic initiatives to improve performance. prereq: 3601 or HRD 3001

OLPD 3808. Foundations of Student and Trainee Assessment. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
Developing tests of knowledge, affect, and processes for programs focused on instruction of skills associated with business/industry. Developing learning-progress reporting systems. Evaluating instructional effectiveness. Applying tests and other evaluation instruments to assess/report learning in business/industry and in career/technical education fields.

OLPD 3820. Principles of Supervisory Management. (3 cr.; Student Option; Every Fall & Spring)
Introduction to the principles of supervision in education, business, industry, government, and service organizations.

OLPD 3828. Diversity in the Workplace. (3 cr.; A-F or Audit; Every Fall & Spring)
Diversity in the workplace. Issues of recruiting and selection, management, and performance.

OLPD 3829. Foundations of Course Development for Business and Industry. (2 cr.; A-F or Audit; Every Fall & Spring)
Designing instructional programs/courses focused on helping learners develop desired competence. Designing instructional processes for performance-based training and vocational/technical education. Developing course syllabus components that clarify broad course expectations. Developing academic/community-based elements that complement course goals.

OLPD 3861. Foundations of Instructional Methods for Business and Industry. (2 cr.; A-F or Audit; Every Fall & Spring)
Theory/practice in instructional methods/techniques for career/technical education (CTE) instructors and for human resources and development (HRD) professionals. How to deliver instruction using various teaching methodologies, select appropriate methodologies, and plan for their delivery.

OLPD 4301. Global Youth Leadership and Community Engagement. (6 cr.; A-F only; Periodic Fall, Spring & Summer)
Six-credit course over three semesters. Students take courses at the U of M (spring and fall) and at FLASCO University in Buenos Aires, Argentina, (four weeks in August). Theory and practice of youth-engagement/empowerment to address issues that affect their lives, their communities, and the broader global society.

OLPD 4303W. Leadership for Global Citizenship. (WI; 3 cr.; A-F only; Every Fall & Spring)
Leadership theory, community building, social change, interdisciplinary approaches to complex global issues. Students finalize portfolios, submit scholarly products to demonstrate understanding of personal/positional leadership in changing global context. Capstone course.

OLPD 4318. Advanced Project Management. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Project management for business and industry. Advanced aspects and techniques in project management, project lifecycles, deliverables, and processes as they are commonly used in the workplace. prereq: 3318 or EDPA 3218

OLPD 4400. Education for Small Business Entrepreneurship. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Process of starting a small business. Helps students identify the skills necessary to operate the business.

OLPD 4401. E-Marketing. (3 cr.; A-F or Audit; Every Fall & Spring)
Basic understanding and personal experience with how e-marketing can be used as part of an overall marketing and promotion plan.

OLPD 4420. Practicum in Nonprofit Organizations. (2 cr. (max 4 cr.); A-F or Audit; Every Fall & Spring)
Opportunity to work in all aspects of nonprofit organization. Fundraising, managing events/marketing, conducting outreach programs. prereq: BME major recommended

OLPD 4426. Strategic Customer Relationship Management. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Principles of customer relationship management, brand identity, and integrated marketing communications. Comprehensive framework for how organizations interact with their various publics to create goodwill/loyalty.

OLPD 4496. Applied Experience in Business & Marketing Education. (1-4 cr.; S-N only; Every Fall, Spring & Summer)
Application of theory to practice related to BME core coursework with integrative paper. Work, internship, study abroad, research, field experience, service learning, etc. can all fulfill this degree requirement. Contact OLPD Program Advisors for more information. prereq: BME major, ugrd, [3496 or concurrent registration is required (or allowed) in 3496]

OLPD 4602. Managing Work Teams. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Frameworks and strategies for developing effective work teams. Skill development in facilitating resolution of conflicts in organizations. Foundational information as well as practical applications for participants to become small team leaders.

OLPD 4608. Introduction to International Human Resource Development. (3 cr.; A-F or Audit; Every Spring)
International/cross-cultural aspects of HRD. Practices/impact of economic, social, and cultural influences on HRD programs/interventions. prereq: 3601 or HRD 3001 or 3620 or HRD 3201 or 3640 or HRD 3301

OLPD 4627. Management and Supervisory Training and Development. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
OLPD 4696. Internship: Human Resource Development. (1-4 cr.; S-N only; Every Fall, Spring & Summer) 
Apply/contract for human resource development positions. Contracts describe specific HRD responsibilities to be fulfilled during internship/theory-to-practice learning outcomes.

OLPD 4870. Introduction to Integrating Human Rights into Organizational Leadership. (3 cr.; A-F or Audit; Every Spring) 
Forum to explore local and international policies/practices for integrating human rights into organizational leadership and management.

OLPD 5000. Cultures, Schools, and Communities (Human Relations). (1 cr.; A-F only; Every Fall) 
Addressing social/cultural dimensions of education. Challenges/dilemmas facing contemporary educators. Speakers, simulations, presentations, professional learning communities, field assignments.

OLPD 5001. Formal Organizations in Education. (3 cr.; Student Option; Every Fall, Spring & Summer) 
Classical/current theories of organizations. Applications to education and related fields.

OLPD 5002. Private Colleges as Formal Organizations. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) 
Provide certificate students with introduction to contemporary thinking on organizations/administration. Primary focus on organizational theory. Prereq: Bachelors degree must be completed before starting this course.

OLPD 5005. School and Society. (2 cr.; A-F or Audit; Every Fall, Spring & Summer) 
Readings in history, philosophy, social sciences, and law revealing diverse educational values in a pluralistic society. Multiple expectations of schools. Civil liberties, rights, community. Varying cultural backgrounds of students, family circumstances, exceptional needs. Prereq: Jr or sr or MEd/initial licensure student or CLA music ed major or preteaching major or instr consent.

OLPD 5009. Human Relations: Applied Skills for School and Society. (1 cr.; A-F or Audit; Every Fall, Spring & Summer) 
Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/decision making, prejudice reduction, conflict resolution, teaching in diverse educational settings. Prereq: MEd/init lic or CLA music ed or preteaching or instr consent.

OLPD 5010. Cultures, Schools, and Communities (Human Relations). (2 cr.; A-F only; Every Fall) 
Addressing social/cultural dimensions of education. Challenges/dilemmas facing contemporary educators. Speakers, simulations, presentations, professional learning communities, field assignments. Prereq: Enrolled in initial licensure program.

OLPD 5011. Leading Organizational Change: Theory and Practice. (3 cr.; Student Option; Every Fall) 
How theory is incorporated, affects the change process, and can improve schools/institutions of higher education. Characteristics that impact change processes/outcomes. Leadership/policy effects.

OLPD 5020. Cultures, Schools, and Communities (Human Relations). (1 cr.; A-F only; Every Spring) 
Addressing social/cultural dimensions of education. Challenges/dilemmas facing contemporary educators. Speakers, simulations, presentations, professional learning communities, field assignments. Prereq: Enrolled in teacher initial licensure program.

OLPD 5041. Sociology of Education. (3 cr.; Student Option; Every Spring) 
Structures and processes within educational institutions; linkages between educational organizations and their social contexts, particularly related to educational change.

OLPD 5044. Introduction to the Economics of Education. (3 cr.; Student Option; Periodic Fall & Spring) 
Costs and economic benefits of education, with a focus on K-12: educational markets, prices, and production relationships; investment and cost-benefit analysis.

OLPD 5048. Cross-Cultural Perspectives on Leadership. (3 cr.; Student Option; Every Fall & Summer) 
Introduction to cultural variables of leadership that influence functioning of cross-cultural groups. Lectures, case studies, discussion, problem-solving, simulations. Intensive workshop.

OLPD 5056. Case Studies for Policy Research. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) 
Qualitative case study research methods and their applications to educational policy and practice. Emphasis on designing studies that employ open-ended interviewing as primary data collection technique.

OLPD 5057. Research in International Education. (3 cr.; Student Option; Every Summer) 

OLPD 5061. Ethnographic Research Methods. (3 cr.; Student Option; Every Fall & Spring) 
Practice in aspects of field methodology below the level of full field study; detailed reading; analysis of studies in anthropology and education for methodological content.

OLPD 5080. Special Topics: Organizational Leadership, Policy, & Development. (1-3 cr.; max 24 cr.; Student Option; Every Fall, Spring & Summer) 
Topical issues in organizational leadership, policy, development.

OLPD 5087. MA Research Seminar. (1-3 cr.; max 24 cr.; S-N only; Every Fall, Spring & Summer) 
This research seminar is designed for students who are in their final year of completing Plan A theses or Plan B papers as part of their degree program requirements. During this seminar we will work towards the completion of your paper by writing solid drafts of the first three chapters of your thesis.

OLPD 5095. Problems: Organizational Leadership, Policy, and Development. (1-3 cr.; max 24 cr.; Student Option; Periodic Fall, Spring & Summer) 
Course or independent study on specific topic within department program emphasis.

OLPD 5096. Internship: Organizational Leadership, Policy, and Development. (1-9 cr.; max 24 cr.; Student Option; Every Fall & Spring) 
Internship in elementary, secondary, general, postsecondary administration, or other approved field related setting.

OLPD 5103. Comparative Education. (3 cr.; Student Option; Every Fall) 
Examination of systems and philosophies of education globally with emphasis upon African, Asian, European, and North American nations. Foundations of comparative study with selected case studies.

OLPD 5104. Strategies for International Development of Education Systems. (3 cr.; A-F or Audit; Periodic Fall) 
Strategies for improving quality/efficiency of schooling in developing countries. Introduction to current research on what policy/programmatic interventions have proven most successful in increasing access, raising quality, and improving efficiency of education in developing countries. Prereq: Grad student

OLPD 5107. Gender, Education, and International Development. (3 cr.; A-F or Audit; Every Fall) 
Role of gender/gender relations in international development/education. Interdisciplinary body of literature from development studies, political science, economics, anthropology, cultural studies, gender/women's studies.

OLPD 5121. Educational Reform in International Context. (3 cr.; Student Option; Every Spring) 
Critical policy analysis of educational innovation and reform in selected countries. Use theoretical perspectives and a variety of policy analysis approaches to examine actual educational reforms and their implementation.

OLPD 5124. Critical Issues in International Education and Educational Exchange. (3 cr.; Student Option; Every Spring) 
Analysis of comprehensive policy-oriented frameworks for international education; practices of U.S. and other universities;
OLPD 5128. Anthropology of Education. (3 cr.; Student Option; Periodic Spring)
Insights from educational anthropology for educators to address issues of culture, ethnicity, and power in schools.

OLPD 5132. Intercultural Education and Training: Theory and Application. (3 cr.; Student Option; Every Spring)
Examination of intercultural education; formal and nonformal education programs intended to teach about cultural diversity, promote intercultural communication and interaction skills, and teach students from diverse background more effectively.

OLPD 5201. Strategies for Teaching Adults. (3 cr.; A-F or Audit; Periodic Fall, Spring & Summer)
Psychological theories of adult learning; learning styles and personality types; teaching styles; group and team learning; moderating and study circles; teaching technologies and distance learning; gender, race, and cultural communication. Applications of strategies. prereq: Grad student only

OLPD 5202. Perspectives of Adult Learning and Development. (3 cr.; Student Option; Periodic Fall & Summer)
Emphasis on major adult development theorists, theories, and current applications. Transformative learning, self-directed learning, experiential learning, and cooperative learning provide theoretical framework for exploring physiological, psychological, sociological, and cultural aspects of adult development through the life span.

OLPD 5204. Designing the Adult Education Program. (3 cr.; A-F or Audit; Periodic Spring)
Designing and implementing educational programs for adults. Application of concepts, theories, and models in different adult learning situations.

OLPD 5211. Introduction to the Undereducated Adult. (1 cr.; A-F or Audit; Every Summer)
Definitions of literacy in workplace, community, and family. Issues: poverty/welfare, ethnicity, cultural diversity, social class, language/learning, immigrants.

OLPD 5212. Introduction to Adult Literacy in the Workplace. (1 cr.; A-F or Audit; Every Summer)
Review workplace literacy programs, funding, program planning, and needs assessment. Reaching/recruiting workers. Role of employers and the unions. Writing for low literacy employees. prereq: 5211 or ADED 5211

OLPD 5213. Introduction to Adult Literacy in the Community. (1 cr.; A-F or Audit; Every Summer)
Community programs in United States. Literacy building. Family literacy skills. Correctional education in reintegrating offenders back into community. Integrating people with disabilities through community literacy programs. Literacy/development in developing countries. Reaching/recruiting indigenous, migrant, immigrant groups. Social action approaches to literacy education. prereq: 5211 or ADED 5211

OLPD 5224. Formal Assessment of Adult Literacy. (1 cr.; A-F or Audit; Periodic Fall)
Assessment of adult English/literacy skills for work, family, community, and continuing education. Formal testing policy, techniques, standardized tests. Assumptions about testing, cultural bias, and interpretation of formal tests. Test preparation programs. prereq: 5211 or ADED 5211

OLPD 5225. Informal Assessment of Adult Literacy. (1 cr.; A-F or Audit; Periodic Fall)
Informal assessment of adult English/literacy skills for work, family, community, and further education. Informal testing techniques, setting educational goals, formal versus informal assessment. prereq: 5211 or ADED 5211

OLPD 5226. Advanced Assessment of Adult Literacy. (1 cr.; A-F or Audit; Periodic Fall)
Applications/case studies. Educational planning for work, family, community. prereq: 5211 or ADED 5211

OLPD 5233. Methods of Teaching Beginning Adult Literacy. (1 cr.; A-F or Audit; Periodic Fall)
Learning English/literacy as an adult. Initial approaches to teaching reading, writing, and communications skills. Theories of learning/curriculum design. Technology as teaching tool. Teaching students with disabilities or with cultural/gender differences. prereq: 5211 or ADED 5211

OLPD 5234. Methods of Teaching Intermediate Adult Literacy. (1 cr.; A-F or Audit; Periodic Fall)
Learning English/literacy as an adult. Approaches to teaching reading, writing, and communications skills. Communication/comprehension in oral/written English. English reading/oral communication skills for workplace. Evaluating commercial materials/software. prereq: [5211 or ADED 5211], [5233 or ADED 5233]

OLPD 5235. Methods of Teaching Advanced Adult Literacy. (1 cr.; A-F or Audit; Periodic Fall)
Approaches to teaching reading, writing, study, communication skills. Preparing students for college/continuing education. English in workplace/on Internet. Problem solving, analytical thinking. Technology as teaching tool. Evaluating commercial material/software. prereq: 5211 or ADED 5211

OLPD 5296. Field Experience in Adult Education. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Supervised fieldwork and practice. Presentations and evaluations of adult education practices.

OLPD 5310. Data-Driven Decision Making I. (1 cr.; Student Option; Every Spring)
Data-driven decision making for schools/administrators. Focuses on data collection/analysis needs of educational organizations and on use of appropriate software/databases to collect, manage, analyze, and report school information. prereq: Broadband Internet access, a newer computer

OLPD 5321. The Principal as Leader of High-Performing Schools. (3 cr.; Student Option; Every Fall, Spring & Summer)
Role of principal: qualifications, duties, problems.

OLPD 5322. Leaders in the Superintendency and Central Office. (3 cr.; Student Option; Every Fall & Summer)
Role/responsibility of superintendent in school district. Real life experiences, leadership potential as CEO. Purposes, power, politics, practices of position. Interplay of internal school forces, community forces. Leadership in public, high-profile appointment.

OLPD 5323. Women in Leadership. (3 cr.; Student Option; Every Fall)
Women in leadership, in context of larger systems and their own lives. Supporting equity/equality across areas of difference. prereq: Technology access

OLPD 5324. Strategic Financial Planning and Policy for Educational Leaders. (3 cr.; Student Option; Every Spring & Summer)
State-local school finance systems, budgeting, governmental fund accounting. Interpretation of financial information. prereq: Grad student pursuing licensure as elementary-secondary [principal or superintendent]

OLPD 5332. Personal Leadership and the Private College. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Recognize/develop leadership skills and competencies necessary for college work, consensus building, group leadership within private colleges. Blend practice/theoretical perspectives to develop leadership competencies of students. prereq: Must have Bachelors degree awarded prior to taking this course.

OLPD 5341. The American Middle School. (3 cr.; Student Option; Every Fall & Summer)
Focus on the uniqueness of the early adolescent and appropriate learning situations. For educators working with middle-level students.

OLPD 5344. School Law. (3 cr.; Student Option; Every Spring & Summer)
Legal foundations of elementary/secondary education. Statutory themes, relevant case law, emergent policy issues. Implications for educational organizations and for administrative practice.

OLPD 5346. Politics of Education. (3 cr.; A-F or Audit; Every Fall & Spring)
Political dimensions of policy formulation/implementation in education. Use of power/influence in shaping educational policies and in resolving conflicts over educational issues. Analysis of consequences/cross-impacts. prereq: postbac, MEd, or grad student

OLPD 5348. Leaders of Human Resources Administration. (3 cr.; Student Option; Every Spring & Summer)
OLPD 5356. Disability Policy and Services. (3 cr.; Student Option; Every Spring & Summer)
Policy, research, and current practices related to education, health, and social services that support children, youth, and adults with special needs, and that support their families. Federal, state, and local perspectives.

OLPD 5361. Project in Teacher Leadership. (3 cr.; Student Option No Audit; Every Fall, Spring & Summer)
Create, implement, evaluate, and present a leadership project designed to initiate positive change in educational environments. Review of related literature, proposal development, project development, implementation and evaluation, critical reflection, sharing learning outcomes. prereq: MEd student in Teacher Leadership Program

OLPD 5364. Context and Practice of Educational Leadership. (3 cr.; A-F or Audit; Every Fall & Summer)
Current research/practice on educational leadership. Focuses on creating school cultures conducive to continuous improvement/change. Strategies for personal/organizational leadership in PK-12 settings.

OLPD 5368. Leadership for Special Education Services. (3 cr.; Student Option; Every Fall & Spring)
Legislative, procedural, executive, and judicial actions that affect services, families, and children with special needs at federal, state, and local levels. prereq: Administrator or supervisor or professional responsible for managing general or special or alternative education program

OLPD 5374. Leadership for Professional Development. (4 cr.; Student Option; Every Fall)
Designing, implementing, evaluating staff development in preK-12 settings. Research-based standards for effective staff development. Need for embedded time for collaborative learning, evaluating staff/student outcomes. prereq: Postbaccalaureate, at least 3 yrs teaching experience

OLPD 5385. Licensure Seminar: Program Policies and Inclusionary Leadership. (1 cr.; S-N or Audit; Every Fall, Spring & Summer)
Preparation for licensure program. Program overview, preassessment, reflective practice, APA writing, exit panel review, administrative employment interview.

OLPD 5386. Leadership Portfolio Seminar. (1 cr.; S-N or Audit; Every Fall, Spring & Summer)
Development of electronic administrative licensure portfolio to earn endorsement for license as school superintendent, K-12

OLPD 5387. Leadership for Teaching and Learning. (3 cr.; Student Option; Every Spring & Summer)
Multiple aspects of administrating teaching/learning. Administration of teaching/learning as system in inclusive schools. Questions administrator must ask as leader of learning for students/adults.

OLPD 5388. Leadership for Master(ful) Scheduling. (2 cr.; Student Option; Every Fall & Summer)
Work of high-performing professional learning communities. Implications for moving from building master schedule to leadership for master(ful) scheduling of time, space, motion, people. Hands-on work with infinite campus software/scheduling-building logic.

OLPD 5389. Community Education Leadership. (3 cr.; Student Option; Every Fall)
Competencies of leadership, community relations, communication, community assessment, program development, program evaluation. Philosophy/administration of community/alternative education programs.

OLPD 5391. Special Education Law for Leaders. (1 cr.; Student Option; Every Fall & Summer)
Competencies of leadership, policy, and political influence. Legal/regulatory applications focusing on special education law. prereq: Designed for students working on licensure in PK-12 administration

OLPD 5392. Special Education Finance: Program Models, Policy, and Law. (2 cr.; Student Option; Every Fall)
How special education revenue is a resource to accomplish student-related objectives. Revenue sources, compliance, budget monitoring. Key policy, case law, program models from perspective of director of special education. prereq: [5324 or concurrent registration is required (or allowed) in 5324 or EDPA 5324 or concurrent registration is required (or allowed) in EDPA 5324]. Knowledge of special education

OLPD 5393. Leading School Finance Elections. (1 cr.; S-N or Audit; Every Spring)
Comprehensive planning model for conducting school finance elections. Emphasizes systems, strategies, and campaign tactics.

OLPD 5394. Leadership in Community Education Finance and Law. (1 cr.; S-N or Audit; Every Summer)
Interplay between finance and laws directly applicable to community education. MN Statute 124D, revenues/expenditures, and UAFS approached from frame of reference development. prereq: [5324 or EDPA 5324] recommended

OLPD 5396. Field Experience in PK-12 Administration: Authentic Practice in Leadership. (3 cr.; max 12 cr.; S-N or Audit; Every Fall & Spring)
Field experience or internship arranged for students seeking licensure as PK-12 principal/superintendent. Content/credit depend on licensure requirements specified in individual field experience agreement. prereq: instructor consent.

OLPD 5476. Field Based Projects in Business and Industry. (1-4 cr.; S-N or Audit; Every Fall, Spring & Summer)
Curricular, instructional, developmental, or evaluative problems and projects applicable to local school or business and industry situations.

OLPD 5501. Principles and Methods of Evaluation. (3 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to program evaluation. Planning an evaluation study, collecting and analyzing information, reporting results; evaluation strategies; overview of the field of program evaluation.

OLPD 5502. Theory and Models of Evaluation. (3 cr.; Student Option; Every Fall & Summer)
Evaluation theories/models currently available to practitioners. Communication with clients about value/utility of program. Systems theory. prereq: [5501/EPsy 5243] or PA 5311 or PUBH 6034 or another introductory evaluation course approved by instructor.

OLPD 5521. Cost and Economic Analysis in Educational Evaluation. (3 cr.; Student Option; Every Fall)
Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluation of educational problems and programs.

OLPD 5524. Evaluation Colloquium. (1 cr.; max 24 cr.; S-N or Audit; Every Fall & Spring)
Informal seminar of faculty/students. Issues/problems of program evaluation. prereq: [5501 or EDPA]. [5501 or EPSY 5243]

OLPD 5528. Focus Group Interviewing Research Methods. (1-3 cr.; Student Option No Audit; Every Fall)
Students get an overview of the critical features of designing and conducting focus group interviews. Students practice moderating skills and then develop questions for a focus group project.

OLPD 5601. Foundations of Human Resource Development. (1 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to human resource development as a field of study and practice.

OLPD 5604. Systems Foundation of Human Resource Development. (1 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to system theory as a core discipline supporting the theory and practice of human resource development. prereq: 5601

OLPD 5605. Strategic Planning through Human Resources. (3 cr.; A-F or Audit; Periodic Spring)
Strategic nature of organizations. How HRD can align its goals with those of organization. Strategic planning, systems thinking. Ways
HRD managers can become strategic players in organization. prereq: 5607 or 5615 or HRD 5201 or HRD 5301

OLPD 5607. Organization Development. (3 cr.; A-F or Audit; Periodic Fall, Spring & Summer)
Introduction to major concepts, skills, and techniques for organization development/change. prereq: Grad student only

OLPD 5610. Survey of Research Methods and Emerging Research in Human Resource Development. (3 cr.; A-F or Audit; Periodic Spring)
Role of research in HRD. Standards/criteria for evaluating research, critique of conference research papers, identification of emerging research themes.Offered in conjunction with the annual conference of Academy of HRD. prereq: [Registered, in attendance] at conference of Academy of HRD

OLPD 5611. Facilitation and Meeting Skills. (1 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to the disciplines of planning and running effective meetings. Tools and methods for meeting management and evaluation are presented within the context of organization development.

OLPD 5612. International Human Resource Development. (3 cr.; Student Option; Every Fall, Spring & Summer)
Problems, practices, programs, theories, and methodologies in human resource development as practiced internationally. prereq: Grad students only; udrg seniors with instructor consent

OLPD 5615. Training and Development of Human Resources. (3 cr.; A-F or Audit; Periodic Spring & Summer)
Training/development of human resources in organizations. Process phases of analysis, design, development, implementation, and evaluation. prereq: Grad student only

OLPD 5616. Training on the Internet. (3 cr.; Student Option; Every Spring & Summer)
Major concepts, skills, and techniques for giving and receiving training on the Internet. prereq: Grad student only

OLPD 5619. Planning and Decision-Making Skills. (1 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to the disciplines of planning and decision making typically used in process improvement interventions. Tools and methods for facilitating group decisions and problem solving.

OLPD 5670. Special Topics in Human Resource Development. (1-3 cr. [max 24 cr.]; Student Option; Every Fall, Spring & Summer)
Issues, methods, and knowledge in HRD areas. Topics vary.

OLPD 5696. Internship: Human Resource Development. (1-10 cr.; S-N or Audit; Periodic Fall & Spring)
Students apply/contract for human resource development positions. prereq: [53901 or HRD 3601, 3696 or HRD 3196], 3680 or 3640 or HRD 3201 or HRD 3301], 3202 or ADED

3101], undergrad] or [5607 or 5615 or HRD 5201 or HRD 5301], [5801 or WHRE 5001], [grad student], instr consent

OLPD 5697. International Field Study in Human Resource Development. (3 cr. [max 6 cr.]; A-F only; Every Spring & Summer)
Engage in international travel/study for one week with an HRD faculty leader. Visit a variety of sites in business and industry to become aware of how HRD is practiced outside the United States. prereq: 5001

OLPD 5701. U.S. Higher Education. (3 cr.; Student Option; Every Fall & Summer)
U.S. higher education in historical/contemporary perspective. Emphasizes structure, history, and purposes of system as a whole.

OLPD 5704. College Students Today. (3 cr.; Student Option; Every Spring & Summer)
Issues involving population of students in colleges/universities. College student development theory, students' expectations/interests. How college affects students outcomes. Role of curricular/extracurricular activities. Student-faculty interaction.

OLPD 5709. Critical Issues in Higher Education. (3 cr.; A-F or Audit; Every Spring)

OLPD 5712. Multicultural Theories of College Student Development Applied to Teaching and Learning. (3 cr.; A-F only; Every Fall, Spring & Summer)
Multicultural student development theories/theorists. Implications for teaching/learning. Students reflect on Student Personnel Point of View and Learning Reconsidered: Campus-wide Focus on the Student Experience and other collaborative efforts.

OLPD 5721. Race and Ethnicity in Higher Education. (3 cr.; Student Option; Every Fall, Spring & Summer)
Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty. Historical perspectives.

OLPD 5724. Leadership and Administration of Student Affairs. (2-3 cr.; Student Option; Periodic Fall & Spring)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

OLPD 5732. The Law and Postsecondary Institutions. (3 cr.; Student Option; Periodic Fall & Spring)
Analysis of court opinions and federal regulations affecting postsecondary educational institutions.

OLPD 5734. Institutional Research in Postsecondary Education. (2-3 cr.; A-F or Audit; Periodic Fall)
Scope, role, administration, research strategies, and evaluation of institutional research in postsecondary institutions. Methodologies, disciplinary foundations of research. Use of institutional, state, and national databases in addressing institutional missions/functions. prereq: [5701, [EPSY 5231 or EPSY 8261], grad student] or instr consent

OLPD 5736. Public Engagement and Higher Education. (3 cr.; A-F only; Every Spring)
Study/practice of public engagement in higher education. Civic roles of post-secondary education institutions.

OLPD 5795. Plan B Research Design. (3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall)
Foundation to design Plan B research project relevant to student's professional interests. Literature review strategies to establish conceptual framework for project. Relates research question to design alternatives and to associated qualitative/quantitative analysis techniques. Issues such as human subjects and APA guidelines for preparing research papers. prereq: Grad student

OLPD 5796. Supervised Practicum in Multicultural Postsecondary Teaching and Learning. (3 cr.; S-N only; Every Fall, Spring & Summer)
Postsecondary teaching experience in supervised settings. Weekly group supervision session. Classroom experiences, learning centers, and other postsecondary teaching venues. prereq: Grad student in PsTL certificate program or admitted to PsTL master's program

OLPD 5801. Survey: Human Resource Development and Adult Education. (3 cr.; Student Option; Every Fall, Spring & Summer)
Overview of fields of human resource development and adult education. Societal context, theories, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Unique characteristics and ways fields overlap and enhance one another. prereq: Grad student only

OLPD 5806. Philosophy and Practice of Career and Technical Education. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)

OLPD 5808. Student and Trainee Assessment. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)

OLPD 5811. Education for Work. (3 cr.; Student Option; Periodic Spring)
Examination of contextual bases underlying education for work; implications for practice.

OLPD 5812. Consulting Skills for Organization Change. (3 cr.; Student Option No Audit; Every Fall & Spring)

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
OLPD 5813. Enhancing Work-based Learning Through Collaboration. (2 cr.; Student Option; Every Summer)
Interagency planning issues/practices relating to special populations for educational, business, and human service organization personnel, family members, and advocates.

OLPD 5816. Distance Learning in Adult Education and Training. (3 cr.; A-F or Audit; Every Fall & Spring)
Distance learning concepts, theory, history, present practice, delivery systems, course design, major issues, future directions.

OLPD 5819. Evaluating and Using Research in Organizations and Education. (3 cr.; A-F or Audit; Every Fall & Spring)
Role of educational research in professional practice. Problems of practice for research. Alternative modes of research. Synthesis/application of results of research. prereq: Grad student

OLPD 5822. Work-Based Learning Practices. (3 cr.; Student Option; Every Fall, Spring & Summer)

OLPD 5823. Work-Based Learning Policies. (2 cr.; Student Option; Periodic Fall & Summer)
Aims/purposes of federal, state, and local policies, related to work-based learning.

OLPD 5829. Course Development for Business and Industry. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
Designing instructional programs/courses that help learners develop desired competencies. Designing instruction for performance based training and vocational/technical education. Developing course syllabus components that clarify course expectations. Developing academic/community-based elements that complement course goals. Reflect on and compare performance-based instruction with other curriculum models for the field.

OLPD 5845. The Entrepreneurial Private College. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Financial management/entrepreneurial strategies for private college. Enrollment management, revenue generating strategies, branding/marketing, fundraising, developing/sustaining entrepreneurial institutions. Design strategies for private colleges. prereq: Must have completed Bachelors degree before taking this course.

OLPD 5861. Instructional Methods for Business and Industry. (2 cr.; Student Option; Every Spring)
Theory/practice in instructional methods for career/technical education (CTE) instructors and human resources/development (HRD) professionals. How to select various teaching methods and plan for their delivery. Preparing an instructional methods plan to clarify course content, teaching methods selected, rationale for their selection, and how a student organization might facilitate student learning.

OLPD 5873. Directed Study in OLPD. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Self-directed study, with faculty advice, in areas not covered by regular courses.

OLPD 5902. Leading Change in Private Colleges. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Theories of organizational change processes. Application for leading private colleges with unique cultures/distinctive missions. Factors impacting change process/implcations for leading private colleges. prereq: Must have Bachelors degree awarded prior to taking this course.

OLPD 6402. Integrative Leadership Seminar. (3 cr.; A-F or Audit; Every Fall & Spring)
Basic concepts, practices, people, and organizations associated with integrative leadership. Case materials, related readings, presentations, interactive discussion.

OLPD 6490. Managing Civic Engagement. (3 cr.; Student Option; Every Spring)

OLPD 8002. Critical Issues in Contemporary Education. (3 cr.; Student Option; Every Fall & Spring)
Meanings of difference from sociological, psychological, historical and philosophical perspectives as related to current and emerging critical issues in education. Participants help design, facilitate, and present the course. prereq: EdD or PhD student

OLPD 8011. Doctoral Research Seminar I. (1 cr.; S-N or Audit; Every Fall & Summer)
Introduction/planning for individual program development, preliminary examinations, and dissertation prospectus. Modes of inquiry used in current research in education, databases relating to education, recent writings on literature synthesis, key contributions to education literature. prereq: EdPA or WHRE doctoral student

OLPD 8012. Doctoral Research Seminar II. (1 cr.; S-N or Audit; Every Spring & Summer)
Introduction to quantitative/qualitative research approaches/methods. Nature of research, role of researcher, philosophical perspectives on research, ethical issues in conducting research. prereq: EdPA doctoral student

OLPD 8013. Doctoral Research Seminar III. (1 cr.; S-N or Audit; Every Fall & Spring)
Introduction to most important quantitative/qualitative approaches employed in educational policy research. prereq: EdPA doctoral student

OLPD 8015. Inquiry strategies in educational and organizational research. (3 cr.; A-F only; Every Fall)
Logic of research design, from research questions and audience considerations to selecting a design for collecting/analyzing quantitative, qualitative, and mixed-method data. prereq: [8011 or EDPA 8011]; OLPD PhD student

OLPD 8016. Research Design and Educational Policy. (3 cr.; max 6 cr.; Student Option; Every Fall)
Logic of research design, from research questions to selecting a design for collecting/analyzing quantitative, qualitative, and mixed-method data. Writing proposals that build a reasoned statement of research problem. prereq: [8015 or EDPA 8015], CEHD doctoral student, instr consent

OLPD 8020. Leadership: From Theory to Reflective Practice. (3 cr.; A-F or Audit; Periodic Fall)
Leadership theory. Emphasizes seminal scholars' work from related social science disciplines. Implications of theory for practice of leadership. Knowledge, behaviors, values, and skills needed in educational and other public settings.

OLPD 8022. Education and Globalization: Anthropological Perspectives. (3 cr.; A-F or Audit; Every Spring)
Anthropological/comparative perspectives used to understand educational processes in a globalized world. What can be gained by adopting translocal view of educational phenomena.

OLPD 8087. Seminar: Organizational Leadership, Policy, and Development. (1-3 cr.; max 24 cr.; Student Option; Every Fall, Spring & Summer)
Topical issues.

OLPD 8095. Problems: Organizational Leadership, Policy, and Development. (1-3 cr.; max 24 cr.; Student Option; Periodic Fall, Spring & Summer)
Independent study on issues of educational policy/administration. Arranged with instructor.

OLPD 8096. Internship: Organizational Leadership, Policy, and Development. (1-9 cr.; max 24 cr.; Student Option; Every Fall & Spring)
Internship on issues of educational policy/administration. Arranged with instructor.

OLPD 8101. International Education and Development. (3 cr.; A-F or Audit; Every Fall)
History of international development in post-World War II era. Theories of how education affects economic, political, social development. Case studies of contemporary international development/education issues. prereq: Doctoral student or instr consent

OLPD 8103. Comparative Education. (3 cr.; A-F or Audit; Every Fall)
Doctoral-level course. History, methodologies, and major debates in the field of comparative education. Major research paper or extensive literature review.

OLPD 8104. Innovative Systems Thinking in Education and Culture. (3 cr.; Student Option; Every Fall)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

OLPD 8121. Doctoral Seminar: Comparative and International Development Education. (1-6 cr.; S-N or Audit; Every Fall & Spring) Focuses on needs of students while writing the dissertation; general guidance in how to construct the thesis. prereq: EdPA PhD candidate


OLPD 8314. Data Analysis for Educational Management. (3 cr.; Student Option; Periodic Fall, Spring & Summer) Managers of educational organizations are faced with problems that require analysis of a wide range of information. Outlines a frame for data analysis and introduces a set of computer-based tools suited to the practice of educational administration.

OLPD 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

OLPD 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

OLPD 8502. Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives. (3 cr.; Student Option; Every Spring) Concepts, approaches, models, and theoretical frameworks for program evaluation that have developed since the 1960s. prereq: [5501 or EDPA 5501 or EPSY 5243]

OLPD 8595. Evaluation Problems. (1-6 cr.; [max 24 cr.]; Student Option; Every Fall, Spring & Summer) Independent study of an issue in theory or practice of program evaluation. prereq: [5501 or EDPA 5501 or EPSY 5243], instr consent

OLPD 8596. Evaluation Internship. (1-9 cr.; [max 24 cr.]; Student Option; Every Fall, Spring & Summer) Hands-on experience in conducting program evaluation in real-world setting under supervision of evaluation professional. prereq: [5501 or EDPA 5501 or EPSY 5243], instr consent

OLPD 8601. Advanced Training and Development of Human Resources. (3 cr.; A-F or Audit; Periodic Fall) Personnel training/development research. Critical review of selected/innovative practices. prereq: 5615 or HRD 5201


OLPD 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Pre-thesis credit prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

OLPD 8702. Administration and Leadership in Higher Education. (3 cr.; Student Option; Every Fall, Spring & Summer) Leadership, governance, and administration in higher education through theoretical perspectives and practical analysis. Planning, change, decision making, organizational culture, budgets, conflict. prereq: [5001 or EDPA 5501], [5701 or EDPA 5701]

OLPD 8703. Public Policy in Higher Education. (3 cr.; A-F or Audit; Every Fall) Theories, analytic methods, and critical issues in postsecondary education policy at national/state levels. Equality of educational opportunity, affirmative action, system governance/coordination, research funding, student financial aid, public accountability. prereq: [5001 or EDPA 5501], [5701 or EDPA 5701]

OLPD 8715. Plan B Capstone Seminar. (3 cr.; S-N only; Every Fall, Spring & Summer) Determining topic, creating timeline, and initiating project in conjunction with year 2 internship. prereq: 5206, grad student admitted to master’s program in multicultural college teaching/learning; if Plan B project includes research with human subjects, application to Institutional Review Board is required


OLPD 8777. Thesis Credits: Master’s. (1-18 cr.; [max 50 cr.]; No Grade Associated; Every Spring & Summer) (No description) prereq: Max 16 cr per semester or summer; 10 cr total required [Plan A only]

OLPD 8796. Supervised Internship in Postsecondary Teaching and Learning. (3-12 cr.; [max 24 cr.]; S-N only; Every Fall, Spring & Summer) Classroom-based or online group supervision. Weekly supervised experiences. Internship settings based on students’ interests/goals. prereq: 5196, [grad student admitted to Multicultural College Teaching and Learning MA or College Student Development and Counseling Psychology Ph.D]

OLPD 8800. Organizational Leadership, Policy, and Development Colloquium. (1-3 cr.; [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Selected topics regarding work/human resource education professionals. Topics based on interest/demand.

OLPD 8801. Advanced Theory in Human Resource Development and Adult Education. (3 cr.; A-F or Audit; Periodic Fall) Theory of individuals/organizations as adaptive entities. Roles of human resource development and adult education in mediating complex demands. prereq: 5801 or ADED 5001 or WHRE 5001

OLPD 8812. Quantitative Research in Education. (3 cr.; Student Option; Every Fall) Assumptions, procedures for, considerations in planning/conducting quantitative research in education.

OLPD 8815. Ethics and Responsible Research. (1 cr.; A-F or Audit; Periodic Fall, Spring & Summer) Introduction to ethical/legal issues involved in practicing responsible educational research. Key issues, formal/informal codes of conduct, ethical reasoning.

OLPD 8841. Foundations of Organizational Leadership, Policy, and Development. (3 cr.; Student Option; Periodic Fall) Key historical/philosophical concepts in work, career, adult development. Individual/organizational change. Learning through experience.

OLPD 8842. Comparative Systems in Organizational Leadership, Policy, and Development. (3 cr.; Student Option; Periodic Spring) Looking critically across/within countries/regions at structures intended to deliver work-/career-related education/training. prereq: 8141 or WHRE 8141

OLPD 8888. Thesis Credit: Doctoral. (1-24 cr.; [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

OLPD 8890. Research Seminar. (1 cr.; [max 6 cr.]; S-N or Audit; Periodic Fall) Developing, reporting, and evaluating research. Participants make/react to presentations. prereq: [8811 or WHRE 8911] [8812 or WHRE 8912 or WHRE 8913 or WHRE 8914] or instr consent

OLPD 8896. Internship. (1-10 cr.; S-N or Audit; Every Fall, Spring & Summer) Student applies for position in professional practice; individual arrangements describe specific responsibilities during internship. Ed.D. program requirement.

Orthodontics (OTHO)

OTHO 7101. Growth & Development. (0-5 cr.; A-F or Audit; Every Summer) Head growth, development, osteology, and myology. Both normal and abnormal
morphology and function, with emphasis on cephalometric methods. prerequisite: Admission to graduate orthodontic program.

**OTHO 7102. Growth & Development.** (3-0 cr. ; A-F or Audit; Every Fall & Spring) Head growth, development, osteology, and myology. Both normal and abnormal morphology and function, with emphasis on cephalometric methods.

**OTHO 7103. Growth & Development.** (3-0 cr. ; A-F or Audit; Every Spring) Head growth, development, osteology, and myology. Both normal and abnormal morphology and function, with emphasis on cephalometric methods.

**OTHO 7111. Diagnosis & Treatment Planning.** (3-0 cr. ; A-F or Audit; Every Summer) Etiology, treatment and prognosis of clinical orthodontic patients. prerequisite: Admission to graduate orthodontic program.

**OTHO 7112. Diagnosis & Treatment Planning.** (3-0 cr. ; A-F or Audit; Every Fall) Etiology, treatment and prognosis of clinical orthodontic patients. prerequisite: Admission to graduate orthodontic program.

**OTHO 7113. Diagnosis & Treatment Planning.** (3-0 cr. ; A-F or Audit; Every Spring) Etiology, treatment and prognosis of clinical orthodontic patients. prerequisite: Admission to graduate orthodontic program.

**OTHO 7201. Clinical Orthodontics.** (3-0 cr. ; A-F or Audit; Every Spring & Summer) Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision. prerequisite: Admission to graduate orthodontic program.

**OTHO 7202. Clinical Orthodontics.** (3-0 cr. ; A-F or Audit; Every Fall & Spring) Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision. prerequisite: Admission to graduate orthodontic program.

**OTHO 7203. Clinical Orthodontics.** (3-0 cr. ; A-F or Audit; Every Spring) Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision. prerequisite: Admission to graduate orthodontic program.

**OTHO 8121. Orthodontic Seminar.** (3-0 cr. ; A-F or Audit; Every Summer) Evaluating orthodontic literature, including preparation and presentation of literature reviews. prerequisite: Orthodontic grad student

**OTHO 8122. Orthodontic Seminar.** (3-0 cr. ; A-F or Audit; Every Fall) Evaluating orthodontic literature, including preparation and presentation of literature reviews. prerequisite: Orthodontic grad student

**OTHO 8123. Orthodontic Seminar.** (3-0 cr. ; A-F or Audit; Every Spring) Evaluating orthodontic literature, including preparation and presentation of literature reviews. prerequisite: Orthodontic grad student

**OTHO 8131. Topics in Orthodontics.** (3-0 cr. ; A-F or Audit; Every Spring & Summer) Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management. prerequisite: Orthodontic grad student

**OTHO 8132. Topics in Orthodontics.** (3-0 cr. ; A-F or Audit; Every Fall & Spring) Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management. prerequisite: Orthodontic grad student

**OTHO 8133. Topics in Orthodontics.** (3-0 cr. ; A-F or Audit; Every Spring) Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management. prerequisite: Orthodontic grad student

**OTHO 8141. Research in Orthodontics.** (0-5 cr. ; A-F or Audit; Every Summer) Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature. prerequisite: Orthodontic grad student

**OTHO 8142. Research in Orthodontics.** (0-5 cr. ; A-F or Audit; Every Fall & Spring) Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature. prerequisite: Orthodontic grad student

**OTHO 8143. Research in Orthodontics.** (0-5 cr. ; A-F or Audit; Every Fall & Spring) Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature. prerequisite: Orthodontic grad student

**Orthopaedic Surgery (ORSU)**

**ORSU 7180. Orthopaedics I.** (3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer) A brief survey course with exposure to a large number of patients, rather than a didactic and highly structured course. Instruction is given by audiovisual technique, conference, and seminars, in addition to teaching primarily in the outpatient clinic. There are opportunities for participation in the inpatient service and in surgery for the student interested in this additional experience. To round out the somewhat limited experience inherent in a three week rotation, independent study of the text, Disorders and Disease of the Musculoskeletal System, by Robert B. Salter, is strongly recommended.

**ORSU 7185. Orthopaedics II: Externship in Orthopaedic Surgery.** (3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer) The student serves as an acting intern on a clinical service. Student interest and initiative determines the level of responsibility and the extent of participation in surgical procedures. Independent study using available audiovisual resources and the orthopaedic library is encouraged.

**ORSU 7186. Research Problems in Orthopaedic Surgery.** (2-12 cr. ; H-N or Audit; Every Fall, Spring & Summer) After consultation with staff, the student performs well-defined, orthopaedically-related research projects adjusted to the student's level of experience and interest.

**ORSU 7188. Externship in Orthopaedic Surgery-CL.** (3-6 cr. ; H-N or Audit; Every Fall & Spring) This supervised clinical experience with pediatric inpatients and outpatients is recommended for the student interested in an orthopaedic surgery career or interested in musculoskeletal problems and care for the multiply-handicapped child. Reading material for this course will be drawn from these texts, among others: Pediatric Orthopedics, by Lovell-Winter (J.B. Lippincott, publisher), 2nd Ed, 1986; Pediatric Orthopedic Textbook, by Mihran Tachdjian, M.D.; and Orthopedic Surgery in Infancy and Childhood, by Albert Ferguson, Jr., M.D. (Williams & Wilkins, publishers).

**ORSU 7190. Externship in Orthopaedic Surgery-VA.** (3-6 cr. ; H-N or Audit; Every Fall & Spring) This course consists of supervised clinical experience in the primary care of both adult inpatients and outpatients with an emphasis on reconstructive types of orthopaedic surgery. The student has a great deal of individual ward and surgical responsibility and is expected to present their cases. The student functions at the junior resident level. While the student does not take call individually, they may choose to take call with the resident to whom they are assigned. Recommended for the student interested in an orthopaedic surgery career and for the student choosing a non-orthopaedic surgery career. Primary text for externship: Salter RB: Textbook of Disorders and Injuries of the Musculoskeletal System, Baltimore, Williams & Wilkins.

**ORSU 7191. Orthopaedic Externship-HC.** (3-6 cr. ; H-N or Audit; Every Fall & Spring) This course provides detailed exposure to orthopaedic reconstruction and trauma. Inpatient service, rounds, conferences, surgery, and outpatient clinics are available. Special emphasis is given in clinic to learning techniques of orthopaedic examination and diagnosis. This course is valuable for the student planning a career in orthopaedics, general surgery, or family practice. The student is given an orthopaedic manual which serves as a guideline for treating various orthopaedic problems and fractures during the six-week rotation. Recommended reading: 1. The Manual of Acute Orthopedic Therapeutics, Clawson DK and Iverson L; 2. Rockwood and Green, Fractures, Volumes 1 and 2.

**ORSU 7192. Primary Care Orthopaedics-MT.** (3-6 cr. ; H-N or Audit; Every Fall & Spring) The student observes and assists orthopaedic surgeons in a general orthopaedic practice. The student's interest and initiative will...
Otolaryngology (OTOL)

OTOL 5101. Introduction to the Basic Sciences in Otolaryngology I: Ear. (2 cr.; A-F or Audit; Every Fall & Spring)
Multidisciplinary introduction to the basic sciences of the ear. Acoustics and psychoacoustics, temporal bone anatomy, external and middle ear mechanisms, cochlear physiology, auditory neuropathology, ear embroyology, ear biochemistry, immunology, fine structures, vestibular mechanisms and measurement. Special grading option for nonmajors only. Prereq: Otolaryngology major or instr consent

OTOL 5102. Introduction to the Basic Sciences in Otolaryngology II: Head and Neck. (2 cr.; A-F or Audit; Every Fall & Spring)
Multidisciplinary introduction to the basic sciences of the head and neck. Laryngeal anatomy and physiology, nasal anatomy and physiology, immune biology, embryology of head and neck. Special grading option for nonmajors only. Prereq: Otolaryngology major or instr consent

OTOL 5993. Directed Studies. (1-12 cr.; Student Option; Every Fall, Spring & Summer)
Directed readings and preparation of reports on selected topics. Prereq: instr consent

OTOL 7200. Surgical Specialty: Otolaryngology. (2-4 cr.; P-N or Audit; Every Fall, Spring & Summer)
This required course includes clinical experiences in the specialty and formal interactive lecture presentations emphasizing primary care problems related to the field. The student may choose two 2-week rotations in different specialties or one 4-week rotation in one specialty. SPECIAL INSTRUCTIONS: To request the Duluth site, contact the UMD Department of Family Medicine, 10 University Drive, Duluth, MN 55812 (218-726-7916) at least one month prior to quarterly cancel/add deadline.

OTOL 7202. Orthopaedic Surgery Subspecialty. (2-4 cr.; [max 8 cr.]; P-N or Audit; Every Fall, Spring & Summer)
Rotation provides knowledge essential for physician in primary care setting to evaluate/diagnose common orthopaedic diseases. Prereq: Med student

OTOL 7503. Research in Basic Science - ENT. (6 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Opportunities are provided to work with otolaryngology faculty and basic scientists within the Department of Otolaryngology. Additional opportunities for clinical otolaryngology are provided if relevant.

OTOL 7930. Otolaryngology Medical Residency. (6 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Otolaryngology medical residency.

OTOL 8230. Clinical Otolorhinolaryngology. (4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Diagnostic and management instruction and experience in all phases of clinical otolorhinolaryngology. Both inpatient and outpatient services are provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practice and weekly special group conferences. Prereq: Grad otol major

OTOL 8231. Surgery of the Ear, Nose, and Throat. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Surgical training and experience with broad scope of surgical problems encountered in otolorhinolaryngology provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practice and weekly special group conferences. Prereq: Grad otol major

OTOL 8232. Maxillofacial Surgery. (1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Basic science and management principles of maxillofacial diseases. Problems of maxillary trauma. Experience with these problems in the hospitals of the training program, especially the county hospitals. Prereq: Grad otol major

OTOL 8233. Plastic and Reconstructive Surgery: Head and Neck. (1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Otolaryngologic cosmetic surgery emphasizing rhinoplasty and otoplasty. Prereq: Otol major

OTOL 8234. Anatomy of the Head and Neck and Temporal Bone Dissection. (2 cr.; Student Option; Every Fall, Spring & Summer)
Head and neck anatomy studied from cadaver through programmed learning. Temporal bones dissected to learn anatomy and to practice otologic surgical procedures. S/N for nonmajors only. Prereq: Grad otol major or instr consent

OTOL 8235. Roentgenology of the Head and Neck. (1 cr.; [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Principles and procedures in roentgenology for otolaryngologic and head and neck problems. prereq: Grad otol major

**OTOL 8236. Pharmacology in Otolaryngology.** (1 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Principles of pharmacology as they relate to otolaryngology. prereq: Grad otol major

**OTOL 8237. Endoscopy.** (1 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Didactic and practical instruction in laryngoscopy, esophagoscopy, bronchoscopy, and mediastinoscopy. General management principles emphasized. prereq: Grad otol major

**OTOL 8238. Pathology of the Ear, Nose, and Throat.** (1 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Gross pathology and histopathology of diseases of the ear, nose, throat, and related regions. prereq: Grad otol major

**OTOL 8239. Otoneurology.** (1-2 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)

Instruction and experience in diagnosis and management of otoneurologic problems, including training in electronystagmographic analysis of vestibular function. prereq: Grad otol major or instr consent

**OTOL 8240. Allergy.** (1 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Concepts and management of otolaryngologic allergy. prereq: Grad otol major

**OTOL 8241. Cancer of the Head and Neck.** (1 cr. [max 12 cr.]; A-F or Audit; Every Fall, Spring & Summer)

Clinical head and neck oncology; etiology, treatment (both surgical and nonsurgical), and other principles of management. prereq: Grad otol major

**OTOL 8242. Audiology and Speech Pathology.** (2 cr.; Student Option; Every Fall & Spring)

Clinical audiology and speech-language pathology, including diagnosis and treatment of conductive, sensorineural, and central hearing loss; voice disorders; swallowing disorders; velopharyngeal insufficiency related to cleft lip/palate and craniofacial anomalies; alaryngeal speech; and speech disorders related to head and neck cancer. prereq: Grad otol major or instr consent

**OTOL 8243. Introduction to Research Methodology.** (1 cr.; Student Option; Every Fall & Spring)

Statistical methods, experimental design, and execution of otolaryngologic research. Ethics of research with human and animal subjects. prereq: Grad otol major or instr consent

**OTOL 8244. Seminar: Current Literature.** (1 cr.; Student Option; Every Fall, Spring & Summer)

Presentation and discussion of selected articles. Required for all otolaryngology graduate students. prereq: Grad otol major or instr consent

**OTOL 8247. Anatomy and Physiology of Hearing and Balance.** (3 cr.; Student Option; Every Spring)

Structure and function of auditory and vestibular systems. Network analysis of middle and inner ear mechanics, hair cell biophysics, auditory nerve and CNS electrophysiology, information processing, neural mechanisms subserving balance and gaze, cellular morphology, and computer models. prereq: instr consent

**OTOL 8248. Directed Readings in Auditory Physiology.** (1-2 cr.; Student Option; Every Fall & Spring)

Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed. prereq: instr consent

**OTOL 8249. Current Topics in Cochlear Anatomy.** (1 cr.; Student Option; Every Fall & Spring)

Review of current research papers concerning cochlear anatomy and pathology. prereq: instr consent

**OTOL 8250. Advanced Biochemistry of the Auditory System.** (1 cr.; Student Option; Every Fall, Spring & Summer)

Review of recent progress in biochemical aspects of auditory end organs. prereq: MdBc 6100, MdBc 6101 or equiv or instr consent

**OTOL 8251. Molecular Carcinogenesis of Head and Neck Squamous Cell Carcinoma.** (2 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)

Current topics in molecular carcinogenesis of head and neck squamous cell carcinoma. prereq: MICA 8009 or concurrent registration is required (or allowed) in MICA 8009 or instr consent

**OTOL 8252. Advanced Clinical Audiology.** (2 cr.; Student Option; Every Fall, Spring & Summer)

Comprehensive reading and practicum in auditory evaluation of patients. Assumes basic knowledge of clinical audiology. Each session devoted to aspect of auditory evaluation or aural rehabilitation, including behavioral audiology, electrophysiologic evaluation, hearing aid selection, and cochlear implants. prereq: Grad otol major, 8242 or instr consent

**OTOL 8333. FTE: Master's.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Master's student, adviser and DGS consent

**OTOL 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Doctoral student, adviser and DGS consent

**OTOL 8666. Doctoral Pre-Thesis Credits.** (1-6 cr.; max 12 cr.); No Grade Associated; Every Fall, Spring & Summer

Doctoral Pre-Thesis Credits prerequisite: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**OTOL 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**OTOL 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Max 18 cr per semester or summer; 24 cr required

**Pathology (PATH)**

**PATH 7865. Departmental Seminar.** (1 cr. [max 2 cr.]; H-N or Audit; Every Fall, Spring & Summer)

**Pediatric Dentistry (PDEN)**

**PDEN 7000. Directed Research in Pediatric Dentistry.** (1 cr.; S-N or Audit; Every Fall, Spring & Summer)

Completion of senior project, prepare table clinic presentation, and prepare AAPD presentations through regular progress meetings with faculty.

**PDEN 7010. Fundamentals of Pediatric Dentistry.** (0-2 cr.; A-F only; Every Summer)

Comprehensive introductory course in pediatric dentistry. Cariology/oral prevention, oral radiology, diagnosis/treatment planning, behavior guidance, analgesia/anesthesia, restorative dentistry, pulpal therapy, nitrous oxide-oxygen inhalation, periodontal disease.

**PDEN 7020. Introduction to Pediatric Hospital Dentistry.** (0-2 cr.; A-F only; Every Summer)


**PDEN 7030. Sedation in Pediatric Dental Practice.** (0-2 cr.; A-F only; Every Fall)

Learn to provide evidence-based, safe, effective mild/moderate sedation to children/adolescents. Patient case selection for office based sedation, pre-sedation pediatric physical examination/history taking, patient physiology/monitoring, drug pharmacology, emergency planning.

**PDEN 7040. Primer in Pediatric Medicine.** (0-2 cr.; A-F only; Every Fall)

Provides foundation knowledge in pediatric patient assessment, history taking, communication with pediatric healthcare community. Arranged as 8 modules covering topics of medical home care, health history taking, physical examination, diet/nutrition, health screening, prevention of injury/disease, management of disease, hospital admission.

**PDEN 7100. Advanced Clinical Pediatric Dentistry.** (1-6 cr. [max 36 cr.]; S-N or Audit; Every Fall, Spring & Summer)

Faculty-supervised treatment of patients, including treatment of difficult or unusual pediatric dentistry problems.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

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PED 8010. Pediatric Dentistry Diagnosis and Treatment Planning. (1 cr. [max 5 cr.]; S-N only; Every Fall, Spring & Summer) Systematic approach to diagnosis of and treatment planning for various pediatric dentistry problems. Faculty/peer review of selected patient cases managed by students. Patient care is reviewed/discussed to ensure appropriate treatment protocols and quality of care.

PED 8031. Independent Study in Pediatric Dentistry. (2 cr.; S-N only; Every Fall, Spring & Summer) Independent readings from pediatric dentistry textbooks in preparation for an oral exam. May include additional clinical experiences.

PED 8100. Hospital Pediatric Dentistry. (1 cr.; S-N or Audit; Every Fall, Spring & Summer) Faculty-supervised diagnosis/treatment of pediatric dentistry problems at Fairview-University Medical Center and Hennepin County Medical Center. Rotation seminars in pediatrics/anesthesia. Pre/post-operative discussion/evaluation of treatment plans.

PED 8110. Pediatric Dentistry Outreach Experiences. (1 cr. [max 3 cr.]; S-N or Audit; Every Fall, Spring, & Summer) Faculty-supervised diagnosis and treatment of pediatric dentistry problems at Hennepin County Medical Center, the CUHCC Clinic, and other off-site locations. Participation on a rotation basis in seminars in pediatrics and anesthesia. Pre/postoperative seminar discussion and evaluation of treatment plans.

**Pediatrics (PED)**

PED 6121. Conflict, Anger, Aggression, Violence. (2 cr.; A-F or Audit; Spring Even Year) Current studies of biological bases (e.g., evolutionary adaptation, genetic, physiological substrates), behavioral expression (e.g., roles of environment, development, learning/motivation, personality, psychopathology), and social interactions (e.g., culture, criminal violence, warfare, genocide). prereq: Ped 6121/ PubH 6121

PED 6996. Department of Pediatrics-Summer Internship in Pediatrics. EPAC Explore Students Only. (0 cr.; No Grade Associated; Every Summer) Exposure to clinical general pediatrics early in medical school. Two-week preceptorship with general pediatrician during summer hiatus between first/second year of medical school. Only available to students part of EPAC Explore group. Participating students need to be in academic good standing at the medical school.

PED 7091. Independent Study in the Neural Basis of Anger, Tantrums, and Aggression. (2 cr.; A-F only; Periodic Fall) Neural and other biological bases for emotional expression of anger and for tantrum/aggression. prereq: instr consent

PED 7501. Pediatric Externship. (6 cr.; H-N or Audit; Every Fall, Spring & Summer) Provides basic pediatric skills and knowledge necessary for each student, no matter what field of medicine they select. Required textbook: Rudolph's Fundamentals of Pediatrics, Rudolph, A. & Kamer, R.K., Lange Medical Publishers.

PED 7512. Pediatric Acting Internship. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) An intensive learning experience focusing on children with diseases treated by subspecialty services, generally cardiology, nephrology, or oncology. The student functions as an acting intern. prereq: 7501

PED 7531. Psychology Internship. (12 cr.; No Grade Associated; Every Fall, Spring & Summer) N/A prereq: psych grad

PED 7533. Clinical Allergy at Fairview-University Medical Center. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Emphasizes the practical aspects of allergic and immunologic work-ups and treatments. The particular content of the course is modified depending upon individual needs.

PED 7534. Pediatric Cardiology at Fairview-University Medical Center. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Primarily a clinical consult experience, with attendance at four clinics a week involving staff-supervised patient work-ups; it also includes discussions on congenital cardiac malformations, and five different specialized conferences involving radiologists, surgeons, pathologists, and pediatric electrocardiograms, followed by staff consultation. No call is required.

PED 7535. Pediatric Infectious Diseases. (4-6 cr.; H-N or Audit; Every Fall, Spring & Summer) The student works closely with the infectious disease fellow and pediatric resident on service, and contribute to the diagnosis and management of patients with suspected or proven infections. prereq: one ped rotation

PED 7536. Pediatric Hematology/Oncology/Bone Marrow Transplantation. (4-6 cr.; H-N or Audit; Every Fall, Spring & Summer) An introduction to hematology, oncology, and bone marrow transplantation in pediatric patients, including children with various types of leukemias, solid tumors, hematological, and immunological disorders. prereq: 7501, 7512, or Med 7500.

PED 7537. Pediatric Endocrinology and Metabolism. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Includes daily rounds on the pediatric wards, three or four half-days of outpatient clinic work, and several conferences weekly. The student works with faculty, fellows, and house officers in a small group. Conferences include interdepartmental clinical and basic science topics. prereq: 7501, 7512, or Med 7500

PED 7538. Pediatric Gastroenterology and Nutrition. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) The student sees GI and nutrition consults on the pediatric stations, attends clinic on Wednesday afternoons, and observes all diagnostic and biopsy procedures pertaining to gastrointestinal patients.

PED 7539. Neonatal Medicine Externship. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Each student has an opportunity to be an extern in one of the neonatal intensive care units and participate in the night call rotation with other students and house officers. prereq: 7501, 7512, or Med 5700.

PED 7540. Pediatric Neurology. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) Successful completion of this rotation satisfies the Department of Neurology 7-510 requirement. Pediatric neurology patients have a variety of problems ranging from coma, muscular dystrophy, epilepsy to learning disabilities; from inborn errors of metabolism, metabolic neurologic dysfunction to behavior disorders.

PED 7543. Pediatric Nephrology at Fairview-University Medical Center. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Daily working rounds with the staff are made in the hospital, and the team makes formal rounds with each student to discuss patients. Outpatient management of a wide variety of problems, both nephrologic and urologic.

PED 7544. Pulmonary Disease in Pediatrics. (4-12 cr.; H-N or Audit; Every Fall, Spring & Summer) Emphasis is on care of pulmonary problems in patients with diverse lung diseases. Includes patient follow-up and work with the pediatric pulmonary health care team.

PED 7548. Clinical Genetics. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This course is designed for the student interested in clinical pediatrics and medicine as well as academic pediatrics. The course builds basic genetic skills by participating as a member of the combined medicine/pediatrics clinical genetics group.

PED 7553. Adolescent Medicine. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This clinical elective is designed to expose the student to the major developmental issues and health concerns of youth in a variety of community-based services for youth. prereq: enrolled yr 4 med

PED 7555. Neonatal Clerkship - Marshfield, WI. (4 cr.; H-N or Audit; Every Fall, Spring & Summer) This elective revolves primarily around medical problems related to the newborn, including neonatal infections, metabolic problems, cardiovascular problems, shock, pulmonary insufficiency, central nervous system asphyxia and hemorrhage. prereq: 7512, enrolled yr 4 med

PED 7556. Pediatrics Clerkship - Marshfield, WI. (4 cr.; H-N or Audit; Every Fall & Summer) The student functions as a house officer on the pediatric ward and in the emergency room and...
has night call every third or fourth night. prereq: 7501, enrolled yr 4 med

PED 7559. Pediatric Clinical Care Medicine. (; 3-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student works as a member of the resident-fellow-attending physician team in assessing and treating all medical and surgical patients on the pediatric intensive care unit. prereq: 7501 and/or 7512.

PED 7560. Research/Special Problems in Pediatrics. (; 1-15 cr. ; H-N or Audit; Every Fall, Spring & Summer)
A research experience in pediatrics can be arranged on an individual basis with various members in the Pediatrics Department. This course affords the student opportunity to work with a pediatric faculty member on a predetermined research project. prereq: InMd 6104

PED 7566. Evolution of American Pediatrics. (; 6 cr.; H-N or Audit; )
This course explores the evolution of American Pediatrics from the post-Civil War period to the present. American Pediatrics may be divided into several distinct eras based on the forces which defined its boundaries and identity. These include societal and governmental influences, changing norms of medical practice, emerging scientific knowledge, and reforms in medical education. The course will also examine Pediatrics' contribution to medical knowledge and the influence of pediatrics on the attitudes of government and society toward children. Team teaching format combines formal lectures, assigned readings, and student/faculty discussion.

PED 7583. Fundamentals of Clinical Oncology. (; 4 cr.; H-N or Audit; Every Fall, Spring & Summer)
This multidisciplinary course provides an introduction to the fundamentals of clinical oncology (adult and pediatric) and is designed for the medical student interested in entering any specialty. prereq: Med 7500 or 7501

PED 7700. Primary Care Clinics: Pediatrics. (; 4 cr.; P-N only; Every Fall, Spring & Summer)

PED 7910. Pediatric Medical Residency. (; 6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Pediatric medical residency.

PED 7930. Pediatric Medical Fellowship. (; 6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Pediatric medical fellowship.

Performance of Veterinary Serv (PVS)

PVS 5881. Food Production, Manufacturing/Processing, and Supply Chains. (1 cr.; S-N only; Every Summer)
Food commodities and agricultural crops play critical roles relevant to public health, energy and economic vitality, feeding the increasing global human population, and providing multiple outputs from feed for animals to fuel for vehicles, transportation and energy. Each time the course is offered it will focus on a different agricultural commodity which provides critical outputs for the state of MN. Some examples include corn, sugar beets, and soy beans. Individuals working or interested in complex food systems will benefit from the knowledge, networking, and breadth of understanding about agricultural commodities, as a means to think more critically about the interconnection of food, animal feed, fiber and fuel in the economics, culture and health of our society.

PVS 5882. Food governance, Policy and Regulation. (1 cr.; S-N only; Every Spring)
This course provides an overview of food governance, policy, and regulation in the United States. The roles of legislative bodies and regulatory agencies at local, state, and national levels will be reviewed in order to explore the complexity of food policy. Current issues will be analyzed.

PVS 5883. Global Food Systems: Geography, Politics and Trade. (1 cr.; S-N only; Every Spring)
This course explores the global distribution of food production and consumption in order to understand the dynamics of food systems including both domestic production and trade. The course provides students an opportunity to expand their knowledge about the drivers of global food systems and the complexity of the issues such as food security, global economic development and the implications of climate change, and sustainability.

PVS 5890. Veterinary Public Practice Seminar. (0.5 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
This is a seminar or rounds course in which students will be exposed to the project and research activities of VPH residents and faculty. Students will prepare and present a seminar on their project and/or research work associated with the residency program.

PVS 5991. Animal Health and Food System Policy and U.S. State government. (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)

PVS 5992. Animal Health and Food System Policy and U.S. Federal Government. (1 cr.; S-N only; Every Fall)
This course is designed to immerse students in the national policy-making arena for animal health and food systems. Participants will interact with officials in relevant Federal government agencies as well as national stakeholder organizations and policy-relevant think tanks. The course will explore the role of scientific evidence in developing and implementing policy as well as the impact of politics and beliefs. The course will provide students an understanding and experience regarding the policy-making process as it pertains to trade, animal health, and food systems at the national levels.

PVS 5993. Animal Health and Food System Policy and Intergovernmental Organizations. (1 cr.; S-N only; Every Spring)
Evidence-based policy development. Relevant global animal health and food system issues. Role of scientific evidence in developing/implementing policy. Policy-making process as it pertains to trade, animal health, and food system across intergovernmental organizations. Role of scientific evidence in intergovernmental organization's policy development. prereq: DVM or equiv degree or current DVM student or instr consent

PVS 5995. Engaging Intergovernmental Organizations. (2 cr.; S-N only; Every Fall & Spring)
Each enrolled student will be expected prepare for the program prior to traveling to the off-campus site by becoming familiar with the relevant organizations which includes reading the background materials provided online. Prior to the off-campus component of the course, students will be asked to participate in an online webinar and work as a member of a virtual team in preparing an executive overview of one of the intergovernmental organizations to share with the entire class at the first meeting. Each student is also expected to participate in directed discussions, interact with key officials, perform group task assignments, and ultimately develop and share a presentation to foster professional networks and public-private-academic partnerships with relevant stakeholders.

PVS 5996. Professional Communications: Policy Issue Briefs. (1 cr. [max 2 cr.]; S-N or Audit; Every Fall & Spring)
Critical review of scientific and lay literature. Principles of risk communication. Presentation of scientific information. Prepare and critique executive summaries of current topics for CAHFS Daily News. Support media interactions of CAHFS faculty. Generate fact sheets for use on CAHFS website. prereq: Students must have a professional or graduate degree related to human, animal, or ecosystem health or be pursuing a graduate degree (MS/PhD) or professional masters (MPH/MPA) or instr consent

PVS 5997. Farm to Table Study Program. (1 cr.; Student Option; Every Fall)
Explore food system within specific country while considering aspects of animal welfare/health, food safety, food protection, public health. Site visits along food supply chain. Discussions with government/private sector leaders. Interactive cross-culture group activities. prereq: instr consent

PVS 5998. Leadership to Address Global Grand Challenges. (1.5 cr.; Student Option No Audit; Every Spring)
Leadership strategies useful in addressing global grand challenges. Practices that foster collective action across diverse groups of

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Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
PHCL 4003. Anti-infective drugs: Drugs that kill invaders. (2 cr.; A-F or Audit; Every Spring)
Principles/mechanisms of anti-infective drugs, and treatments of infectious diseases. prereq: College-level biology

PHCL 4010. Current Research Topics in Pharmacology. (2 cr.; A-F only; Every Fall)
Cutting-edge research projects in pharmacology. Research seminars, literature studies, discussion sessions, oral presentations. prereq: Upper div or instr consent

PHCL 4020. Chemotherapy: from current anticancer drugs to future cancer therapeutics. (3 cr.; A-F only; Every Fall)
This course will expose students to the studies of therapeutic agents used for the treatment of cancer. We will study the mechanisms of current anticancer drugs. We will also explore the development of novel anticancer agents, as well as the process of drug discovery & development. prereq: College-level biology; PHCL 2001 and/or PHCL3100, GCD4151 recommended.

PHCL 4100. Laboratory in Molecular Pharmacology. (2 cr.; A-F only; Every Fall & Spring)
Hands-on experimentation using molecular techniques for data collection/analysis. prereq: [2001 or 4001], 3100, [BioC 3021 or BioC 4331], [BioC 4025, BioC 4125 recommended]

PHCL 4343. Pharmacology of the Synapse. (3 cr.; A-F only; Every Fall)
Study synapse as pharmacological gateway to nervous system. Explore physiology of cellular signaling at synapse, how signaling influences conditions such as Parkinson's disease, depression, anxiety, pain, addiction. How various drugs modify signaling at synapse. recommend: [PHCL 2001, PHCL 3100]

PHCL 4993. Directed Studies. (1-3 cr.; [max 6 cr.]; S-N only; Every Fall, Spring & Summer)
Individual study ("dry lab" experience) on selected topics in pharmacology/biomedical science with faculty from the Pharmacology Department or other biomedical disciplines. Readings and use of scientific literature. prereq: instr consent, dept consent

PHCL 4994. Directed Research. (1-3 cr.; [max 12 cr.]; S-N only; Every Fall, Spring & Summer)
Laboratory research ("wet lab" experience) in the areas of pharmacological/biomedical research. prereq: instr consent, dept consent

PHCL 5012. Pharmacology for Pharmacy Students II. (2 cr.; A-F only; Every Spring)
Action/fate of drugs. prereq: 5101 or instr consent

PHCL 5019. Problems in Pharmacology. (1-18 cr.; Student Option; Every Fall, Spring & Summer)
Research projects and special problems by arrangement. prereq: Upper div or grad student or instr consent

PHCL 5110. Introduction to Pharmacology. (3 cr.; A-F or Audit; Every Fall)
Basic principles of Pharmacology. Focuses on molecular mechanisms of drug action. prereq: Grad student or instr consent

PHCL 5111. Pharmacogenomics. (3 cr.; A-F or Audit; Every Spring)
Human genetic variation, its implications. Functional genomics, pharmacogenomics, toxicogenomics, proteomics. Interactive, discussion-based course. prereq: Grad student or instr consent

PHCL 5112. A Graduate Toolkit I: An Introduction to the Scientific Research Lab. (1 cr.; A-F only; Every Fall)
Basic operating principles/techniques of scientific research lab. Personnel structure, professionalism, authorship/publication. Recombinant protein production/purification, DNA/RNA purification/methods, molecular biology methods, microscopy, model systems/bioinformatics. prereq: instr consent

PHCL 5113. A Graduate Toolkit II: Scientific Speaking and Writing for Graduate Students. (2 cr.; A-F only; Every Fall)
Guidance on PowerPoint design, public speaking, question/answer sessions at scientific talks. Practice sessions are videotaped/analyzed to highlight strategies for improvement. Guidance in writing thesis research topic. prereq: Completion of one yr of a grad program

PHCL 5462. Neurobiology of Pain, Sleep, and Addiction. (2 cr.; A-F only; Every Spring)
Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years. prereq: instr consent

PHCL 8209. Substance Abuse at the Bedside. (1 cr.; S-N only; Every Fall & Spring)
Clinical management of addictive diseases. Students discuss how observed clinical interactions can influence a basic science project in which they are involved. prereq: Grad student in any basic-science program

PHCL 8211. Advanced Medical Pharmacology I. (5 cr.; A-F only; Every Spring)
Online content focused on organ system-based study of medical therapeutics. In-class content focused on current biomedical literature. Develop critical reasoning skills needed to interpret/critique basic science, translational, clinical research papers/presentations. prereq: 5110, [grad student or instr consent]

PHCL 8212. Advanced Medical Pharmacology II. (0-3 cr.; A-F only; Every Summer)
Online content focused on organ system-based study of medical therapeutics. In-class content focused on current biomedical literature. Develop critical reasoning skills needed to interpret/critique basic science, translational, clinical research papers/presentations. Prereq 8211 or instr consent

PHCL 8217. Problems in Investigative Pharmacology. (0 cr.; S-N or Audit; Every Fall)
Presentation and discussion of contemporary research problems, investigative approaches, and methodologies in experimental pharmacology. Related to cardiovascular, renal, endocrine, and autonomic pharmacology; neuropharmacology; psychopharmacology; chemotherapeutics; toxicology; and molecular pharmacology.

PHCL 8221. Neurobiology of Pain and Analgesia. (3 cr.; Student Option; Periodic Fall & Spring)
Course offered triennially. prereq: instr consent

PHCL 8222. Transdisciplinary Tobacco Research. (1 cr. [max 2 cr.]; S-N or Audit; Fall Odd Year)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Transdisciplinary science, its application to nicotine/tobacco research. Transdisciplinary theories/methods, examples of their application/integration. Draws on TTURC/local investigators, public health advocates. Offered every other year. prereq: instr consent

PHCL 8320. Readings in Neurobiology. (2-4 cr.; Student Option; Every Fall & Spring) Topics in neurobiology/neurophysiology. prereq: instr consent

PHCL 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

PHCL 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

PHCL 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHCL 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHCL 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

Pharmacy (PHAR)

PHAR 1. CoP - Phillips Neighborhood Clinic. (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Teaching laboratories to community/clinic-based interprofessional patient care model at Phillips Neighborhood Clinic. prereq: Current Student Pharmacist in the College of Pharmacy

PHAR 1001. Orientation to Pharmacy. (2 cr.; Student Option; Every Fall, Spring & Summer) You may know that pharmacists are responsible for the dispensation of medications, but did you know that pharmacists play a critical role in the healthcare process by ensuring that their patients receive the best overall care? Designed to help you better understand the world of pharmacy, this online pharmacy course will introduce you to this exciting profession and help you gain an understanding of the impact pharmacists have in the patient care process. This course examines what training is necessary for success in the pharmacy field, demonstrates the roles a pharmacist can have in patient care, research and academia, and provides virtual tours of various settings in which pharmacists work. This is not a self-study course. While it is completely online, there are deadlines for assignments throughout the semester. No late registrations will be accepted. Course information is sent to the U of M email addresses of registered students shortly before, and/or on, the first day of classes each Fall, Spring, and Summer term. For more information, contact phar1001@umn.edu or 612-624-7976.

PHAR 1002. Medical Terminology. (2 cr.; Student Option; Every Fall, Spring & Summer) Interested in learning the difference between an antigen and an antibiotic? During this course, you will not only increase your medical vocabulary by more than 2,500 words in a self-paced manner, you will also learn to identify and articulate a wide variety of medical conditions and processes. Communication related to disease states, procedures, and diagnostics in healthcare can sometimes seem like another language. This course will help you recognize medical abbreviations, relate terms to procedures and diagnostics, and comprehend the meaning of medical terminology by using word elements. If you are interested in the healthcare fields or would like to understand more about your own medical care, we encourage you to learn more in this course. This is a completely online, self-paced course but runs on an accelerated 10-week schedule each Fall, Spring, and Summer term. For more information, contact phar1002@umn.edu or 612-624-7976.

PHAR 1003. Non-Prescription Medications and Self-Care: Treating Minor Conditions. (2 cr.; Student Option; Every Fall, Spring & Summer) Non-prescription medications and dietary supplements comprise a large market within the healthcare industry. Throughout this course, you will learn about these medications and other self-care remedies available to treat many different medical conditions. For each condition discussed, you will learn basic causes, signs, and symptoms, self-care guidelines, and when to see a healthcare provider. For medications discussed you will learn the basic mechanism of action, uses, and potential side effects. This course will help you gain a better understanding of how non-prescription and self-care products can be used safely and effectively. This online class is primarily self-paced with due dates for certain aspects at times throughout the semester. Students may choose to work ahead in the course. Course information is sent to the University of Minnesota email addresses of registered students shortly before, and/or on, the first day of classes each fall, spring, and summer term. For more information, contact phar1003@umn.edu or 612-624-7976.

PHAR 2004. Common Prescription Drugs and Diseases. (2 cr.; Student Option; Every Fall, Spring & Summer) Are you interested in understanding how some of the most common prescription medications work, why they are used, and how they should be used when treating common ailments? Perhaps you would like to recognize the most common causes of specific diseases, identify their symptoms, and recognize the diagnostic criteria associated with them. Throughout this course, you will learn why some medications can’t be used by certain people, understand how prescription drugs are regulated, and examine the correlation between common prescription drugs and diseases. Additionally, you will explore various drug information resources and learn how to find reliable sources of drug information. This online class is primarily self-paced with due dates for certain aspects at times throughout the semester. Students may choose to work ahead in the course. Course information is sent to the University of Minnesota email addresses of registered students shortly before, and/or on, the first day of classes each fall, spring, and summer term. For more information, contact phar1004@umn.edu or 612-624-7976.

PHAR 3006. Orientation to Health Literacy and Communication. (2 cr.; A-F only; Every Fall, Spring & Summer) Issues associated with health literacy. Dimensions associated with misunderstandings that occur in health-related communication.

PHAR 3206. Issues in Health Literacy and Communication. (3 cr.; A-F only; Every Fall, Spring & Summer) Issues associated with health literacy. Dimensions associated with misunderstandings that occur in health-related communication.

PHAR 3207. Leadership in Health Care. (3 cr.; A-F only; Every Fall, Spring & Summer) Leadership skills/theories to create positive change in health care settings.

PHAR 3208. Directed Study: Wellness Communication and Behavior Change in Patient Populations. (1 cr.; Student Option; Every Fall & Spring) Theories/models of health education/individual behavior change. Factors that impact health/habitual behavior. Solutions. Health campaigns/patient compliance.

PHAR 3601. Basic Human Physiology for the Health Professions. (3 cr.; A-F only; Every Fall, Spring & Summer) Are you interested in understanding the function of the human body? This course will expose you to normal functions of the major organ systems and diseases in those systems. Not only will this course prepare you for a future career in the health sciences, you’ll also gain knowledge about the physical, mechanical and biochemical functions of various human systems. Also, this course includes an online lab, an innovative tool designed to further your examination of the human body. Human systems discussed during this class include cellular, cardiovascular, respiratory, renal, gastrointestinal and endocrine systems. A simulated lab experience will be included with this course. This is a completely online course with due dates throughout the semester, though students have the option to work ahead if they choose. Course information is sent to the University email addresses of
PHAR 3700. Fundamentals of Pharmacotherapy. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Pharmacotherapy?the treatment of disease through the administration of medications? is a field particularly interesting to many healthcare workers. This course is designed to introduce you to some of the main drug classes available for the treatment of particular diseases. You will also learn about basic pharmacology, recognize brand and generic drug names, and explore their common uses and therapeutic classes. A basic understanding of treatment options available for common disease states will also be developed during this course. Additionally, the course develops basic proficiency in the use of drug information resources. This is a completely online course with due dates throughout the semester though students have the option to work ahead if they choose. Course information is sent to the University of Minnesota email addresses of registered students shortly before, and/or on, the first day of classes each Fall, spring, and summer term. For more information, contact phar3700@umn.edu or 612-624-7976. Prereq: Medical terminology recommended

PHAR 3800. Pharmacotherapy for the Health Professions. (3 cr.; A-F only; Every Fall & Spring) Pharmacotherapy?the treatment of disease through the administration of medications? is a topic central to the practice of nursing. This course is designed to introduce you to the main drug classes available for the treatment of particular diseases and the monitoring parameters for patients taking these medications. You will also learn about basic pharmacology, recognize brand and generic drug names, and explore their common uses and therapeutic classes. A basic understanding of contraindications and precautions related to various classes of medications will also be covered. Additionally, the course develops basic proficiency in the use of drug information resources. Students will be assessed through patient case quizzes and exams. This is a completely online course with weekly due dates. Course information is sent to the University of Minnesota email addresses of registered students shortly before and/or on the first day of classes each Fall, Spring and Summer term. For more information, contact phar3800@umn.edu or 612-624-7976. Prereq: Anatomy and physiology

PHAR 4200W. Drugs and the U.S. Healthcare System. (CIV,Wi; 3 cr.; Student Option: Every Fall & Spring) Being an empowered patient is important when discussing ethics-driven issues within the U.S. healthcare system. This course will expose students to current controversial issues surrounding medications and national healthcare, and help students examine their own role as a participant in this system. Students will learn to draw comparisons between medication use systems around the world and analyze other controversies related to access, choice, and quality of healthcare. During this course, students will understand how their choices, ethics and behavior affect societal decisions surrounding the availability of medications in the U.S. and what their rights are as a citizen-participant during the healthcare debate. This is a completely online course with weekly due dates. Course information is sent to the University email addresses of registered students shortly before, and/or on, the first day of classes each Fall and Spring term. For more information, contact phar4200@umn.edu or 612-624-7976.


PHAR 4293. Directed Research I for Undergraduates. (1-5 cr.; Student Option; Every Fall, Spring & Summer) Work with College of Pharmacy faculty. prereq: undergrad, instr consent

PHAR 4294. Directed Study I for Undergraduates. (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Individualized study. Students work with faculty on special projects. prereq: Undergrad, instr consent

PHAR 5200. Drugs and the U.S. Healthcare System. (3 cr.; Student Option; Every Fall & Spring) Being an empowered patient is important when discussing ethics-driven issues within the U.S. healthcare system. This course will expose students to current controversial issues surrounding medications and national healthcare and help students examine their own role as a participant in this system. Students will learn to draw comparisons between medication use systems around the world and analyze other controversies related to access, choice, and quality of healthcare. During this course, students will understand how their choices, ethics and behavior affect societal decisions surrounding the availability of medications in the U.S. and what their rights are as a citizen-participant during the healthcare debate. This is a completely online course with weekly due dates. Course information is sent to the University email addresses of registered students shortly before, and/or on, the first day of classes each Fall and spring term. For more information, contact phar5200@umn.edu or 612-624-7976. Prereq: Basic knowledge of human anatomy/physiology

PHAR 5205. Obesity: Issues, Interventions, Innovations. (2 cr.; Student Option; Every Fall & Spring) This course will focus on the role of the pharmacist in treating obesity. Students will learn the pharmacology of past and current medications to treat obesity, as well as the pathophysiology of the disease to understand why more options aren’t available. Students will explore drug information sources for dietary supplements for weight loss, discuss the care of an obese patient including non-pharmacologic treatments for obesity, as well as recognizing the potential for bias and its effect on patient care. Finally, students will look at bariatric surgery and discuss some specific adjustments in care for bariatric patients. This is a completely online course with weekly due dates. Course information is sent to the University of Minnesota email addresses of registered students shortly before, and/or on, the first day of classes each Fall and Spring term. For more information, contact phar5205@umn.edu or 612-624-7976. Prereq: Second or third year pharmacy student, or student enrolled in a graduate science or health-related program. Biochemistry and physiology suggested.

PHAR 5206. Applied Health Literacy and Communication. (3 cr.; A-F only; Every Fall, Spring & Summer) Issues associated with health literacy. Dimensions associated with misunderstandings that occur in health-related communication.

PHAR 5207. Applied Leadership in Health Care. (3 cr.; A-F only; Every Fall, Spring & Summer) Leadership skills/theories to create positive change in health care settings. prereq: advanced undergraduates or professional health care students or grad students

PHAR 5212. Survey of Pediatric Metabolic, Genetic, and Oncologic Disease. (2 cr.; A-F only; Every Fall & Summer) Appraisal of major genetic/metabolic disorders and oncologic diseases of childhood. Disease state epidemiology, pharmacotherapy, monitoring, practical applications. prereq: Second year or higher in College of Pharmacy or instr consent

PHAR 5230. Principles of Clinical Pharmacology Research. (2 cr.; A-F only; Every Fall)
Drug therapy investigation. Topics include experimental design of drug studies in human research subject volunteers. Topics related to individualization of therapy including effects of genetic polymorphisms, demographic variables, physiologic variables, age on drug disposition treatment outcomes. prereq: 3rd Year Pharmacy Student or instr consent


PHAR 5700. Applied Fundamentals of Pharmacotherapy. (3 cr.; A-F only; Every Fall, Spring & Summer) Pharmacotherapy: the treatment of disease through the administration of medications?is a field particularly interesting to many healthcare workers. This course is designed to introduce you to some of the main drug classes available for the treatment of particular diseases. You will also learn about basic pharmacology, recognize brand and generic drug names, and explore their common uses and therapeutic classes. A basic understanding of treatment options available for common disease states will also be developed during this course. Additionally, the course develops basic proficiency in the use of drug information resources. This is a completely online course with due dates throughout the semester though students have the option to work ahead if they choose. Course information is sent to the University of Minnesota email addresses of registered students shortly before, and/or on, the first day of classes each fall, spring, and summer term. For more information, contact phar3700@umn.edu or 612-624-7976. Prereq: Medical terminology recommended

PHAR 5800. Pharmacotherapy for the Health Professions. (3 cr.; A-F only; Every Fall) Pharmacotherapy: the treatment of disease through the administration of medications?is a topic central to the practice of nursing. This course is designed to introduce you to the main drug classes available for the treatment of particular diseases and the monitoring parameters for patients taking these medications. You will also learn about basic pharmacology, recognize brand and generic drug names, and explore their common uses and therapeutic classes. A basic understanding of contraindications and precautions related to various classes of medications will also be covered. Additionally, the course develops basic proficiency in the use of drug information resources. Students will be assessed through patient case quizzes and exams. This is a completely online course with weekly due dates. Course information is sent to the University of Minnesota email addresses of registered students shortly before and/or on the first day of classes each fall term. For more information, contact phar3800@umn.edu or 612-624-7976. Prereq: Anatomy and physiology

PHAR 6122. Pharmacotherapy II: Patient-Centered Pathophysiologic Approach. (5 cr.; A-F only; Every Spring) Pathophysiology/pharmacotherapy of common cardiovascular, endocrine, gastrointestinal disorders. prereq: 6121, concurrent registration is required (or allowed) in 6131, 6154, 6163, 6173, PHCL 5101, PHCL 5102

PHAR 6123. Pharmacotherapy III: Patient-centered Pathophysiologic Approach. (5 cr.; A-F only; Every Fall) Pathophysiology/pharmacotherapy of common neurologic, psychiatric, pulmonary, geriatric disorders. prereq: 6122, 6163, concurrent registration is required (or allowed) in 6175, PHCL 5101, PHCL 5102

PHAR 6124. Pharmacotherapy IV: Patient-centered Pathophysiologic Approach. (5 cr.; A-F only; Every Spring) Pathophysiology/pharmacotherapy of common infectious diseases, oncologic/toxicologic disorders. prereq: 6121, 6122, 6123, 6155, 6163

PHAR 6131. Pharmacy and the Health Care System. (3 cr.; A-F only; Every Spring) Delivery of pharmaceuticals/pharmacy services in U.S. health care system. Issues in hospital/community practice, characteristics of pharmaceutical industry. Economic/financial issues in delivering pharmaceutical services. prereq: 2nd year pharmacy student

PHAR 6133. Pharmacy Practice Management. (3 cr.; A-F only; Every Spring) Principles of pharmacy management, including inventory control, purchasing, pricing, financial analysis, personnel management. prereq: 3rd year pharmacy student

PHAR 6135. Pharmacy Outcomes. (2 cr.; A-F only; Every Spring) How to integrate knowledge of basic sciences, pharmacotherapy, pharmacy practice management, pharmaceutical care, written communication, literature evaluation, drug information retrieval, law/ethics, and pharmacoeconomics to manage patients with multiple medical conditions. prereq: 6123, 6175

PHAR 6137. Ethics in Pharmacy Practice. (1 cr.; A-F only; Every Spring) Theories of ethics, ethical analysis of practical ethical issues experienced by pharmacists. Relationship of ethical reasoning to public policy and law. Readings from peer-reviewed publications and popular media. Case studies. prereq: 3rd yr pharmacy student

PHAR 6150. CoP Honors: Medicinal Chemistry Seminar. (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring) Current topics in medicinal chemistry. prereq: instr consent

PHAR 6151. Biochemistry of Medicinals I. (3 cr.; A-F only; Every Fall) Biochemistry topics required for understanding pharmacodynamic action/therapeutic use of medicinal agents. prereq: 1st yr PHAR, 6171

PHAR 6153. Pharmaceutical Immunology. (2 cr.; A-F only; Every Spring) Basic biological mechanisms of immune system. Emphasizes drug allergies, immunosuppressives, monoclonal antibodies, and preparation/use of immunologic derived agents in diagnosing/treating disease. prereq: 6151

PHAR 6155. Medicinal Agents II. (2 cr.; A-F only; Every Spring) Chemical/biological properties and therapeutic uses of drugs affecting central nervous, endocrine, and intermediary metabolism systems. prereq: 6154, concurrent registration is required (or allowed) in 6174 and Phcl 5102

PHAR 6156. Medicinal Agents III. (4 cr.; A-F only; Every Fall) Therapeutic properties/uses of antiviral, anti-infective, antineoplastic agents. prereq: 6151, 6141

PHAR 6157. Human Nutrition and Drug Therapy. (3 cr.; A-F only; Every Spring) Basic concepts of human nutrition and clinical application. prereq: 6152

PHAR 6158. Recombinant DNA-Derived Drugs. (1 cr.; A-F only; Every Spring) Biotechnology as it relates to basic/clinical pharmaceutical sciences. Emphasizes recombinant DNA techniques and preparation/use of biotechnology-derived agents in diagnosing/treating disease. prereq: 6151

PHAR 6160. CoP Honors: Experimental and Clinical Pharmacology Seminar. (1 cr.; A-F only; Every Fall & Spring) Selected topics in experimental/clinical pharmacology. prereq: instr consent

PHAR 6164. Biopharmaceutics. (3 cr.; A-F only; Every Fall) Applied theory of dosage form design for optimal drug activity/bioavailability for all routes of drug administration. prereq: 6161, 6162, 6163

PHAR 6174. Pharmaceutical Care Skills IV. (2 cr.; A-F only; Every Spring) Basic/clinical science curriculum in lab setting. Longitudinal care in lab setting. prereq: concurrent registration is required (or allowed) in 6122

PHAR 6175. Pharmaceutical Care Skills V. (2 cr.; A-F only; Every Fall) Integrates basic/clinical science curriculum lab setting, prereq: concurrent registration is required (or allowed) in 6171, 6172, 6173, 6174, 6111, 6112 or instr consent

PHAR 6181. Pharm.D. Paper & Seminar. (1 cr.; A-F only; Every Fall & Spring) Research paper/research project plan. Professional behavior, patient confidentiality, universal precautions. prereq: 3rd yr Pharmacy student

PHAR 6182. Pharm.D. IV Seminar. (1 cr.; S-N only; Every Fall) Students present thesis topics to peers and faculty evaluators. prereq: 4th yr pharmacy student, 6181
PHAR 6183. Pharm.D. IV Paper. (2 cr.; S-N only; Every Fall, Spring & Summer) Final paper describing hypothesis-driven research project, patient-care oriented project, management project, drug-utilization evaluation, or extensive literature review. prereq: 6181

PHAR 6203. College of Pharmacy Community Outreach. (; 1-3 cr.; A-F or Audit; Every Fall, Every Spring & Summer) Apply knowledge gained in classroom and teaching laboratories to community-based patient care activities. prereq: Current student pharmacist in College of Pharmacy

PHAR 6205. Interprofessional Teamwork for the Health Professions. (; 1 cr.; A-F only; Every Fall) Interprofessional education that provides an introductory experience to interprofessional teamwork skills with a focus on patient-centered care, especially end of life care. prereq: Major in [public health or nursing or medicine or dentistry or social work or pharmacy]

PHAR 6208. Community-based Immunization Delivery. (; 1 cr.; S-N or Audit; Every Fall) Students will learn about, plan, and implement influenza immunization clinics.


PHAR 6212. Dermatology. (1 cr.; A-F or Audit; Every Fall) Pathophysiology/pharmacotherapy of dermatologic disorders. prereq: 3rd yr Pharmacy student


PHAR 6217. Advanced Pharmaceutical Care Clinic. (; 1-2 cr.; Student Option; Every Spring) Expanded, direct patient care opportunities. Students conduct comprehensive pharmaceutical care assessments in presence of practitioners. Weekly student case presentations/discussions. prereq: [6230] or 3rd yr pharmacy student

PHAR 6219. Building a Pharmaceutical Care Practice. (2 cr.; A-F only; Every Spring) Initiating pharmaceutical care practice. Building personal practice plan. prereq: 2nd or 3rd year pharmacy student

PHAR 6220. Pediatric Drug Therapy. (; 2 cr.; A-F or Audit; Every Spring) Pathophysiology/therapeutics of disease states. Common issues encountered in providing pharmaceutical care to pediatric patients. prereq: 3rd or 4th yr pharmacy student

PHAR 6222. Advanced Pharmaceutical Compounding. (; 2 cr.; A-F only; Every Fall & Spring) Expands skills gained in pharmaceutical care lab. prereq: 2nd or 3rd year pharmacy student

PHAR 6223. Pharmacokinetics Research Seminar. (; 1 cr. [max 2 cr.]; A-F or Audit; Every Fall & Spring) Evaluate literature in pharmacokinetics/pharmacodynamics/drug metabolism. prereq: 6163 with grade of “B” or better

PHAR 6224. Pharmacogenomics: Genetic Basis for Variability in Drug Response. (; 2 cr.; A-F only; Every Spring) Theory/practice of pharmacogenomics. Principles of human genetics/genomics. Applications to scientific education, problems in drug therapy optimization; patient care. prereq: At least 3rd year or later in healthcare related program or equivalent experience or instn consent

PHAR 6226. Interprofessional Diabetes Experience. (; 2 cr.; A-F only; Every Spring) Diabetes mellitus through active, hands-on learning in interprofessional environment. Participate in week-long experience of living with diabetes. Online learning activities. prereq: 2nd year or later pharmacy student

PHAR 6227. Leading Adaptive Change. (2 cr.; S-N only; Every Fall) Hands-on experience leading change initiative. Create vision for change, plan approach, implement plan, evaluate outcomes. Project focuses on area of pharmacy practice or education.

PHAR 6228. Leading Change Portfolio. (; 2 cr.; S-N only; Every Spring) Supports completion of Leadership Emphasis Designation. Documentation/self-reflection of leadership learning experiences pursued inside/outside of classroom. prereq: 6237 or 6238

PHAR 6230. Ambulatory Pharmaceutical Care Clinic. (; 2 cr.; Student Option; Every Spring) How to conduct pharmaceutical care assessments, for patients with actual drug-related needs, in a controlled clinic setting. prereq: Enrolled pharmacy student


PHAR 6232. Health System Pharmacy Management. (; 2 cr.; A-F only; Every Spring) Management techniques needed in various institutional pharmacy settings. Integrating distributive/clinical components of institutional practice. prereq: 2nd or 3rd yr pharmacy student

PHAR 6233. Drug Use Review and Management. (2 cr.; A-F only; Every Fall) Principles of drug use review in various health care settings. Optimizing quality, minimizing cost. prereq: 3rd year Pharmacy student


PHAR 6236. Clinical/Pharmacy Management in Modern U.S. Health-Care and Regulatory Landscape. (; 2 cr.; A-F only; Every Fall & Spring) U.S. Food and Drug (FDA) law, civil liability of malpractice, duty of pharmacy professionals, implications of intellectual property rights of others. Business law topics ranging from contracts to non-compete agreements.

PHAR 6237. Leading Change in Pharmacy I. (; 2 cr.; S-N only; Every Fall) Mini-curriculum. Leadership development, its relation to advancing the profession of pharmacy.

PHAR 6238. Leading Change in Pharmacy II. (; 2 cr.; S-N or Audit; Every Spring) Mini-curriculum. Leadership development, its relation to advancing the profession of pharmacy.

PHAR 6249. Addiction Medicine, Substance Abuse, and Chemical Dependency. (2 cr.; A-F or Audit; Every Spring) Addiction, chemical abuse, chemical dependency. How pharmacists can impact those affected. prereq: 2nd or 3rd yr Pharmacy student

PHAR 6250. CoP Honors: Social and Administrative Pharmacy Seminar. (; 1 cr. [max 2 cr.]; A-F or Audit; Every Fall & Spring) Current topics in hospital pharmacy. prereq: instr consent

PHAR 6260. CoP Honors: Pharmacoeconomics Seminar. (; 1 cr.; A-F or Audit; Every Fall & Spring) Contemporary topics in pharmacoeconomics research. prereq: instr consent

PHAR 6270. CoP Honors: Critical Care Seminar. (; 2 cr.; A-F or Audit; Every Fall) Research/topics of importance to experimental/clinical pharmacology. prereq: instr consent

PHAR 6294. Directed Study I. (1 cr. ; Student Option; Every Fall, Spring & Summer) Research/topics of importance to experimental/clinical pharmacology. prereq: instr consent

PHAR 6294. Directed Study I. (1 cr. ; Student Option; Every Fall, Spring & Summer)
Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology. 

**PHAR 6301. Veterinary Pharmacotherapy.** (2 cr.; A-F only; Every Spring) Pharmacotherapy of common medical conditions of small animals. prereq: 3rd year pharmacy student

**PHAR 6393. Directed Research II.** (1.5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology. prereq: instr consent

**PHAR 6394. Directed Study II.** (1-5 cr.; A-F or Audit; Every Fall, Spring & Summer) Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

**PHAR 6493. Directed Research III.** (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology. prereq: instr consent

**PHAR 6494. Directed Study III.** (1-5 cr.; S-N only; Every Fall, Spring & Summer) Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

**PHAR 6700. Becoming a Pharmacist.** (2 cr.; S-N only; Every Fall) Introduction to knowledge, skills, attitudes necessary for success in professional pharmacy curriculum/practice of pharmacy.

**PHAR 6701. CoP Community Outreach.** (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Teaching laboratories to community/clinical-based interprofessional patient care model.

**PHAR 6702. Integrated Biochemical Sciences.** (4.5 cr.; A-F only; Every Fall) Foundation in structure/function of medicinals. Familiarize students with structural/physical properties of proteins, nucleic acids, lipids, carbohydrates, ligands/drugs. Basic concepts central to structure-function relationships of therapeutics. prereq: Successful completion of Becoming a Pharmacist (BaP)

**PHAR 6710. Directed Research.** (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology. prereq: instr consent

**PHAR 6715. Professional Development and Assessment Sequence I.** (1 cr.; S-N only; Every Spring) Knowledge acquisition. Career/professional development. prereq: Successful completion of Becoming a Pharmacist

**PHAR 6716. Applied Pharmaceutical Care.** (3.2 cr.; A-F only; Every Spring) Common medical conditions/medications students are likely to encounter during their introductory pharmacy practice experiences (IPPEs). prereq: Successful completion of Becoming a Pharmacist

**PHAR 6718. Drug Delivery I.** (2.4 cr.; A-F only; Every Spring) Builds on Drug Delivery I. Dosage forms, mostly solid/dispersed. Chemical kinetics, chemical stability, buffer systems, polymers/proteins, rheology. Physicochemical principles relevant to design, preparation, storage, use, efficacy, evaluation of pharmaceutical dosage forms. prereq: Successful completion of Drug Delivery I

**PHAR 6720. Pharmaceutical Care Skills Lab II.** (2 cr.; A-F only; Every Spring) Part of pharmaceutical care learning center curriculum spanning six semesters. Introduction to profession. Begin building skills necessary to become competent/caring pharmaceutical care practitioner. prereq: Successful completion of Pharmaceutical Care Skills Lab I

**PHAR 6722. Principles of Medicinal Chemistry.** (2.1 cr.; A-F only; Every Spring) Discipline of medicinal chemistry. Principles of drug design/drug metabolism. prereq: Successful completion of Integrated Biochemical Sciences

**PHAR 6724. Immune System and Infectious Disease.** (3.1 cr.; A-F only; Every Spring) Immunological, epidemiological, pathogenic basis of viral, bacterial, protozoal, fungal, helminthic disease. Biological composition of vaccines/immunologic response to live attenuated pathogens/microbial extracts. Chemical, cellular, biological principles of immune system. prereq: Successful completion of Integrated Biochemical Sciences

**PHAR 6726. Principles of Pharmacology.** (2.3 cr.; A-F only; Every Spring) Builds on information in basic science courses offered in first semester of PharmD program. Foundational content necessary for comprehension/application of all subsequent pharmacotherapy modules that require application of pharmacological concepts/knowledge. prereq: Successful completion of Foundations of SAPh

**PHAR 6728. Pharmaceutical Calculations.** (0.7 cr. [max 3.1 cr.]; A-F only; Every Fall) Accurately performing pharmaceutical calculations is a critical component of patient care in every pharmacy practice environment. Calculations contribute just as much to good patient outcomes as the newest methods and guidelines for diagnosis, treatment, and prevention. The challenge of pharmacy calculations lies not in the cutting edge of science or their mathematical complexity, but in the need for consistent accuracy to prevent patient harm and possible fatality. To obtain this level of accuracy, an understanding of methods and deliberate, undivided attention to detail is required. Students must understand and master the basic concepts of pharmaceutical calculations with organization, consistency, and accuracy in order to provide optimal care to their future patients every day. Students should be committed to becoming a competent generalist practitioner who assumes responsibility and is willing to be held accountable for their patients' medication outcomes. prereq: enrolled in the Pharm.D. program, successful completion of PHAR 6700

**PHAR 6732. Medical Chemistry and Pharmacology of Cardiovascular Agents.** (2.3 cr.; A-F only; Every Fall) Builds upon foundational concepts learned in Principles of Pharmacology/Principles of Medicinal Chemistry, applies them to drug classes primarily used for treatment of cardiovascular diseases. prereq: Principles of Pharmacology, Principles of Medicinal Chemistry

**PHAR 6734. Cellular Metabolism and Nutrition.** (2.8 cr.; A-F only; Every Fall) Basic principles of intermediary metabolism/how such processes are used by body. Basic nutrients used by body/their roles as OTC products in community pharmacies. prereq: Integrated Biochemical Sciences

**PHAR 6736. Cardiovascular Pharmacotherapy.** (1.9 cr.; A-F only; Every Fall) Key topics critical to preparing generalist practitioner to have input on optimizing care of patients with common conditions such as hypertension, dyslipidemia, ischemic heart disease (angina, acute myocardial infarction)
supraventricular arrhythmias (atrial fibrillation), chronic heart failure. prereq: All PharmD year one coursework, Physiology Competency Exam

PHAR 6738. Pharmacokinetics. (3.7 cr. ; A-F only; Every Fall)
Designed to give generalist practitioners fundamental skills to solve pharmacokinetically-based problems in patient care, particularly in regards to dosage regimen design/adjustment. Builds on concepts learned in Drug Delivery I & II. Follows path of drug molecule from incorporation into dosage form to release/disposition in biological system. prereq: Drug Delivery I concurrent registration is required (or allowed) in II

PHAR 6740. Pharmaceutical Care Skills Lab III. (2 cr. ; A-F only; Every Fall)
Designed for second year pharmacy students to continue to build skills necessary to become pharmaceutical care practitioner. Laboratory section/discussion. prereq: Pharmaceutical Care Skills Lab I concurrent registration is required (or allowed) in II, Applied Pharmaceutical Care

PHAR 6742. Practice-based Problem Solving with Evidence-based Methods: Foundations. (1 cr. ; A-F only; Every Spring)
Practice skills necessary to research, prepare, present scholarly paper/seminar. Builds on Biostatistics/Dug Literature Evaluation material from "Becoming a Pharmacist, Foundations of Social/Administrative Pharmacy, Foundations of Pharmaceutical Care." prereq: Becoming a Pharmacist, Foundations of Social and Administrative Pharmacy, Foundations of Pharmaceutical Care

PHAR 6745. Professional Development and Assessment III. (0.5 cr. ; S-N only; Every Spring)
For the second year of the Professional Development and Assessment Sequence, the emphasis is on knowledge comprehension. Class includes work in career and professional development, prereq: Successful completion of Professional Development and Assessment I concurrent registration is required (or allowed) in II

PHAR 6748. Biopharmaceutics. (2.6 cr. ; A-F only; Every Spring)
Biopharmaceutics is the final course in a four-course sequence that comprises the curriculum in pharmaceutics. Biopharmaceutics integrates core knowledge obtained in the previous three courses (Drug Delivery I & II and Pharmacokinetics), and also relies on general knowledge in anatomy, physiology, mathematics, general chemistry, and pharmacology. prereq: Courses and/or content: Calculus, thermodynamics, viscosity, sedimentation, diffusion, chemical kinetics, novice to developing level understanding of dosage forms, developing understanding of pharmacokinetics/ pharmacodynamics, physiology, general chemistry, physics, biochemistry, enzyme kinetics, and metabolic pathways. It is strongly recommended that students review course materials in Drug Delivery I concurrent registration is required (or allowed) in II and Pharmacokinetics as well as anatomy, physiology, calculus, and physics with consideration of the application of the concepts to the delivery of drugs to patients.

PHAR 6750. Pharmaceutical Care Skills Lab IV. (2 cr. ; A-F only; Every Spring)
This course is designed for second-year pharmacy students to continue to build the skills necessary to become a competent, caring pharmaceutical care practitioner. prereq: Students must have successfully completed Pharm Care Skills 1, 2, and 3, and Applied Pharmaceutical Care. Students must be concomitantly registered in all required PD2 courses in order to have the content required to complete integrated activities, e.g., students must be enrolled in Diabetes in order to successfully complete the patient care sequence utilizing diabetes content in this course. Exceptions may be made on a case by case basis.

PHAR 6752. Integrated Endocrinology. (2.1 cr. ; A-F only; Every Spring)
This course will integrate all pertinent endocrinology topics (excluding diabetes) into one course. Specifically, the pathophysiology, medicinal chemistry, pharmacology and the therapeutic application of the requisite knowledge will be covered in an integrated approach via specific modules. All major endocrine pathways will be taught including: hypothalamic/pituitary, steroids, female sex hormones, hormonal contraception, menopause/hormone therapy, bone health, male gonadal hormones, drugs in pregnancy and lactation, sexual dysfunction and thyroid hormone. prereq: Students will need to have successfully completed: Cellular Metabolism/Nutrition, - Cardiovascular Pharmacotherapy - Pharmaceutical Care Skills Labs 1-3. Students should be concurrently enrolled in Kidney, Fluids, and Electrolytes, and Diabetes and Metabolic Syndrome. Students should be able to describe the function of the overall endocrine systems and the multiple roles of hormones in the body.

PHAR 6754. Diabetes and Metabolic Syndrome. (2.1 cr. ; A-F only; Every Spring)
In this course, students will learn the principles of the pathophysiology of diabetes, pharmacology of the antidiabetic agents, evaluate key research on diabetes, interpret and apply clinical guidelines for diabetes, assess socioeconomic aspects of diabetes, and apply this information to patient cases. Special populations with diabetes will also be discussed including pediatric, gestational, and geriatric diabetes. Students will also learn the pathophysiology of metabolic syndrome, pharmacology of obesity treatments, nonpharmacological and pharmacological ways to treat metabolic syndrome, including the implications of bariatric surgery on use of antidiabetic agents, and apply this information to patient cases. prereq: Students will need to have successfully completed: Molecular Metabolism/Nutrition, Cardiovascular Pharmacotherapy concurrent registration is required (or allowed) in Pharmaceutical Care Skills Lab 1-3. Students should be able to describe the physiology of insulin action, incretin hormones, amylin, and the fasting and fed states. Students should be able to describe how insulin is designed and manufactured. Students should be able to describe the following biochemistry topics: carbohydrate metabolism and lipid metabolism, and protein. Students should be able to assess a patient and determine most appropriate pharmacotherapy treatment options for a patient's hypertension and dyslipidemia treatments, including ability to describe, interpret and apply evidence-based guidelines. Students should be able to describe how nutrition impacts energy production, utilization and storage, and obesity. Students need to be able to describe the caloric content of carbohydrates, proteins and lipids and be able to apply that knowledge to reading food labels and evaluating a patient's nutritional status.

PHAR 6756. Kidney, Fluid, and Electrolytes. (2.1 cr. ; A-F only; Every Spring)
About 75% of new cases of chronic kidney disease (CKD) are due to diabetes and hypertension. Patients with CKD often experience congestive heart failure and anemia. In addition, the kidney is the main excratory route for many drugs. Thus, this course offers an opportunity to integrate material learned in previous and concurrent courses. In this course, students will learn key concepts and develop specific skills in the management of common fluid and electrolyte and single acid/base disorders and in prevention and management of chronic kidney disease and associated conditions. prereq: Students must have completed the following courses successfully: - Applied Pharmaceutical Care, - Foundations of Social and Administrative Pharmacy, - Medicinal Chemistry and Pharmacology of Cardiovascular Agents, - Pharmokinetics, - Cardiovascular Pharmacotherapy, - Cellular Metabolism and Nutrition. See the course syllabus for more detailed prerequisites.

PHAR 6758. Pulmonary Pharmacotherapy. (1.1 cr. ; A-F only; Every Spring)
This course will provide students with the requisite pathophysiology and pharmaco/therapeutic knowledge to care for patients with common pulmonary diseases. It will integrate concepts of pediatric and geriatric pulmonary dosing and infectious diseases. prereq: Students must have completed the following courses successfully: - Applied Pharmaceutical Care - Foundations of Social and Administrative Pharmacy - Medicinal Chemistry and Pharmacology of Cardiovascular Agents - Pharmokinetics - Cardiovascular Pharmacotherapy - Cellular Metabolism and Nutrition. See the course syllabus for more detailed prerequisites.

PHAR 6760. Professional Development and Assessment IV. (0.5 cr. ; S-N only; Every Fall)
For the third year of the Professional Development and Assessment sequence, the emphasis will be on deeper exploration into career options, as well as the tools needed for contemporary pharmacy practice. Students will have the opportunity to engage with their peers as well as practicing pharmacists as they...
learn about the expectations of contemporary professional practice. prereq: Phar 6715, 6730, 6745

PHAR 6762. Medicinal Chemistry and Neuropharmacology. (2.8 cr.; A-F only; Every Fall)
Neuropharmacology and Medicinal Chemistry of Neurological Treatments builds upon the foundational concepts learned in Principles of Pharmacology and Principles of Medicinal Chemistry, and applies them to drug classes primarily used for the treatment of central nervous system (CNS) and peripheral nervous system (PNS) dysfunction. prereq: Phar 6722, 6726, and 6732

PHAR 6766. Biotechnology-Derived Drugs. (1 cr.; A-F only; Every Fall)
Biotechnology-derived drugs are where the future is, and pharmacy students need to understand how they are made, how they act and what special considerations are involved. This course will provide the foundational knowledge necessary to dispense current biotechnology-derived drugs and provide the basis for self-education needed to understand the biotechnology-derived drugs of the future. prereq: Phar 6702, 6722, 6726, 6724, 6734, and 6752

PHAR 6768. Infectious Diseases. (3 cr.; A-F only; Every Fall)
Course will focus on the pharmacology, pharmacokinetics, and pharmacodynamics of antibiotics and the pharmacotherapy of infectious diseases. prereq: Phar 6702, 6706, 6718, 6724, 6736, 6738, 6748, 6756, and 6758

PHAR 6770. Pharmaceutical Care Skills Lab V. (2 cr.; A-F only; Every Fall)
This course is designed for third year pharmacy students to continue to build the skills necessary to become a competent, caring pharmaceutical care practitioner. The course consists of two components: a laboratory section and a discussion. prereq: Pharmaceutical Care Skills Labs I, II, III, and IV, and Applied Pharmaceutical Care

PHAR 6772. Topics in Pharmacotherapy. (1.6 cr.; A-F only; Every Fall)
Course provides students with the pharmacologic, pharmacotherapeutic, and pharmaceutics knowledge they need to understand therapies for dermatologic, gastrointestinal, and genitourinary conditions, and arthritis and gout. Prepares future generalist pharmacists to be knowledgeable about common conditions of aforementioned topics and appropriate pharmacotherapy options for treatment. It will focus primarily on pharmacotherapy, but will have an overview of pathophysiology of these conditions. Students will be expected to apply knowledge to design and monitor a patient-centered pharmaceutical care plan and to appropriately educate patients regarding proper use of the various psychiatric and neurologic medications covered in the course. prereq: All required PharmD year two coursework

PHAR 6774. Pharmacotherapy of Neurologic and Psychiatric Disorders. (3.1 cr.; A-F only; Every Fall)
Course prepares future generalist pharmacists to be knowledgeable about common psychiatric and neurologic disorders and about the appropriate use of medications used to treat them. Course primarily focuses on the pharmacotherapies used to treat psychiatric and neurologic disorders. This course will additionally provide an overview of the presentation and pathophysiology of specific psychiatric and neurologic disorders, an overview of the differences between the practices of psychiatry and neurology and a discussion of sligmas associated with mental illness. An overview of non-pharmacologic therapies will be introduced to the extent relevant to the generalist pharmacists. At the conclusion of the course students will be expected to apply knowledge learned in the course in order to design and monitor a pharmacotherapeutic plan for specific patients and to appropriately counsel patients regarding proper use of the psychiatric and neurologic medications covered in the course. prereq: All required PharmD year two coursework

PHAR 6778. Pharmacy Law. (0.7 cr. [max 1 cr.]; A-F only; Every Spring)
The course covers both federal and state laws that impact and regulate the practice of pharmacy including federal regulation of medications, regulation of controlled substances, and the Minnesota Pharmacy Practice Act. The course will be offered entirely online.

PHAR 6780. Pharmacy Outcomes. (2 cr.; A-F only; Every Spring)
Course facilitates integration of knowledge of basic sciences, pharmacotherapy, pharmacy practice management, pharmaceutical care, written communication, literature evaluation, drug information resources, law and ethics, and pharmacoeconomics to manage patients with multiple medical conditions. This course is where students are required to perform and demonstrate knowledge during curricular assessments. prereq: Phar 6700, 6702, 6704, 6706, 6708, 6710, 7310, 6716, 6718, 6720, 6722, 6724, 6726, 7325, 6732, 6734, 6736, 6738, 6740, 6742, 7330, 6748, 6750, 6752, 6754, 6756, 6758, 7340, 7345, 6770, 6774, 6788, 6782

PHAR 6782. Colloquium II: Research Paper & Presentation. (1 cr.; A-F only; Every Spring)
Third year Pharm.D. students practice skills necessary to research, prepare a research paper, and present a scholarly seminar. prereq: Phar 6700, 6704, 6706, 6742

PHAR 6784. Integrated Oncology. (2.8 cr.; A-F only; Every Spring)
This course focuses on the etiology and molecular biology of tumorigenesis, medicinal agents, and pharmacology of anticancer agents, treatment of the most common cancers, supportive care of the patient with cancer, and social and ethical considerations of the treatment of the patient with cancer including end of life directives. prereq: PD3 in good academic standing, students will find it helpful to review the following topic areas: Principles of Biochemistry (Lipids [Structure/Function], Proteins [Folding/Conformation]), Cellular Physiology Molecular Biology, Genetics (Cell Biology [signal transduction, DNA replication, transcription, protein translation, cell cycle, apoptosis]), Immunology, Tumorigenesis, Angiogenesis, Genetics principles, Anatomy/Physiology [GI tract, pulmonary, hormone and feedback regulation]

PHAR 6786. Acute Patient Care Pharmacotherapy. (3.4 cr.; A-F only; Every Spring)
Course prepares students to approach patients with multiple medical problems and the dynamic changes that patients can experience in the acute care settings. Students will then learn about the pharmacotherapy approach related to managing those disease states/conditions. Students will be expected to develop therapeutic plans for patient case scenarios at the onset of a hospital admission as well as additional problem that could present over the course of a hospitalization or result in readmission. Additional scenario problems will be incorporated into the cases as the course progresses and the cases and problems will become more complex. By the end of the course, students will have had an opportunity to address multiple medical problems and make pharmacotherapy decisions and will be evaluated based on those decisions. Knowledge gained in this course will prepare students for the APPE acute care/institutional rotation. prereq: successful completion of all 1st year, 2nd year, and fall 3rd year coursework

PHAR 6800. Rehabilitation Pharmacotherapy. (2 cr.; A-F only; Every Summer)
The goal of this course is to equip physical therapy students with a general understanding of the impact of medications on rehabilitation and how rehabilitation affects medication use. Students will practice applying content through patient cases and writing a patient care plan. This is a completely online course with weekly due dates. Course information is sent to the University of Minnesota email addresses of registered students shortly before and/or on the first day of classes each summer term. For more information, contact phar6800@umn.edu or 612-624-7976.

PHAR 6901. Pharmaceutical Care Experience. (1 cr.; S-N only; Every Spring)
The Pharmaceutical Care Experience builds on Foundations of Pharmaceutical Care and provides an early opportunity to practice pharmaceutical care in a primary care clinic setting. This elective will allow students to assess each patient's unique medication experience and drug-related needs through patient interviews. Students will use this information to develop a patient-centered care plan under the guidance of a practitioner mentor. The pharmaceutical care process will be applied and assessed in all future
PHAR 6906. Introduction to Pharmacy Research. (1 cr.; A-F only; Every Spring) Overview of principles to research in particular topic areas. Forum for scientists involved in research in particular areas to discuss research, environment, careers with students. Prereq: consent of course director

PHAR 6908. Drugs of Abuse. (2 cr.; S-N only; Spring Odd Year) Basic medicinal chemistry of substances of abuse, associated paraphernalia. Prereq: Organic chemistry I and Phar 6702

PHAR 6913. The Science and Spirit of Wellbeing. (1 cr.; A-F only; Every Spring) Care, in general, and healthcare in particular, requires a certain degree of wellbeing on the part of the provider. This elective course introduces students to evidence based wellbeing. The course explores individual wellbeing as well as implications for practice and the health and wellbeing of others. Prereq: instr consent

PHAR 6937. Foundations of Leadership. (2 cr.; A-F only; Every Fall & Spring) Leadership development/its relation to advancing the profession of pharmacy. prereq: PDII or PDIIII Pharmacy student


PHAR 6939. Leading Change Experience I. (2 cr.; S-N only; Every Fall) In collaboration with a faculty advisor, students implement a change that requires adaptive leadership. Work will focus on building a "short term win" and a team that can continue efforts into the future. Students will also gain experience in collecting and managing data to assist the change process (e.g., needs assessment and/or outcomes assessment). In addition, working with their faculty advisor, students will create and implement an individualized plan for their own personal leadership development. Students will also gain experience in supporting the leadership development of others. To support individualized development, a leadership networking partner (pharmacist) is assigned and periodic networking events and/or meetings are held. prereq: PHAR 6937 and 6938

PHAR 6940. Leading Change Experience II. (2 cr.; S-N only; Every Spring) Continues leading change and development work initiated in Leading Change Experience I. During this term, students continue with their networking partners, present their leading change work, facilitate transition of the work to new leaders, conduct a critical appraisal of their leadership development, and support second year students as they initiate their projects. Students will also evolve their roles into shifting from personal development to the development of others. Assisting in a mentoring role in several capacities 1) transitioning new leaders into the leading change experience and 2) providing guidance, ideas, and encouragement to those students interested in change initiatives. prereq: PHAR 6937 and 6938

PHAR 6941. Leadership Best Sellers for Pharmacists. (2 cr.; A-F only; Every Fall & Spring) Part of the leadership track in pharmacy.

PHAR 6961. Women's Health. (2 cr.; A-F or Audit; Every Spring) During this course, students will have the opportunity to actively learn and discuss women's health issues taught in the core curriculum to a greater extent. The core curriculum focuses on the pharmacotherapy around women's health, we will focus on the patient's perspective, pathophysiology, and other quality care considerations specific to women including cultural, religious, psychosocial, and socioeconomic factors effecting health. Health topics will range from social issues to menstrual health, breast cancer to eating disorders, with a specific focus on preparing students for professional practice and the pharmacist's role. prereq courses: Endocrinology pharmacotherapy sequence in the PD2 year; prereq topics: Contraceptive agents, emergency contraception, hormonal contraception.

PHAR 6962. Ethics in Pharmacy Practice. (2 cr.; A-F only; Every Spring) Ethical principles, selected schools of ethical thought. Students discuss/debate ethical dilemmas in pharmacy practice/health care. prereq: Pharm.D. 3rd year student

PHAR 6966. Food Medicine: Contemporary Issues. (1 cr.; Student Option No Audit; Every Fall & Spring) Food contributes to the prevention, and conversely, the development of disease processes. In order to better understand the interrelatedness of food and health, this course offers a critical perspective on how the ubiquity of food; race, class, gender, and indigeneity; colonization and corporatization affect people? s food experiences; and subsequently, individual and population health. Students will examine modern food systems and describe implications for social determinants of health, health promotion, chronic disease management and IP collaborative practice. We will address questions such as: How do food systems impact our health? What makes food a political and environmental issue? Are we what we eat? Why do we categorize things that are not food as food? What is food sovereignty?

PHAR 6970. Immunization Tour. (1 cr.; A-F or Audit; Every Fall) Role of health care practitioners. Population based disease prevention. Planning/delivering influenza vaccination clinics. Collaborative public health intervention. prereq: 6175, Completion of CPR

PHAR 6971. Geriatric Pharmacotherapy. (2 cr.; A-F only; Every Spring) Pharmacokinetic/pharmacodynamic changes and their implications in elders. Effects of drug-drug, drug-disease interactions. Drug adherence barriers to provide optimum pharmacotherapy to elderly persons. prereq: 3rd or 4th year Pharmacy student

PHAR 7001. Early Pharmacy Practice Experience I. (; 1 cr.; A-F only; Every Fall) First in series of four courses. Focuses on patient perspective in managing/using chronic conditions/chronic medication use. Community-based instruction, mentor program. prereq: Criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7002. Early Pharmacy Practice Experience II. (; 1 cr.; A-F only; Every Spring) Patient perspective in managing/living with chronic conditions/chronic medication use. Community-based instruction, mentor program. prereq: 7001 or instr consent, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7003. Early Pharmacy Practice Experience III. (; 0.5 cr.; A-F only; Every Fall) Third in series of four courses. Patient perspective in managing/living with chronic conditions/chronic medication use. Community-based instruction, mentoring. Upcoming patient care opportunities. prereq: 7003 or instr consent, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7004. Early Pharmacy Practice Experience IV. (; 0.5 cr.; A-F only; Every Spring) Patient perspective in managing/living with chronic conditions/chronic medication use. Community-based instruction, mentoring. Upcoming patient care opportunities. prereq: 7003 or instr consent, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7005. Introductory Community-Practice Pharmacy Experience. (2.5 cr.; S-N only; Every Spring) Experience in patient care at community practice setting. Three weeks, 40 hrs/week. prereq: 6111, 6171, 7001, 1st year pharmacy student

PHAR 7006. Introductory Institutional-Pharmacy Practice Experience. (2.5 cr.; S-N only; Every Spring) Experience in patient care in hospital setting. Three-week, 40 hrs/week. prereq: College of Pharmacy student completed 6121, 6122, 6131, 6132, 6173, 6174, 7003 and 7004 with passing grade, registered with Minnesota Board of Pharmacy as intern

PHAR 7010. APPE Continuing Professional Development Portfolio. (; 1.5 cr.; S-N only; Every Spring) Continuing professional development. Systematic maintenance, development, and broadening of knowledge, skills, and attitudes.
PHAR 7128. Acute Patient Care Practice Experience II. (4 cr.; A-F only; Every Fall, Spring & Summer) Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity.

PHAR 7213. Elective Practice Experience III. (4 cr.; A-F only; Every Fall, Spring & Summer) Experience in inpatient or outpatient pharmacy practices where direct patient contact/care occurs for 5 weeks, or experience in non-patient care setting. Sites vary widely from governmental agencies to pharmacy associations to specialized practices for 5 weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test). pharmacy practice and developing professional attitude and behavior in the community pharmacy setting. The course will build upon knowledge gained in the first year didactic curriculum, specifically Foundations of SAPh and Foundations of Pharmaceutical Care. The format of the IPPE course includes: in-person, online and an experiential components. The experiential component is a combination of observation, application of current knowledge, and feedback and assessment between you, the preceptor, and others. prereq: College of Pharmacy students must complete PHAR 6700 (Becoming a Pharmacist), 6706 (Foundations in Pharmaceutical Care), 6716 (Applied Pharmaceutical Care), 6728 (Pharmaceutical Calculations), 6710 (Pharmaceutical Care Skills Lab 1), 6720 (Pharmaceutical Care Skills Lab 2), 6704 (foundations of SAPh), 6730 (first year seminar), 6718 (drug delivery), 6722 (med chem), 6726 (pharmacology) with a passing grade. You must be registered with the Minnesota Board of Pharmacy as an intern prior to the onsite experiential component of this course.

PHAR 7330. Community Teachers I. (0.4 cr.; S-N only; Every Fall) EPHECT is a service learning experience which pairs second year students with a volunteer Community Teacher (CT). Students develop a working/professional relationship with their CT and learn from CT's health and life experiences. Students will work with their CT to choose and complete activities unique to each CT's health profile. CTs benefit by gaining better understanding of their health by discussing and evaluating their health profile with professional students. CTs will also better understand the pharmacist's role in healthcare. prereq: Students must have completed or be currently enrolled in the following courses: Becoming a Pharmacist, Foundations of Pharmaceutical Care, Applied Pharmaceutical Care, Pharmaceutical Skills Lab I and II.

PHAR 7340. Community Teacher Experience II. (0.4 cr.; S-N only; Every Spring) EPHECT is a service learning experience which pairs second year students with a volunteer Community Teacher (CT). Through this course students develop a working/professional relationship with their CT and learn from their CT??s health and life experiences. Students will work with their CT to choose and complete activities unique to each CT??s health profile. prereq: Students must have completed or be currently enrolled in the following courses: Becoming a Pharmacist, Foundations of Pharmaceutical Care, Applied Pharmaceutical Care, Pharmaceutical Skills Lab I, II, and III, EPHECT I, and Foundations of SAPh.

PHAR 7345. Introductory Institutional-Practice Pharmacy Experience. (3 cr.; S-N only; Every Spring) The purpose of the Institutional IPPE is to introduce students to the fundamentals of pharmacy practice in the institutional pharmacy setting. The course will build upon knowledge gained in the first two years of the didactic curriculum. The student will spend 120 hours at the institutional site with their preceptor (who is approved by the MN BOP) and the College. An Additional 36 hours is allocated between assignments and online course materials, prereq: Students must have successfully completed Phar 7325 (Community IPPE), Phar 6730 (Professional Development and Assessment II), Phar 6736 (Cardiovascular Pharmacotherapy), Phar 6738 (Pharmacokinetics), Phar 6740 (Pharmaceutical Care Skills III), Phar 6742 (Colloquium I: Scholarly Presentation Skills). Students must be enrolled concurrently in PD2 Spring semester courses. Students must also be registered interns in the state of Minnesota.

PHAR 7401. Acute Patient Care Practice Experience. (12 cr.; Student Option No Audit; Every Fall, Spring & Summer) Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity.

PHAR 7411. Ambulatory Patient Care Practice Experience I. (5 cr.; Student Option No Audit; Every Fall, Spring & Summer) Experience in an ambulatory setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity.

PHAR 7412. Ambulatory Care 2. (5 cr.; S-N only; Every Fall, Spring & Summer) Experience in an ambulatory setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity.

PHAR 7413. Community Pharmacy Practice Experience. (5 cr.; Student Option No Audit; Every Fall, Spring & Summer) Students assigned to participating community pharmacies. Community practice activities full-time for 5 weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity.

PHAR 7421. Elective Practice Experience I. (5 cr.; Student Option No Audit; Every Fall, Spring & Summer) Experience in inpatient or outpatient pharmacy practices where direct patient contact/care occurs for five weeks, or experience in non-patient care setting. Sites vary from governmental agencies to pharmacy associations to specialized practices for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity.
PHAR 7422. Elective Practice Experience II. (5 cr.; Student Option No Audit; Every Fall, Spring & Summer)
Experience in inpatient or outpatient pharmacy practices where direct patient contact/care occurs for five weeks, or experience in non-patient care setting. Sites vary from governmental agencies to pharmacy associations to specialized practices for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7431. Patient Care Practice Experience Elective I. (5 cr.; Student Option No Audit; Every Fall, Spring & Summer)
Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7432. Patient Care Practice Experience Elective 2. (5 cr.; S-N only; Every Fall, Spring & Summer)
Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7433. Patient Care Practice Experience Elective 3. (5 cr.; Student Option No Audit; Every Fall, Spring & Summer)
Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity

Pharmacy Summer Research (PHRM)

PHRM 4999. Pharmacy Summer Research. (0 cr.; No Grade Associated; Every Summer) Pharmacy Summer Research

Philosophy (PHIL)

PHIL 1001. Introduction to Logic. (MATH; 4 cr.; Student Option; Every Fall, Spring & Summer)
Application of formal techniques for evaluating arguments.

PHIL 1002W. Introduction to Philosophy. (AH, WI; 4 cr.; Student Option; Every Fall & Spring)
Problems, methods, historical/contemporary schools of philosophy.

PHIL 1003W. Introduction to Ethics. (CIV, WI; 4 cr.; Student Option; Every Fall & Spring)
Are values/principles relative to our culture? Is pleasure valuable? Are there any absolute rules? These questions and others are addressed through critical study of moral theories.

PHIL 1004W. Introduction to Political Philosophy. (AH, WI, CIV; 4 cr.; Student Option; Every Fall & Spring)
Central concepts, principal theories of political philosophy.

PHIL 1005. Scientific Reasoning. (4 cr.; Student Option; Every Fall)
How does science work? What is scientific method? How to evaluate scientific information in popular media or specialized publications, especially when it relates to technology used in everyday life? General reasoning skills. prereq: [1st or 2nd yr student or instr consent]

PHIL 1005H. Scientific Reasoning. (4 cr.; Student Option; Every Fall)
How does science work? What is scientific method? How to evaluate scientific information in popular media or specialized publications, especially when it relates to technology used in everyday life? General reasoning skills. prereq: [1st or 2nd yr honors student or instr consent]

PHIL 1006W. Philosophy and Cultural Diversity. (AH, WI, DSJ; 4 cr.; Student Option; Every Fall & Spring)
Central problems/methods of philosophy through culturally diverse texts. Focus is critical/comparative, reflecting range of U.S. philosophical traditions.

PHIL 1007. Introduction to Political Philosophy Practicum. (1 cr.; Student Option; Every Fall & Spring)
Students do at least two hours a week of community service and connect their service activities in writing to issues discussed in 1004. prereq: concurrent registration is required (or allowed) in 1004W

PHIL 1026W. Philosophy and Cultural Diversity. (AH, WI, DSJ; 3 cr.; Student Option; Every Summer)
Central problems/methods of philosophy through culturally diverse texts. Focus is critical/comparative, reflecting range of U.S. philosophical traditions.

PHIL 1910W. Topics: Freshman Seminar. (WI; 3 cr.; A-F or Audit; Every Fall & Spring)
Topics specified in Class Schedule. prereq: freshman

PHIL 3001W. General History of Western Philosophy: Ancient Period. (AH, WI; 4 cr.; Student Option; Every Fall)
Major developments in ancient Greek philosophical thought: pre-Socrates, Socrates, Plato, Aristotle, Hellenistic thinkers.

PHIL 3005W. General History of Western Philosophy: Modern Period. (AH, WI; 4 cr.; Student Option; Every Spring)
Major developments in philosophic thought of the modern period: renaissance beginnings, Descartes through Hume. Some attention to Kant.

PHIL 3100. Value Theory Practicum. (1 cr. [max 3 cr.]; Student Option; Every Fall & Spring)
Combines issues in ethics/political philosophy courses to needs of people in Twin Cities through community service. At least 26 hours of community service for semester is required. prereq: [concurrent registration is required (or allowed) in 3301 or concurrent registration is required (or allowed) in 3302W or concurrent registration is required (or allowed) in 3304 or concurrent registration is required (or allowed) in 3307 or concurrent registration is required (or allowed) in 3308], instr consent

PHIL 3231. Philosophy and Language. (4 cr.; Student Option; Every Fall & Spring)
Philosophical issues concerning the nature and use of human language.

PHIL 3234. Knowledge and Society. (4 cr.; Student Option; Every Fall)
Critical discussion of concepts such as knowledge, objectivity, justification, rationality, evidence, authority, expertise, and trust in relation to the norms and privileges of gender, race, class, and other social categories.

PHIL 3301. Environmental Ethics. (ENV; 4 cr.; Student Option; Spring Odd Year)
Philosophical basis for membership in moral community. Theories applied to specific problems (e.g., vegetarianism, wilderness preservation). Students defend their own reasoned views about moral relations between humans, animals, and nature.

PHIL 3302W. Moral Problems of Contemporary Society. (CIV, WI; 4 cr.; Student Option; Every Fall, Spring & Summer)
How do we determine what is right and wrong? How should we live our lives? What do we owe others? Moral/ethical thought applied to problems and public disputes (e.g., capital punishment, abortion, affirmative action, animal rights, same-sex marriage, environmental protection).

PHIL 3304. Law and Morality. (4 cr.; Student Option; Fall Even, Spring Odd Year)
A study of the relationship among law, morality, and our role as citizens.

PHIL 3305. Medical Ethics. (4 cr.; Student Option; Every Spring)
Moral problems confronting physicians, patients, and others concerned with medical treatment, research, and public health policy. Topics include abortion, living wills, euthanasia, genetic engineering, informed consent, proxy decision-making, and allocation of medical resources.

PHIL 3307. Social Justice and Community Service. (AH, CIV; 4 cr.; Student Option; Fall Odd Year)
Exploration of concepts of justice, charity, equality, freedom, community service in
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

PHIL 3311W. Introduction to Ethical Theory. (WI; 4 cr.; Student Option; Every Fall & Spring) Nature and justification of moral judgments and moral principles; analysis of representative moral views.

PHIL 3322W. Moral Problems of Contemporary Society. (AH, CIV; 3 cr.; Student Option; Every Summer) How do we determine what is right and wrong? How should we live our lives? What do we owe others? Moral/ethical thought applied to problems and public disputes (e.g., capital punishment, abortion, affirmative action, animal rights, same-sex marriage, environmental protection).

PHIL 3502W. Introduction to Aesthetics. (WI; 3 cr. [max 4 cr.]; Student Option; Every Fall) Development of aesthetic theories with applications to specific aesthetic problems.

PHIL 3601W. Scientific Thought. (WI; 4 cr.; Student Option; Every Fall, Spring & Summer) Introduction to philosophical issues concerning the nature of scientific knowledge. Reading of historical and contemporary sources that describe major scientific achievements and controversies. Prereq: One course in philosophy or natural science

PHIL 3602. Science, Technology, and Society. (3 cr.; A-F or Audit; Periodic Fall) Philosophical issues that arise out of interaction between science, technology, society (e.g., religion and science, genetics and society, science and the environment).

PHIL 3607. Philosophy of Psychology. (4 cr.; Student Option; Every Fall & Spring) Major theories of mind including the "invention" of the mind by Descartes, classical empiricism, the impact of Darwinism, Freud's theories, Gestalt psychology, behaviorism, Chomsky's rationalism, contemporary functionalism, the computer model. Prereq: One course in philosophy or psychology

PHIL 3993. Directed Studies. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.

PHIL 4010. Ancient Philosophers. (3 cr. [max 6 cr.]; Student Option; Periodic Spring) Major work of selected ancient philosophers (e.g., Plato's Parmenides, Plato's Sophist, Aristotle's Metaphysics). Works discussed may vary from offering to offering. Prereq: 3005 or 4004 or instr consent

PHIL 4085. Wittgenstein. (3 cr.; Student Option; Periodic Fall & Spring) In "Philosophical Investigations" Wittgenstein challenged some of the most long-standing and entrenched intuitions of philosophers -- basic intuitions about mind, rationality, linguistic understanding, and the very nature of philosophical/conceptual inquiry. Many of these intuitions remain entrenched and Wittgenstein's challenge is as relevant today as it was in 1950. In Phil 4805 we examine the text and the secondary literature, and do so in the light of issues and debates that continue to demand attention.

PHIL 4100. Value Theory Practicum. (1 cr. [max 3 cr.]; Student Option; Every Fall & Spring) Issues studied in ethics/political philosophy courses applied to needs of people in Twin Cities through community service. At least 26 hours of community service for semester is required. Prereq: [concurrence registration is required (or allowed) in 4320 or concurrent registration is required (or allowed) in 4321 or or concurrent registration is required (or allowed) in 4330 or concurrent registration is required (or allowed) in 4414], instr consent

PHIL 4101. Metaphysics. (3 cr.; Student Option; Fall Odd, Spring Even Year) Philosophical theories concerning nature of reality. Prereq: One course in history of philosophy or instr consent

PHIL 4105W. Epistemology. (WI; 3 cr.; A-F or Audit; Periodic Fall & Spring) Theories of nature/sources of knowledge/evidence. Prereq: 1001 or instr consent

PHIL 4231. Philosophy of Language. (3 cr.; Student Option; Periodic Fall & Spring) Theories of reference, linguistic truth, relation of language/thought, translation/synonymy. Prereq: 1001 or 5201 or instr consent

PHIL 4310W. History of Moral Theories. (WI; 3 cr.; Student Option; Periodic Fall) Issues in western moral philosophy from classical age to present. Prereq: 1003 or instr consent

PHIL 4320W. Intensive Study of an Historical Moral Theory. (WI; 3 cr. [max 6 cr.]; Student Option; Periodic Fall) Intensive consideration of an author or theory in the history of moral or political philosophy. Prereq: 1003 or instr consent

PHIL 4321W. Theories of Justice. (WI; 3 cr.; Student Option; Fall Even, Summer Odd Year) Philosophical accounts of concept/principles of justice. Prereq: 1003 or 1004 or instr consent

PHIL 4326. Lives Worth Living: Questions of Self, Vocation, and Community. (AH, CIV; 4 cr. [max 8 cr.]; Student Option; Every Summer) Immersion experience. Students live together as a residential community of learners. Works of philosophy, history, and literature form backdrop for exploring such questions as "How is identity constructed?", "What is vocation?", and "What experiences of community are desirable in a life?" Each student creates a life-hypothesis for a life worth living. Prereq: instr consent

PHIL 4330. Contemporary Moral Theories. (3 cr.; Student Option; Periodic Fall & Spring) Discusses view that evaluative judgments cannot be based on factual considerations alone, relation of this view to objectivity of ethics. Prereq: 1003 or instr consent

PHIL 4350. Catching Lives Worth Living: Participation in the Growth of a Living-Learning Community. (2 cr. [max 4 cr.]; Student Option; Every Summer) Involvement in a democratic living-learning community built by students/instructors. Students participate in community activities and daily instructor meetings. Four seven-day offerings each summer. Prereq: Application, instr consent

PHIL 4414. Political Philosophy. (3 cr.; Student Option; Periodic Fall & Spring) Survey of historical/contemporary works in political philosophy. Prereq: 1004 or instr consent

PHIL 4501. Principles of Aesthetics. (3 cr.; Student Option; Periodic Fall & Spring) Aesthetic problems that arise in studying or practicing an art. Prereq: 3502 or philosophy course or instr consent

PHIL 4510. Philosophy of the Individual Arts. (3 cr.; Student Option; Periodic Fall & Spring) Aesthetic problems that arise in the study or practice of an art. Prereq: 3502 or philosophy course or instr consent

PHIL 4607. Philosophy of the Biological Sciences. (3 cr.; Student Option; Periodic Fall & Spring) Structure/status of evolutionary theory. Nature of molecular biology, genetics. Reductionism in biology. Legitimacy of teleology. Species concept. Prereq: Courses in [philosophy or biology] or instr consent

PHIL 4615. Minds, Bodies, and Machines. (3 cr.; Student Option; Periodic Fall & Spring) Mind-body problem. Philosophical relevance of cybernetics, artificial intelligence, computer simulation. Prereq: one course in philosophy or instr consent

PHIL 4760. Selected Topics in Philosophy. (3 cr.; Student Option; Periodic Fall & Spring) Philosophical problems of contemporary interest. Topics specified in Class Schedule. Prereq: 3 [3xxx-5xxx] cr in philosophy or instr consent

PHIL 4993. Directed Studies. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.

PHIL 4995. Senior Project (Directed Studies). (1 cr.; A-F only; Every Fall, Spring & Summer)
Guided individual study leading to research paper that satisfies senior project requirement. prereq: instr consent, dept consent

PHIL 4995H. Honors Senior Project. (.1 cr. ; A-F only; Every Fall, Spring & Summer) Guided individual study leading to research paper that satisfies senior project requirement. prereq: instr consent, dept consent

PHIL 5010. Ancient Philosophers. (.3 cr. [max 6 cr.]; Student Option; Periodic Spring) Major work of selected ancient philosophers (e.g., Plato's Parmenides, Plato's Sophist, Aristotle's Metaphysics). Works discussed vary. prereq: 3001 or instr consent

PHIL 5085. Wittgenstein. (3 cr.; Student Option; Periodic Fall & Spring) In "Philosophical Investigations" Wittgenstein challenged some of the most long-standing and entrenched intuitions of philosophers -- basic intuitions about mind, rationality, linguistic understanding, and the very nature of philosophical/conceptual inquiry. Many of these intuitions remain entrenched, and Wittgenstein's challenge is as relevant today as it was in 1950. In Phil 4805 we examine the text and the secondary literature, and do so in the light of issues and debates that continue to demand attention.

PHIL 5201. Symbolic Logic I. (.4 cr.; Student Option; Every Fall & Spring) Study of syntax and semantics of sentential and first-order logic. Symbolization of natural-language sentences and arguments. Development of deductive systems for first-order logic. Metatheoretic proofs and methods, including proof by mathematical induction and proof of consistency and completeness. prereq: 1001 or instr consent

PHIL 5202. Symbolic Logic II. (.4 cr.; Student Option; Every Spring) Elements of set theory, including the concepts of enumerability and nonenumerability. Turing machines and recursive functions; the results of Church, Godel, and Tarski and the philosophical significance of those results. prereq: 5201 or instr consent

PHIL 5211. Modal Logic. (.4 cr.; Student Option; Spring Odd Year) Axiomatic and semantic treatment of propositional and predicate modal logics; problems of interpreting modal languages. prereq: 5201 or instr consent

PHIL 5221. Philosophy of Logic. (.3 cr.; Student Option; Periodic Fall) Attempts to answer, "What is logic?" Scope of logic. Disputes about alternative logics. Theories concerning logical truth (e.g., conventionalism: view that logical truths are contingent). prereq: 5202 or instr consent

PHIL 5222. Philosophy of Mathematics. (.3 cr.; Student Option; Periodic Fall & Spring) Major philosophical questions arising in connection with mathematics. What is mathematics about? How do we know the mathematics we do? What is the relation between mathematics and the natural sciences? Selected readings of leading contributors such as Frege, Dedekind, Russell, Hilbert, Brouwer, Godel, Quine. prereq: College level logic or mathematics course or instr consent

PHIL 5326. Lives Worth Living: Questions of Self, Vocation, and Community. (.4 cr.; Student Option; Every Summer) Immersion experience. Students live together as a residential community of learners. Works of philosophy, history, and literature form backdrop for exploring such questions as "How is identity constructed?," "What is vocation?," and "What experiences of community are desirable in a life?" Each student creates a life-hypothesis for a life worth living. prereq: instr consent

PHIL 5350. Catching Lives Worth Living: Participation in the Growth of a Living-Learning Community. (.1-3 cr. [max 6 cr.]; Student Option; Every Summer) Involvement in a democratic living-learning community built by students/instructors. Students participate in community activities and daily instructor meetings. Four seven-day offerings each summer. prereq: Application, instr consent

PHIL 5415. Philosophy of Law. (.3 cr.; Student Option; Periodic Spring) Analytical accounts of law and legal obligation. prereq: 1003 or 1004 or 3302 or social science major or instr consent

PHIL 5510. Philosophy of the Individual Arts. (.3 cr.; Student Option; Periodic Fall & Spring) Aesthetic problems that arise in studying or practicing an art. prereq: 3502

PHIL 5601. History of the Philosophy of Science. (.3 cr.; Student Option; Periodic Fall & Spring) History of logical empiricism, from its European origins in first half of 20th century to its emergence as nearly universal account of science in post-war Anglo-American philosophy. prereq: instr consent

PHIL 5602. Scientific Representation and Explanation. (.3 cr.; Student Option; Periodic Fall) Contemporary issues concerning representation and explanation of scientific facts. prereq: instr consent

PHIL 5603. Scientific Inquiry. (.3 cr.; Student Option; Periodic Spring) Philosophical theories of methods for evaluating scientific hypotheses. Role of experimentation in science. How hypotheses are accepted within scientific community.

PHIL 5605. Space and Time. (.3 cr.; Student Option; Periodic Fall) Philosophical problems concerning nature/structure of space, time, and space-time. prereq: Courses in philosophy or physics or instr consent

PHIL 5606. Philosophy of Quantum Mechanics. (.3 cr.; Student Option;) Problems of interpretation in ordinary (nonrelativistic) quantum mechanics. Two-slit experiment, Schrodinger cat paradox (measurement problem), Einstein-Podolsky-Rosen paradox. Leading approaches to interpretation (Copenhagen, hidden variables, universal wave function) and their connections with philosophical issues.

PHIL 5670. Selected Topics in Philosophy. (.3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Philosophical problems of contemporary interest. Topics specified in Class Schedule. prereq: 3xxx-5xxx course in phil or instr consent

PHIL 5993. Directed Studies. (.1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: instr consent, dept consent, college consent

PHIL 8010. Workshop in History of Philosophy. (.1 cr. [max 4 cr.]; Student Option; Every Fall & Spring) Topics vary by offering. prereq: concurrent registration is required (or allowed) in 4xxx hist of phil course, instr consent

PHIL 8080. Seminar: History of Ancient and Medieval Philosophy. (.3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Topics vary by offering. prereq: instr consent

PHIL 8081. Seminar: History of Philosophy--Ancient Philosophers. (.3 cr.; Student Option;) Major developments in ancient Greek philosphic thought; methods and role of history of philosophy in discipline of philosophy.

PHIL 8085. Seminar: History of Philosophy--Modern Philosophers. (.3 cr.; Student Option; Periodic Fall) Major developments in modern philosophic thought; methods and role of history of philosophy in discipline of philosophy. prereq: instr consent

PHIL 8090. Seminar: History of Modern Philosophy. (.3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Topics vary by offering. prereq: instr consent

PHIL 8100. Workshop in Epistemology and Metaphysics. (.1 cr. [max 4 cr.]; Student Option; Every Fall & Spring) Topics vary by offering. prereq: concurrent registration is required (or allowed) in 4xxx [epistemology or metaphysics] course, instr consent

PHIL 8110. Seminar: Metaphysics. (.3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) Topics vary by offering. prereq: 4101 or instr consent

PHIL 8130. Seminar: Epistemology. (.3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Problems in the theory of knowledge. Topics specified in [Class Schedule]; prereq: 4105 or instr consent

PHIL 8131. Epistemology Survey. (.3 cr.; Student Option; )
Survey, against background of traditional issues, of contemporary developments in theory of knowledge.

**PHIL 8133. Feminist Theories of Knowledge.** (3 cr.; Student Option; )
Interdisciplinary seminar; feminist approaches to knowledge and criticism of paradigms of knowledge operative in the disciplines. Feminists’ use of concepts of subjectivity, objectivity, and intersubjectivity; feminist empiricism, standpoint theory, and contextualism, and postmodern and postcolonial theorizing.

**PHIL 8180. Seminar: Philosophy of Language.** (3 cr. [max 6 cr.]; Student Option; Every Fall)
Topics vary by offering, prereq. 4231 or instr consent

**PHIL 8182. Formal Semantics of Natural Language.** (3 cr.; A-F or Audit; Periodic Fall)
Truth-conditional model-theoretic semantics applied to treatment of opacity, intensionality, quantification, and related phenomena in natural language, prereq. Phil 5201 or instr consent

**PHIL 8200. Workshop in Logic and Philosophy of Mathematics.** (1 cr. [max 4 cr.]; Student Option; Periodic Fall & Spring)
Topics vary by offering, prereq. [concurrent registration is required (or allowed) in 4xxx logic or 4xxx phil of math], instr consent

**PHIL 8210. Seminar: Logical Theory.** (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Topics vary by offering, prereq. [5201, 5205] or instr consent

**PHIL 8220. Seminar: Philosophy of Mathematics.** (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Topics such as significance of limitative metatheorems (Goedel, et al), assessment of major foundational programs (set theoretic, modern Hilbertian, constructivist), modal/structuralist alternatives to standard platonism, prereq. 5202 or [4xxx or 5xxx] math course or instr consent

**PHIL 8300. Workshop in Moral and Political Philosophy.** (1 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Topics vary by offering, prereq. [concurrent registration is required (or allowed) in 4xxx moral phil or 4xxx pol phil] instr consent

**PHIL 8310. Seminar: Moral Philosophy.** (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Concepts/problems relating to ethical discourse, prereq. 4310 or 4320 or 4330 or instr consent

**PHIL 8320. Seminar on Medical Ethics.** (3 cr. [max 6 cr.]; Student Option; Periodic Spring)
Patients’ rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, maternal/fetal conflicts, allocation of medical resources.

**PHIL 8333. FTE: Master’s.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq. Master’s student, adviser and DGS consent

**PHIL 8410. Seminar: Philosophy of Law.** (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Primarily for law students and advanced political science, history, or sociology majors or minors. prereq. 5415 or instr consent

**PHIL 8420. Seminar: Political Philosophy.** (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Topics vary by offering, prereq. 4321 or 4414 or instr consent

**PHIL 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq. Doctoral student, prereq. and DGS consent

**PHIL 8500. Workshop in Aesthetics.** (1 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Topics vary by offering, prereq. concurrent registration is required (or allowed) in 4xxx aesthetics course, instr consent

**PHIL 8510. Seminar: Aesthetics Studies.** (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Topics vary by offering.

**PHIL 8550. Seminar: Philosophy of Religion.** (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Topics vary by offering, prereq. 4521 or instr consent

**PHIL 8600. Workshop in the Philosophy of Science.** (1 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Topics vary by offering, prereq. concurrent registration is required (or allowed) in 4xxx philosophy course, instr consent

**PHIL 8656. Seminar: Philosophy of Medicine and the Biomedical Sciences.** (3 cr.; Student Option; Every Fall & Spring)
Aims and goals of medicine; concepts of health, illness, and disease; nature of reasoning in clinical medicine; theoretical evolution in medicine; and role of values in practice of medicine and healthcare.

**PHIL 8660. Seminar: History of Modern Physical Sciences.** (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Topics specified in [Class Schedule]. prereq. instr consent

**PHIL 8670. Seminar: Feminist Philosophy.** (3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Topics vary by offering, prereq. 4622 or 5622 or WoSt 4122 or WoSt 5122 or instr consent

**PHIL 8777. Thesis Credits: Master’s.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall & Spring)
(No description) prereq. Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**PHIL 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq. Max 18 cr per semester or summer; 24 cr required

**PHIL 8993. Directed Study.** (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
tbd prereq. instr consent

**PHIL 8994. Directed Research.** (1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
tbd prereq. instr consent

**Physical Education (PE)**

**PE 1004. Diving: Springboard.** (1 cr.; Student Option No Audit; Periodic Fall & Spring)
Fundamentals of diving. Proper mechanics/techniques to ensure safety. Technical/numerical aspects. Lecture, participatory testing. prereq. 1007 or equiv or instr consent

**PE 1007. Beginning Swimming.** (1 cr.; Student Option No Audit; Every Fall & Spring)
Introduction to basic aquatic safety, fundamentals of swimming and hydrodynamics. Principles of hydrodynamics and stroke
mechanics; five basic strokes; basic rescue techniques with use of pool equipment; hydrotherapy for disabilities and other conditions, opportunities for competitive activities, lifetime enjoyment of aquatics.


**PE 1014. Conditioning.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamentals of personal fitness. Principles of fitness; health and motor skill components of fitness; principles of training/conditioning programs; nutrition; weight control; common fitness injuries; motivation and consistency in fitness programs; stress management.

**PE 1015. Weight Training.** (1 cr.; Student Option No Audit; Every Fall & Spring) Introduction to weight training. Basic aspects of weight training including exercise selection and technique, charting workouts, program design, nutritional considerations, and safety.

**PE 1016. Posture and Individual Exercise.** (1 cr.; Student Option No Audit; Every Fall & Spring) Good posture techniques, individual exercises, fitness concepts, and mental techniques. Specific overall sound body and mind techniques to include flexibility exercises, cardiovascular fitness, resistance training, nutrition management, weight control, stress management, and self-thought.

**PE 1029. Handball.** (1 cr.; Student Option No Audit; Every Fall & Spring) Hand and eye coordination, footwork in practice and game conditions, and skills and strategies of service and rally for the court sport handball (four-wall version). Novice to intermediate levels of play accommodated.

**PE 1031. Sabre Fencing.** (1 cr.; Student Option No Audit; Every Fall) Basic sabre techniques, movement, an overview of fencing as a recreational sport and an Olympic sport, and the history of fencing.

**PE 1032. Badminton.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Fundamentals including etiquette, terminology, game rules for singles and doubles, footwork, shot selection, and strategy.

**PE 1033. Foil Fencing.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fending fundamentals, including basic foil techniques, movement, a general overview of fencing as a recreational sport and an Olympic sport, and the history of fencing.

**PE 1034. Judo.** (1 cr.; Student Option No Audit; Every Fall & Spring) Basic skills for throwing, falling, grappling (matwork), choking, arm and neck techniques; contest judo from Jiu-Jitsu; fundamental rules and scoring of contests. Videotapes used for technique instruction and contest appreciation.

**PE 1035. Karate.** (1 cr.; Student Option No Audit; Every Fall & Spring) Introduction to Traditional Japanese Shotokan Karate. Students learn to punch, block, strike, & kick with a focus on proper form, posture, & body mechanics. Students also learn a Kata (choreographed form), techniques with partners, & practical self-defense. Non-contact - no pads, hitting, or throwing.

**PE 1036. Racquetball.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamentals of racquetball, including equipment: safety and etiquette; terminology; game rules of singles, doubles, and cutthroat; grips; basic strategies; serves and shots.

**PE 1037. Squash Racquets.** (1 cr.; Student Option No Audit; Every Fall & Spring) Entry-level technique, basic equipment, international dimension courts, and fitness.

**PE 1038. Beginning Tennis.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamental strokes, including forehands, backhands, volleys, lobs, overheads, and serves; introduction to play; terminology, rules, and etiquette.

**PE 1043. Beginning Horse Riding.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Techniques, styles, and communication of English riding. Students will learn riding techniques at a walk, trot, canter, and jumping.

**PE 1044. Self-Defense.** (1 cr.; Student Option No Audit; Every Fall & Spring) Physical, psychological, and de-escalation skills for acting in crisis situations. Distance, body language, and tone of voice are addressed. Physical skills include striking, kicking, shifting, blocking, releasing techniques, floor defenses, and applications to armed attackers and multiple attackers.

**PE 1045. Rock Climbing.** (1 cr.; Student Option No Audit; Every Fall & Spring) Safety, knots, equipment, techniques, and anchor systems used in climbing. Course includes all necessary equipment. Held at St. Paul Gym climbing wall. Prereq: Good general health, no [neck or back] problems

**PE 1046. Tae Kwon Do.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamentals of Tae Kwon Do. Principles of martial arts, body mechanics of Tae Kwon Do, practical self-defense.

**PE 1048. Bowling.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamentals, including stance, approach and delivery, scoring, bowling terminology, and etiquette.

**PE 1053. Ice Skating.** (1 cr.; Student Option No Audit; Every Fall & Spring) Basic turns, basic stops, balance techniques, and various other skills from both the forward and backward positions. Equipment, safety issues, ice skating terminology.

**PE 1055. Golf.** (1 cr.; Student Option No Audit; Every Fall, Spring & Summer) Proper grip, stance, ball address, swing, club selection, psychological management, rules, and etiquette. Basic instruction in analyzing, assisting with, and coaching golf.

**PE 1056. Nordic (Cross-Country) Skiing.** (1 cr.; Student Option No Audit; Periodic Spring) Introduction to the fundamental techniques of classical and freestyle cross country skiing. Students will be taught through lecture and direct experience on cross country skiing trails.

**PE 1057. Beginning Skating.** (1 cr.; Student Option No Audit; Every Spring) Alpine skating. How to stop, turn, and use lifts. Safety, etiquette, and purchase of equipment. Class held at Highland Hills ski area in Bloomington.

**PE 1058. Snowboarding.** (1 cr.; Student Option No Audit; Every Spring) Alpine snowboarding. Uses American Teaching System. Classes are split into nine skill levels, beginning through advanced. Held at Hyland Ski and Snowboard School in Bloomington. Prereq: Good general health, injury free

**PE 1059. Track and Field.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Introduction to track and field: conditioning and training, events and skills, strategies, track and field knowledge, equipment, facilities, and technology.

**PE 1065. Beginning Tumbling and Gymnastics.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Rolls, handstands, cartwheels, extensions, hand springs, tucks (flips). Spotting techniques. Skills on bars, vault, and beam.

**PE 1066. Basketball.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamental skills and rules of basketball, with emphasis on basic court movement and different offensive and defensive strategies.

**PE 1071. Beginning Cricket.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Fundamentals of Cricket. Laws of Cricket, bowling/batting techniques, competitive/ recreational Cricket opportunities.

**PE 1072. Soccer.** (1 cr.; Student Option No Audit; Every Fall & Spring) Fundamentals of soccer including sporting behavior both on and off the field, game rules, soccer terminology, participation and competition drills, fundamental soccer skills, practical instruction in strategy.

**PE 1074. Beginning Volleyball.** (1 cr.; Student Option No Audit; Every Fall & Spring) Basic skills, team play, rules, officiating, and strategy.

**PE 1076. Flag Football.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Introduction to flag football, techniques, field positions, rules/regulations. Students will participate in vigorous exercise activities including running, throwing, kicking, and catching.

**PE 1077. Lacrosse.** (1 cr.; Student Option No Audit; Periodic Fall & Spring)
Introduction to lacrosse, techniques, field positions, rules, regulations. Students participate in vigorous exercise activities including running, throwing, catching, and stick handling.

**PE 1078. Ultimate Disc.** (1 cr.; Student Option No Audit; Every Fall & Spring) Introduction to ultimate disc, techniques, field positions, rules, regulations. Students participate in vigorous exercise activities including running, throwing, catching, and catching.

**PE 1079. Rugby (Non-contact).** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Appropriate techniques and field positions. Safe play using appropriate rules and laws. Vigorous exercise activities, including running, passing, catching, evasion, and other physical activity associated with rugby.

**PE 1082. Broomball.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Techniques. Safe play using appropriate rules and regulations. Vigorous exercise activities, including running, stick handling, shooting, passing, and other physical activity associated with broomball.

**PE 1107. Intermediate Swimming.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Intermediate swimming skills. Fundamentals of swimming and hydrodynamics. prereq: 1007 or equiv; proficient ability to swim 100 meters or intrans consent.

**PE 1129. Intermediate Handball.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Hand/eye coordination, footwork. Skills in practice/game conditions. Strategies of service/rally. prereq: 1029 or intrans consent.

**PE 1133. Intermediate Foil Fencing.** (1 cr.; Student Option No Audit; Periodic Spring) Intermediate/advanced technical/tactical actions in foil, rudimentary epee skills, intermediate/advanced footwork. Rules, officiating, bout tactics. prereq: 1033 or equiv or intrans consent.

**PE 1135. Intermediate Karate.** (1 cr.; Student Option No Audit; Every Spring) Techniques of Japanese traditional Shotokan Karate taught through Ippon Kumite (one step sparring), San Kumite (three step sparring), and Heian Shodan Kata/Nidan Kata (forms). Testing for orange belt is optional. prereq: 1035 or equiv or intrans consent.

**PE 1137. Intermediate Squash.** (1 cr.; Student Option No Audit; Periodic Fall & Spring) Stroke mechanics, shot placement, changing pace. Court movement/positioning. Fitness requirements, joint/muscle stresses. Weight training for squash. On-court etiquette. prereq: 1037 or intrans consent.

**PE 1146. Intermediate Tae Kwan Do.** (1 cr.; Student Option No Audit; Periodic Fall) Continuation of 1046. Focuses on Olympic-style intermediate skills/techniques. Self-defense techniques for men/women. prereq: 1046, previous Tae Kwon Do experience (World Tae Kwon Do Federation sanctioned), basic white Tae Kwon Do uniform.

**PE 1154. Figure Skating.** (1 cr.; Student Option No Audit; Periodic Spring) Terminology, rules. Basic moves, jumps, spins. On/off-ice assignments. prereq: 1053 or equiv or intrans consent.

**PE 1174. Intermediate Volleyball.** (1 cr.; Student Option No Audit; Periodic Spring) Volleyball systems of play. Incorporating offensive/defensive formations. Team play, transition, coaching, officiating. prereq: [1074 or equiv], intrans consent.

**PE 1205. Scuba and Skin Diving.** (1 cr.; Student Option No Audit; Every Fall & Spring) Diving equipment, physics, physiology, decompression, emergencies, recreational dive planning, ocean, currents and aquatic life, snorkeling/SCUBA equipment usage, buoyancy control, entry, emergencies. prereq: Ability to swim 400 yds comfortably or intrans consent.

**PE 1262. Marathon Training.** (3 cr.; Student Option No Audit; Every Spring) Physical challenge achieved through physiological/psychological adaptation. Goal setting that fosters adaptation in many facets of life. Marathon history. prereq: No pre-existing medical condition that would prevent finishing a marathon, intrans consent.

**PE 1720. Special Activities in Physical Education.** (1-3 cr.; max 9 cr.; Student Option No Audit; Periodic Fall, Spring & Summer) Activities or related opportunities not normally available through regular course offerings.

**PMED 6000. Special Topics for the Transitional DPT: Musculoskeletal.** (2-8 cr.; A-F or Audit; Periodic Fall) Selected pathology, assessment, and rehabilitation of musculoskeletal conditions. Industrial consultation, post fracture management, imaging, surgical options for selected conditions of spine/extremities. Required musculoskeletal case study from clinical internships. prereq: Enrolled in Physical Therapy MS program.

**PMED 7410. Rehabilitation Medicine for Adults - VA Medical Center.** (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This course introduces the student to the field of physical medicine and rehabilitation. Each student is responsible for inpatient work-ups and management and has the opportunity to participate in a variety of specialty clinics. EMG, traumatic brain injury, spinal cord injury, amputee, back pain, musculoskeletal pain, cardiac rehab, and inpatient consults. Advanced students with specific interests are encouraged to participate in designing the rotation to fit their needs.

**PMED 7412. Rehabilitation Medicine for Adults - VA Medical Center.** (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Provide patient management in rehabilitation. Evaluate/plan management for disease processes. Plan for continuing care of chronically ill. Work on interdisciplinary team of health care professionals. Write Rx for PT/OT. Develop an accurate exam of joints/muscles. Concept of holistic medicine. Students evaluated by faculty based on participation, clinical skills, attitude. Case presentation, participation in weekly conferences.

**PMED 7416. Pediatric Rehab Medicine at Gillette Children's Hospital.** (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Gillette Children's Hospital pediatric rehabilitation programs emphasize traumatic brain injury, cerebral palsy, ventilatory dependent children, spinal cord injury, and other developmental disabilities. Medical student responsibilities include inpatient work-ups and management as well as the opportunity to participate in a variety of specialty clinics.

**PMED 7417. Research in Physical Medicine and Rehabilitation.** (6 cr.; H-N or Audit; Every Fall) This elective provides an opportunity for the interested student to pursue a clinical or laboratory problem related to physical medicine and rehabilitation.

**PMED 7418. Rehab Medicine at Hennepin County Medical Center.** (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) HCMC rehab programs emphasize traumatic brain injury, major multiple trauma, acute and chronic burns, and EMG. Medical student responsibilities include inpatient work-ups and management as well as the opportunity to participate in a variety of specialty clinics.

**PMED 7910. Physical Medicine and Rehabilitation Medical Residency.** (6 cr.; [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer) Physical medicine and rehabilitation medical residency.
PMED 7930. Physical Medicine and Rehabilitation Medical Fellowship. (1-6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Physical medicine and rehabilitation medical fellowship.

PMED 8200. Physical Medicine and Rehabilitation Service. (1-15 cr.; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8207. Basic and Applied Psychiatry. (1 cr.; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8210. Research in Physical Medicine. (1-15 cr.; Student Option; Every Fall & Spring)
N/A prereq: enrolled in PMed residency training program

PMED 8212. Electromyography. (1-15 cr.; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8214. Readings in Electromyography. (1-3 cr.; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8220. Seminar: Physical Medicine and Rehabilitation. (1-15 cr.; Student Option; Every Fall, Spring & Summer)
TBD prereq: enrolled in PMed residency training program

Physical Therapy (PT)

PT 1002. Orientation to Physical Therapy. (1 cr.; S-N or Audit; Every Fall & Spring)
Introduction to the profession of physical therapy through lectures, discussions, patient presentations, clinic visit, videotapes, and exposure to treatment equipment.

PT 6002. Ethics in Public Health: Research and Policy. (1 cr. [max 2 cr.]; S-N or Audit; Every Fall)
Moral/ethical analysis. Issues in physical therapy research/practice. Ethical decisions in a practice and in professional training. WebCT lectures, in-class discussions/instruction, exams.

PT 6058. Anatomy for Physical Therapy. (6 cr.; A-F or Audit; Every Fall)
Study of gross human anatomy, and surface anatomy, for practice of physical therapy. Cadaver dissection of extremities, head, neck, back, abdomen, thoracic, and pelvic regions. Correlation to clinical conditions. Lecture, laboratory.

PT 6213. Clerkship I. (2 cr.; A-F or Audit; Every Fall)
Practical aspects of clinical education and professional behavior. Psychological, sociological, and cultural needs of diverse patient populations. Students complete a three hrs/week clinical affiliation at University Good Samaritan Center. Patient/therapist observations, concurrent didactic coursework. Facilitation of group exercise, restorative ambulation, range of motion programs, and resident assessment instrument. prereq: Registered PT student

PT 6214. Clerkship II. (2 cr.; A-F or Audit; Every Spring)
Documentation of physical therapy exams, progress, discharge services. Regulatory agencies responsible for outcomes/ accreditation, third party reimbursement, coding, peer review. Complete three hrs/ wk clinical affiliation at Good Samaritan Center under supervision of clinical faculty. Observations/documentation, group exercise, restorative ambulation, range of motion programs, resident assessment instrument. prereq: Registered first year PT student

PT 6215. Clerkship III. (1 cr. [max 2 cr.]; A-F or Audit; Every Fall)
Roles of physical therapist, in orthopedic outpatient setting, as educator and promoter of health/wellness. Students are assigned to a community outpatient orthopedic clinic. Patient evaluations/treatment. Instructing patients, therapists, student physical therapists, and community members to promote physical therapy, health, and wellness. Students assess, prepare, and provide educational experiences. prereq: Registered PT student

PT 6216. Clerkship IV. (1 cr.; A-F or Audit; Periodic Spring)
Role of physical therapist, in acute care or rehabilitation setting, as clinical educator of physical therapy students. Students are assigned to a local hospital or rehabilitation facility. Patient evaluations, treatment, discharge planning. Students prepare for full time clinical experiences and for their role as potential clinical instructors. prereq: Registered 2nd yr PT student

PT 6217. Clerkship V. (2 cr.; A-F or Audit; Periodic Fall)
Second-year clerkship. Role of physical therapist in acute care or rehabilitation setting. Students observe/participate in patient evaluation, treatment/discharge planning, client consultation, and community service evaluation/planning. Sites are selected in conjunction with CUPES. Students keep journal, shared with site supervisor and academic coordinator. prereq: Registered 2nd-year PT student

PT 6219. Foundations in Interprofessional Communication and Collaboration. (1 cr.; S-N only; Every Fall)
Interprofessional approach to health care. Online discussion topics. Directed group activities. Personal and professional image, teamwork self and peer assessment, health professions, professional identity and integrity, relationships between professions, professional identity and integrity, relations between professions and those they serve. Introduction to basic education theory, instructional design for laboratory practitioners.

PT 6220. Clinic Volunteer. (1 cr. [max 6 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Functioning evening clinics supervised by licensed physical therapists. Students perform physical therapy exams, provide treatment various conditions, under supervision of a licensed physical therapy clinical instructor.

PT 6221. Therapeutic Procedures. (4 cr.; A-F or Audit; Every Spring & Summer)
Theory/application of physical agents and therapeutic techniques. Therapeutic massage, ultraviolet radiation, thermotherapy, hydrotherapy, positive pressure devices, transcutaneous electrical nerve stimulation, neuromuscular electrical stimulation, biofeedback, iontophores, high volt pulsed current. prereq: Registered PT student

PT 6231. Clinical Biomechanics. (5 cr.; A-F or Audit; Periodic Fall)

PT 6250. Acute Care in Physical Therapy. (2 cr.; A-F only; Every Summer)
General care of acute and critically ill patient. Disease/disorders common to acute care environment. Integration of evaluation, treatment, and client management skills. prereq: Registered physical therapy student

PT 6251. Integument. (2 cr.; A-F or Audit; Every Summer)
Response of integument to injury, disease, and aging. Emphasizes wound management, burn care, amputee care, and rehabilitation of persons with acute/chronic integument disorders. Integrating elements of physiology, pathophysiology, and therapeutic procedures to evaluate, treat, and manage clients. prereq: Registered PT student

PT 6252. Pathophysiology. (3 cr.; A-F only; Every Summer)
General and organ system pathology. Complicating pathological factors that affect patients. Implications of pathology on patient's clinical presentation. prereq: Enrolled PT student

PT 6280. Clinical Assessment. (4 cr.; A-F or Audit; Periodic Fall)
Clinical assessment techniques of goniometry, manual muscle testing, range of motion, gait analysis, physical/sensory examination, and antropometrics. Basic intervention approaches, including stretching techniques and resistive exercise. Weekly integration assignments with first clinical clerkship. Lecture, discussion, lab. prereq: Registered PT student

PT 6281. Scientific Foundations I: Theory of Therapeutic Exercise. (3 cr.; A-F or Audit; Every Fall)
Principles of skeletal muscle physiology as basis for therapeutic exercise. Exercise
physiology and related microanatomy of musculoskeletal system as they relate to rehabilitation problems. Tissue response to treatment for loss of mobility. Endurance/ strength training. prereq; Registered PT student

PT 6282. Scientific Foundations II: Neuromotor Control. (3 cr.; max 45 cr.; A-F or Audit; Every Spring) Principles of neurophysiology, neurology, motor control, and motor learning as basis for therapeutic intervention in motor dysfunction. Practical application of kinesiologic electromyography and nerve conduction. prereq; Registered PT student

PT 6283. Musculoskeletal I. (7 cr.; A-F or Audit; Every Fall & Spring) First of two-course sequence. Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span. Chart review, history taking, strength testing, functional testing, gait and posture examination, special orthopedic tests. Therapeutic exercises, orthopedic ambulation, joint mobilization, splinting, patient education. prereq; enrolled PT student

PT 6284. Musculoskeletal Rehabilitation II. (4 cr.; A-F or Audit; Periodic Fall) Second of two-course sequence. Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span. Practice evaluations, clinic visits, case examples. Integrates diagnostic procedures, medical/surgical management, and tissue response to injury/intervention for selected orthopedic conditions. Screening for recognition of non-musculoskeletal causes of complaints. prereq; Regis PT student

PT 6287. Neurorehabilitation. (8 cr.; A-F or Audit; Every Spring) Assessment/rehabilitation of patients with neurological conditions (e.g., cerebral vascular disease traumatic brain injury, multiple sclerosis, Parkinson's disease, amyotrophic lateral sclerosis). Using treatment procedures, orthotics, and equipment to improve function and prevent, stabilize, or decrease impairments. prereq; Regis PT student

PT 6288. Pediatric Rehabilitation. (8 cr.; A-F or Audit; Every Summer) Pediatric assessment/rehabilitation for neurological, orthopedic, cardiac, prematurity, transplant, and behavioral conditions. Preparation for adult assessment/treatment with neurological, general medical, and vascular disease. Students use etiologic knowledge to assess patients in clinic and establish treatment plans/goals. prereq; Registered PT student

PT 6290. Administration. (4 cr.; A-F or Audit; Periodic Fall) Learning experiences, special assignments related to physical therapy administration, management, supervision, consultation, private practice, and health care issues. Foundations for regulatory compliance and fiscal responsibility. Interpersonal skills for delivery of direct care service. prereq; Regis PT student

PT 6293. Essentials of Rehabilitation Research. (4 cr.; A-F or Audit; Every Fall) Predictive research, statistical concepts, scientific literature. Tools to design experiments and analyze data. Risk analysis, multivariate regression analysis. Designs of reliability studies, traditional group designs. Students give preliminary presentation of analysis. prereq; Registered 2nd yr PT student

PT 6295. Clinical Internship I. (10 cr.; max 30 cr.; S-N or Audit; Every Fall, Spring & Summer) Communication skills, team participation, and evaluation/treatment. Predicting outcomes. Managing patient diagnoses/problems. Selected specialty area of physical therapy practice. Prereq Registered 2nd yr PT student

PT 6296. Clinical Internship II. (10 cr.; S-N only; Every Fall, Spring & Summer) Second of four courses. Students must demonstrate proficiency in communication, team participation, evaluation and treatment, predicting outcomes, and managing patient diagnoses and problems. Selected specialty area of physical therapy practice.

PT 6297. Clinical Internship III. (10 cr.; S-N only; Every Fall, Spring & Summer) Third of four courses. Students must demonstrate proficiency in communication, team participation, evaluation and treatment, predicting outcomes, and managing patient diagnoses and problems. Selected specialty area of physical therapy practice. prereq; Registered PT student

PT 6298. Clinical Internship IV. (10 cr.; S-N only; Every Fall, Spring & Summer) Fourth of four courses. Students must demonstrate proficiency in communication, team participation, evaluation and treatment, predicting outcomes, and managing patient diagnoses and problems. Selected specialty area of physical therapy practice.

PT 6310. Physiology for Physical Rehabilitation. (5 cr.; max 10 cr.; A-F only; Every Spring) This course is designed to convey foundational information regarding human basic physiology and more advanced integrative physiology to provide the physical therapist a broad range of knowledge on how the human body works at rest, exercise, and as we age.

PT 6340. Human Growth and Development. (3 cr.; A-F or Audit; Every Fall) Developmental process throughout life span. Physical, motor, social, and personality development. Theories of development. Factors that influence a child's development. prereq; Registered PT student

PT 6400. Health Activism. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) Joint Medical School-School of Public Health course. Series of skill-building workshops. Hands-on community project completed by small group of public health and medical students in cooperation with a community organization and a faculty mentor. Projects focus on issues of health disparities, environmental justice, and access to care. prereq; Enrolled DPT student

PT 6813. Cardiopulmonary Physical Therapy. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Theory and techniques of cardiopulmonary evaluation and treatment. Principles of exercise response and adaptations to training. prereq; enrolled PT student

PT 7000. Neurological Theory and Neuroscience in Physical Therapy. (1-6 cr.; A-F only; Fall Odd, Spring Even Year) Recent/current updates in neurological theory/intervention supported by neuroanatomical science. Students explore evidence supporting clinical decision making process. One-six selected weekends. Prereq Admitted to Transitional Doctor of Physical Therapy Program.

PT 7001. Topics in Musculoskeletal PT. (1-6 cr.; A-F only; Every Fall & Spring) Evidence base for evaluation/treatment techniques. Manual/exercise treatment skills. Common radiologic assessments for musculoskeletal client. Special requirements of select client populations such as athletes, industrial workers, musicians/dancers. Topics in women's health. Pathologic processes in common musculoskeletal conditions. One-six weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7002. Topics in Cardiopulmonary Physical Therapy. (2 cr.; A-F only; Fall Even Year) Principles of cardiac/pulmonary systems as applied to physical therapy. Principles of normal/abnormal responses to exercise, pathophysiology, and training. Theory/techniques of cardiopulmonary assessment, evaluation, rehabilitation, and clinical decision making of patients with cardiopulmonary disorders. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7003. Topics in Integumentary Physical Therapy. (2 cr.; A-F only; Spring Odd Year) Response of integument to injury, disease, and aging. Advances in wound management, rehabilitation of persons with acute/chronic integument disorders. Physiology, pathophysiology, and therapeutic procedures to evaluate, treat, and manage clients with disorders of integument. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7004. Topics in Biomechanics and Pathokinesiology in Physical Therapy. (3 cr.; A-F only; Fall Odd Year) Principles of human biomechanics applied to physical therapy. Biomechanics/pathokinesiology of selected joint complexes. Three selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7005. Topics in Pediatric Physical Therapy. (1 cr.; A-F only; Spring Odd Year)

Prereq Admitted in transitional doctor of physical therapy program.

PT 7006. Anatomy for Physical Therapy. (2 cr.; A-F only; Fall Odd Year)
Dissection of bones, muscles, nerves, vessels, connective tissue, and selected internal organs. Joint structures of limbs, spinal column, head, and pelvis. Histology, embryology. Correlation of content to clinical practice. Lecture, human cadaver lab. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7007. Administration and Legal Issues. (2 cr.; A-F only; Fall Even Year)
Ethical/legal analysis applied to clinical/administrative decision making in contemporary practice environments. Theoretical frameworks, concepts, and case analysis to address challenges in practice. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7008. Scientific Basis of PT Practice. (2 cr.; A-F only; Spring Even Year)
Role of science/research in physical therapy as it relates to critical thinking and decision making in practice. Statistical terminology, research design, hypothesis testing. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7009. Capstone Experience. (3 cr.; A-F only; Every Summer)
How case studies are conducted/written. Importance of case studies to a profession. Basics of case report, literature review. Measurement theory, writing techniques. Student projects are evaluated by instructor or core or adjunct faculty. prereq: Must be a DPT student

PT 7010. Topics in Geriatric Rehabilitation I. (2 cr.; S-N only; Every Fall)
Demographics of aging population, psychosocial issues with aging, clinical research in the area of geriatrics. How to write patient case report. Lecture, discussion, literature review. prereq: Licensed physical therapist enrolled in geriatric clinical residency

PT 7011. Topics in Geriatric Rehabilitation II. (2 cr.; S-N only; Every Spring)
Providing physical therapy to geriatric clients. Pphysiology, pathophysiology, and therapeutic procedures to evaluate, treat, and manage clients. How clinical issues vary in geriatric population vs. younger patients. Lecture, discussion, literature review. prereq: Licensed physical therapist enrolled in geriatric clinical residency

PT 7012. Topics in Geriatric Rehabilitation III. (2 cr.; S-N only; Every Summer)
Management/reimbursement issues in geriatric health care system. Body systems/pathological processes common in geriatric client. How physical therapy is reimbursed through Medicare system. Lecture, discussion, literature review. prereq: Licensed physical therapist enrolled in geriatric clinical residency

PT 8131. Research Seminar I. (1 cr.; S-N or Audit; Every Fall)
Scientific thinking in physical therapy. Preparation to execute research project or literature review. Analysis of current literature. Basic features of research design. Elements of evaluating treatment efficacy. Students interact with their research adviser and with research faculty in various specialties. prereq: Grad PT major

PT 8132. Research Seminar II. (1 cr.; A-F or Audit; Every Fall & Spring)
Scientific thinking in physical therapy. Preparation for research project or literature review. Current literature. Features of research design. Evaluating treatment efficacy. Students interact with research adviser and faculty in various specialties. prereq: 8131, grad PT major

PT 8193. Research Problems in Physical Therapy. (1-7 cr.; A-F or Audit; Every Fall, Spring & Summer)
Process of developing/completing a scholarly research project or literature review related to rehabilitation science. Type of research experience is determined by adviser. prereq: Grad PT major

PT 8333. FTE: Master’s. (1-18 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master’s student, adviser and DGS consent

PT 8777. Thesis Credits: Master’s. (1-18 cr.; No Grade Associated; Every Fall & Spring)
(Max 50 cr.) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

Fundamental principles of physics in context of everyday world. Use of conservation principles and quantitative/qualitative problem solving techniques to understand natural phenomena. Lecture, recitation, lab. prereq: 1101W or 1107

PHYS 1107. Introductory Physics Online I. (4 cr.; Student Option; Every Fall & Spring)
Principles of physics in context of everyday world. Use of kinematics/dynamics principles together with quantitative/qualitative problem solving techniques to understand natural phenomena. prereq: High school algebra, plane geometry, trigonometry

PHYS 1108. Introductory Physics Online II. (4 cr.; Student Option; Every Fall & Spring)
Fundamental principles of physics in context of everyday world. Use of conservation principles and quantitative/qualitative problem solving techniques to understand natural phenomena. Lecture content, recitation, lab. prereq: 1101W or 1107; primarily for students interested in technical areas

PHYS 1181. Introductory College Physics I. (3 cr.; S-N only; Every Fall & Spring)
Intended only to be used to recognize proficiency in material of PHYS 1101W. prereq: Proficiency in the material of PHYS 1101W

PHYS 1182. Introductory College Physics II. (3 cr.; S-N only; Every Spring)
Intended only to be used to recognize proficiency in material of PHYS 1102W. prereq: Proficiency in the material of PHYS 1102W

PHYS 1201W. Introductory Physics for Biology and Pre-medicine I. (PHYS,WI; 5 cr.; Student Option; Every Fall, Spring & Summer)
Fundamental principles of physics. Description of motion, forces, conservation principles, structure of matter. Applications to mechanical systems, including fluids, waves, heat. Lab. prereq: [High school or college calculus], trigonometry, algebra

PHYS 1202W. Introductory Physics for Biology and Pre-medicine II. (PHYS,WI; 5 cr.; Student Option; Every Fall, Spring & Summer)
Fundamental principles of physics. Motion, forces, conservation principles, structure of matter. Applications to electromagnetic phenomena, including optics, atomic structure. Lab. prereq: 1201W

PHYS 1281. Introductory Physics for Biology and Pre-medicine I. (4 cr.; S-N only; Every Fall, Spring & Summer)
Intended only to be used to recognize proficiency in material of PHYS 1201W. prereq: Proficiency in the material of PHYS1201W

PHYS 1282. Introductory Physics for Biology and Pre-medicine II. (4 cr.; S-N only; Every Fall & Spring)
Intended only to be used to recognize proficiency in material of PHYS 1202W. prereq: Proficiency in the material of PHYS1202W

PHYS 1301W. Introductory Physics for Science and Engineering I. (PHYS,WI; 4 cr.; Student Option; Every Fall, Spring & Summer)
Use of fundamental principles to solve quantitative problems. Motion, forces, conservation principles, structure of matter. Applications to mechanical systems. Prereq: concurrent registration is required (or allowed) in Math 1271 or concurrent registration is required (or allowed) in Math 1371 or concurrent registration is required (or allowed) in Math 1571.

**PHYS 1302W. Introductory Physics for Science and Engineering I.** (PHYS, WI; 4 cr.; Student Option; Every Fall & Spring) Use of fundamental principles to solve quantitative problems. Motion, forces, conservation principles, fields, structure of matter. Applications to electromagnetic phenomena. Prereq: 1301W, concurrent registration is required (or allowed) in Math 1272 or Math 1372 or Math 1572.

**PHYS 1381. Introductory Physics for Science and Engineering I.** (3 cr.; S-N only; Every Fall, Spring & Summer) Intended only to be used to recognize proficiency in material of PHYS 1301W. Prereq: Proficiency in the material of PHYS 1301W.

**PHYS 1382. Introductory Physics for Science and Engineering II.** (3 cr.; S-N only; Every Fall, Spring & Summer) Intended only to be used to recognize proficiency in material of PHYS 1302W. Prereq: Proficiency in the material of PHYS 1302W.

**PHYS 1401V. Honors Physics I.** (PHYS, WI; 4 cr.; A-F only; Every Fall) Comprehensive, calculus-level general physics. Emphasizes use of fundamental principles to solve quantitative problems. Description of motion, forces, conservation principles. Structure of matter, with applications to mechanical systems.

**PHYS 1402V. Honors Physics II.** (PHYS, WI; 4 cr.; A-F only; Every Spring) Fundamental principles to solve quantitative problems. Description of motion, forces, conservation principles, fields. Structure of matter, with applications to electro-magnetic phenomena. Prereq: 1401V, honors student or permission of University Honors Program.

**PHYS 1501V. Honors Introduction to Mechanics.** (PHYS, WI; 4 cr.; A-F only; Every Fall) Principles of mechanics for those with full year of calculus/equivalent of one year of high-school physics. Introduction to kinematics, forces, momentum/energy, conservation laws, angular momentum, rigid body motion, gravity, simple harmonic motion, waves. Prereq: One year of high school physics, one year of college-level calculus (or a grade of 5 on the BC-level AP calculus exam), Honors, permission of UHP.

**PHYS 1502V. Honors Introduction to Electricity and Magnetism.** (PHYS, WI; 4 cr.; A-F only; Every Spring) Principles of electricity/magnetism for those with full year of calculus/equivalent of one year of high-school physics. Introduction to electrostatics, magnetostatics, electromodynamics, electric/magnetic properties of materials, circuits, Maxwell's equations, electromagnetic waves. Prereq: 1501V, honors.

**PHYS 1904. Freshman Seminar.** (GP; 1-3 cr.; max 6 cr.; Student Option; Periodic Fall & Spring) Topics vary. See Class Schedule. Prereq: Freshman.

**PHYS 1905. Freshman Seminar.** (1-3 cr.; max 6 cr.; Student Option; Every Fall & Spring) Topics vary. See Class Schedule.

**PHYS 1910W. Freshman Seminar: Writing Intensive.** (WI; 1-3 cr.; Student Option; Every Fall) Topics vary. See class schedule.

**PHYS 2201. Introductory Thermodynamics and Statistical Physics.** (3 cr.; Student Option; Every Fall) Thermodynamics and its underlying statistical nature. Prereq: 1302W or 1402V or 1502V. (concurrent registration is required (or allowed) in MATH 1272 or MATH 1372 or MATH 1572H)

**PHYS 2303. Physics III: Physics of Matter.** (4 cr.; Student Option; Every Spring) Thermodynamics, mechanical/electromagnetic waves, optics, quantum theory. Applications of quantum nature of solids. Prereq: 1302, [MATH 1272 or MATH 1372 or MATH 1572H], [MatSci or EE] student.

**PHYS 2311. Modern Physics.** (4 cr.; Student Option; Every Fall, Spring & Summer) Broad overview of physical concepts developed in twentieth century. Special relativity, wave-particle duality, Schrodinger equation, Bohr atom, hydrogen atom in wave mechanics, many-electron atoms, x-rays, nuclear structure, radioactivity, nuclear reactions, statistical physics. Prereq: [1302 or 1402], Chem 1022, Math 2243.

**PHYS 2503. Physics III: Intro to Waves, Optics, and Special Relativity.** (4 cr.; Student Option; Every Fall, Spring & Summer) Third semester of introductory physics. Mechanical/electromagnetic waves, optics, special relativity. Prereq: 1302W, [MATH 1272 or MATH 1372 or MATH 1572H]

**PHYS 2503H. Honors Physics III.** (4 cr.; A-F only; Every Fall) The third semester of a calculus-based introductory physics sequence. Topics include: relativistic kinematics and dynamics, mechanical and electromagnetic waves, light, interference, diffraction, wave-particle duality and topics in modern physics. Course emphasizes the use of fundamental problems to solve quantitative problems. Intended primarily for those who have completed 1401V/1402V, although those students with outstanding performance in 1301W/1302W may be granted permission to enroll. Prereq: 1402V or 1502V, honors student or permission of University Honors Program or instr consent.

**PHYS 2601. Quantum Physics.** (4 cr.; Student Option; Every Spring) Introduction to quantum mechanics. Applications to atomic, molecular, condensed-matter, nuclear, elementary-particle, and statistical physics. Associated lab is 2605. Prereq: [2503H or 2503], (concurrent registration is required (or allowed) in Math 2243 or Math 2373 or Math 2574H)

**PHYS 2605. Quantum Physics Laboratory.** (3 cr.; Student Option; Every Fall & Spring) Laboratory experiments in atomic, solid state, and nuclear physics offered in conjunction with 2601. Prereq: concurrent registration is required (or allowed) in 2601.

**PHYS 3022. Introduction to Cosmology.** (3 cr.; Student Option; Fall Every Year) Large-scale structure and history of universe. Dark matter, cosmic microwave background. Newtonian/relativistic world models. Physics of early universe. Cosmological tests. Prereq: 2601.

**PHYS 3071W. Laboratory-Based Physics for Teachers.** (PHYS, WI; 4 cr.; Student Option; Every Fall & Spring) Laboratory-based introductory physics. Topics selected to apply to elementary school curriculum: earth's motion, properties of matter, heat and temperature, kinematics, and electric current. Prereq: College algebra; no credit for CSE students or students who have completed PHYS 1201/1202, PHYS 1301/1301, PHYS 1401/1402, or PHYS 1501/1502.

**PHYS 3993. Directed Studies.** (1-5 cr.; max 10 cr.; Student Option; Every Fall, Spring & Summer) Directed study in Physics in areas arranged by the student and a faculty member. Prereq: instr consent, dept consent.

**PHYS 3994. Directed Research.** (1-5 cr.; max 10 cr.; Student Option; Every Fall, Spring & Summer) Independent, directed study in physics in areas arranged by the student and a faculty member. Prereq: instr consent, dept consent.

**PHYS 4001. Analytical Mechanics.** (4 cr.; Student Option; Every Fall) Analytic Newtonian mechanics. Mathematics beyond prerequisites developed as required. Prereq: [2303 or 2601 or Chem 3501 or Chem 3502], two sems soph math.

**PHYS 4002. Electricity and Magnetism.** (4 cr.; Student Option; Every Spring) Classical theory of electromagnetic fields using vector algebra and vector calculus. Prereq: [2303 or 2601 or Chem 3501 or Chem 3502], two sems soph math.

**PHYS 4041. Computational Methods in the Physical Sciences.** (4 cr.; Student Option; Periodic Fall & Spring) Introduction to using computer programs to solve problems in physical sciences. Selected numerical methods, mapping problems onto computational algorithms. Arranged lab. Prereq: Upper div or grad student or instr consent.

**PHYS 4051. Methods of Experimental Physics I.** (5 cr.; Student Option; Every Fall) Contemporary experimental techniques. Introduction to modern analog and digital
PHYS 4052W. Methods of Experimental Physics II. (WI; 5 cr.; Student Option; Every Spring)
Second semester of laboratory sequence. Contemporary experimental techniques illustrated by experiments with data analysis. Students design and execute an experimental project. Lectures on specialized topics of professional concern. prereq: 4051

PHYS 4101. Quantum Mechanics. (; 4 cr.; Student Option; Every Fall)
Mathematical techniques of quantum mechanics. Schrödinger Equation and simple applications. General structure of wave mechanics. Operator methods, perturbation theory, radiation from atoms. prereq: [2303 or 2601 or Chem 3502], two sems soph math

PHYS 4121W. History of 20th-Century Physics. (WI; 3 cr.; Student Option; Every Fall & Spring)
Experimental and theoretical discoveries in 20th-century physics (birth of modern physics, special theory of relativity, old and new quantum theories, nuclear physics to WWII) within the context of concurrent educational, institutional, and political developments in Europe and the United States. prereq: general physics or instr consent

PHYS 4201. Statistical and Thermal Physics. (; 3 cr.; Student Option; Every Fall & Spring)
Principles of thermodynamics and statistical mechanics. Selected applications such as kinetic theory, transport theory, and phase transitions. prereq: 2601

PHYS 4211. Introduction to Solid-State Physics. (; 3 cr.; Student Option; Every Spring)
A modern presentation of the properties of solids. Topics include vibrational and electronic properties of solids; diffraction of waves in solids and electron band structure. Other possible topics include optical properties, magnetic phenomena, and superconductivity. prereq: 4101, 4201

PHYS 4303. Electrodynamics and Waves. (3 cr.; Student Option; Every Fall & Spring)
Analytical mechanics. Electricity/magnetism, including mechanical/electromagnetic wave phenomena. Physical/geometrical optics. prereq: 4001, 4002

PHYS 4501. Experimental Project. (; 1-5 cr.; Student Option; Every Fall, Spring & Summer)
Research project in physics area of contemporary interest. Project must be approved by faculty coordinator before registration. prereq: 4052, instr consent

PHYS 4511. Introduction to Nuclear and Particle Physics. (; 3 cr.; Student Option; Every Spring)
Fundamental particles and Standard Model. Symmetries/quarks, models of nuclei, interactions between particles/nuclei, tests of conservation laws, fission/fusion. prereq: 4101

PHYS 4611. Introduction to Space Physics. (; 3 cr.; Student Option; Fall Even Year)

PHYS 4621. Introduction to Plasma Physics. (; 3 cr.; Student Option; Fall Odd Year)
Basic properties of collisionless, magnetized plasmas, single particle motion, plasmas as fluids, magnetohydrodynamics, waves in plasmas. equilibrium, instabilities, kinetic theory/shocks. prereq: [4001, 4002] or equiv or instr consent

PHYS 4911. Introduction to Biopolymer Physics. (; 3 cr.; Student Option; Every Spring)
Introduction to biological and soft condensed matter physics. Emphasizes physical ideas necessary to understand behavior of macromolecules and other biological materials. prereq: [2303, 2403H, 2503] or Chem 3501 or instr consent

PHYS 4950H. Senior Thesis. (; 1-3 cr.; [max 6 cr.]; S-N or Audit; Every Fall & Spring)
Independent project with adviser. prereq: instr consent

PHYS 4960H. Honors Seminar. (; 1 cr.; [max 2 cr.]; Student Option No Audit; Every Fall & Spring)
Designed to prepare students for senior honors thesis projects and provide guidance in choice of future careers. prereq: Upper div honors, instr consent

PHYS 4993. Directed Studies. (; 1-5 cr.; [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Directed study in Physics in areas arranged by student and faculty member. prereq: instr consent

PHYS 4994. Directed Research. (; 1-5 cr.; [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Independent, directed study in Physics in areas arranged by student and faculty member. prereq: instr consent

PHYS 5001. Quantum Mechanics I. (; 4 cr.; Student Option; Every Fall)
Schrödinger equation: bound state and scattering problems in one dimension. Spherically symmetric problems in three dimensions, angular momentum, and the hydrogen atom. Approximation methods for stationary states. Time-dependent perturbation theory. Operators and state vectors: general formalism of quantum theory. prereq: 4101 or equiv or instr consent

PHYS 5002. Quantum Mechanics II. (; 4 cr.; Student Option; Every Spring)
Symmetry in quantum mechanics, space-time symmetries and the rotation group, Clebsch-Gordan coefficients and the Wigner-Eckart theorem. Scattering theory. Method of second quantization with elementary applications. Relativistic wave equations including Dirac equation. prereq: 5001 or equiv

PHYS 5011. Classical Physics I. (; 4 cr.; Student Option; Every Fall)
Classical mechanics: Lagrangian/Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity, prereq: 4001, 4002 or instr consent

PHYS 5012. Classical Physics II. (; 4 cr.; Student Option; Every Spring)
Classical electromagnetism: electrostatics, magnetostatics, Maxwell's equations, electromagnetic waves, radiation, interaction of charged particles with matter, prereq: 5011 or instr consent

PHYS 5022. Relativity, Cosmology, and the Universe. (; 4 cr.; Student Option; Periodic Fall)
Large-scale structure and history of universe. Introduction to Newtonian and relativistic world models. Physics of early universe. Cosmological tests. Formation of galaxies. prereq: 2601 or instr consent

PHYS 5041. Mathematical Methods for Physics. (; 4 cr.; Student Option; Every Fall)
Survey of mathematical techniques needed in analysis of physical problems. Emphasizes analytical methods. prereq: 2601 or grad student

PHYS 5042. Analytical and Numerical Methods of Physics II. (; 4 cr.; Student Option; Periodic Fall)
Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems. prereq: 5041 or instr consent

PHYS 5071. Physics for High School Teachers: Experimental Foundations and Historical Perspectives. (; 3 cr.; Student Option; Periodic Fall)
In-depth examination of a conceptual theme in physics, its experimental foundations and historical perspectives. Kinematics and dynamics from Aristotle through Einstein; nature of charge and light; energy and thermodynamics; electricity, magnetism, and quantized fields; structure of matter. prereq: Gen physics, instr consent; no cr for physics grad or grad physics minor

PHYS 5072. Best Practices in College Physics Teaching. (; 1-3 cr.; [max 5 cr.]; Student Option; Every Fall & Spring)
Pedagogies for introductory physics classes. Topics from educational research/practice as applied to classroom.

PHYS 5081. Introduction to Biopolymer Physics. (; 3 cr.; Student Option; Periodic Fall)
Introduction to biological and soft condensed matter physics. Emphasizes physical ideas necessary to understand behavior of macromolecules and other biological
materials. prereq: working knowledge of thermodynamics, statistical mechanics)

**PHYS 5201. Thermal and Statistical Physics.** (3 cr.; A-F or Audit; Every Fall)

**PHYS 5401. Physiological Physics.** (4 cr.; Student Option; Fall Even Year)
Musculoskeletal system, circulatory system/membrane transport, biological control systems, propagation/action potential in nervous system, biomagnetism, electromagnetism at cellular level, prereq: One semester of introductory calculus-based physics, such as PHYS1301W. Students not sure if they meet prerequisites should consult instructor.

**PHYS 5402. Radiological Physics.** (4 cr.; Student Option; Spring Even Year)
Signal analysis, medical imaging, medical x-rays, tomography, radiation therapy, nuclear medicine, MRI, similar topics. prereq: Two semesters of introductory calculus-based physics, such as PHYS1302W. Students not sure if they meet prerequisites should consult instructor.

**PHYS 5621. Introduction to Plasma Physics.** (3 cr.; Student Option; Periodic Fall)
Basic properties of collisionless, magnetized plasmas, single particle motion, plasmas as fluids, magnetohydrodynamics, waves in plasmas, equilibrium, instabilities, kinetic theory/shocks. prereq: CSE grad student, working knowledge of waves/electromagnetism

**PHYS 5701. Solid-State Physics for Engineers and Scientists.** (4 cr.; Student Option; Periodic Fall & Spring)
Crystal structure and bonding; diffraction; phonons; thermal and dielectric properties of insulators; free electron model; band structure; semiconductors. prereq: Grad or advanced undergrad in physics or engineering or the sciences

**PHYS 5950. Directed Studies.** (1-5 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)
Independent, directed study in physics in areas arranged by the student and a faculty member. prereq: instr consent, dept consent

**PHYS 5993. Directed Research.** (1-5 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)
Problems, experimental or theoretical, of special interest to students. Written reports. prereq: Jr, dept consent

**PHYS 5970. Physics Journal Club.** (1 cr.; Student Option; Every Fall & Spring)
Colloquium of School of Physics and Astronomy. prereq: [5980, 8011] or instr consent; may be taken once to satisfy Plan B requirements. Project topic arranged between student and adviser and DGS consent

**PHYS 5980. Plan B Project.** (1 cr.; Student Option; Every Fall, Spring & Summer)
Project topic arranged between student and instructor. Written report required. prereq: instr consent; may be taken once to satisfy Plan B master's project requirement; no cr toward PhD

**PHYS 8011. Quantum Field Theory I.** (3 cr.; Student Option; Every Spring)
Second quantization of relativistic wave equations: canonical quantization of the free scalar and Dirac fields. Fields in interaction: interaction picture. Quantum electrodynamics: quantization of the electromagnetic field, propagators and Feynman rules, tree-level processes. Higher-order processes and renormalization. prereq: 5002 or instr consent

**PHYS 8012. Quantum Field Theory II.** (3 cr.; Student Option; Every Fall)
Aspects of general theory of quantized fields, including space-time and discrete transformation properties, the CPT theorem, and the spin-statistics connection. Introduction to functional and path-integral methods. Renormalization group and asymptotic freedom. Semi-classical methods and instantons in gauge theories. prereq: 8011 or instr consent

**PHYS 8013. Special Topics in Quantum Field Theory.** (3 cr.; Student Option; Spring Even Year)
Full lecture course. prereq: Grad student or previous experience in quantum field theory. prereq: 8001 or instr consent

**PHYS 8014. Seminar: Cosmology and High Energy Astrophysics.** (1 cr. [max 6 cr.]; S-N or Audit; Every Fall & Spring)
Current topics in cosmology and high energy astrophysics. prereq: instr consent

**PHYS 8301. Symmetry and Its Application to Physical Problems.** (3 cr.; Student Option; Periodic Fall)
Fundamental invariance principles obeyed by laws of physics. Group theory as tool for using symmetry and invariance to help understand behavior of physical systems. Applications made to atomic, molecular, nuclear, condensed-matter, and elementary particle physics. prereq: 5002 or instr consent

**PHYS 8302. Introduction to Quantum Field Theory.** (1 cr.; Student Option; Spring Odd Year)
Quantum mechanical aspects of charged particles, fields, topological quantum field theories, applications, lattice simulations of quantum field theories, topological quantum field theories, quantum field theory methods applied to condensed matter physics, and string theory. prereq: 8012 or instr consent

**PHYS 8303. FTE: Master's.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

**PHYS 8333. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

**PHYS 8500. Plan B Project.** (4 cr.; Student Option; Every Fall, Spring & Summer)
Project topic arranged between student and instructor. Written report required. prereq: instr consent; may be taken once to satisfy Plan B master's project requirement; no cr toward PhD

**PHYS 8501. General Relativity and Cosmology I.** (3 cr.; Student Option; Periodic Fall & Spring)
Tensor analysis and differential geometry. Special relativity leading to formulation of principles of general relativity and Einstein's equations. Tests of general relativity and thorough discussion of various black hole
PHYS 8711. Solid-State Physics I. (3 cr.; Student Option; Every Fall) Fundamental properties of solids. Electronic structure and transport in metals and semiconductors. Properties of disordered materials. prereq: 4211, 5002 or instr consent

PHYS 8712. Solid-State Physics II. (3 cr.; Student Option; Every Spring) Fundamental properties of solids. Electronic structure and transport in metals and semiconductors. Properties of disordered materials. prereq: 8711 or instr consent

PHYS 8750. Advanced Topics in Condensed Matter Physics. (3 cr.; max 9 cr.; Student Option; Periodic Fall & Spring) Sample research topics: magnetism, superconductivity, low temperature physics, superfluid helium. prereq: 8712 or instr consent

PHYS 8777. Thesis Credits: Master's. (1-18 cr. max 50 cr.; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHYS 8800. Seminar: Nuclear Physics. (1 cr. max 6 cr.; S-N or Audit; Every Fall & Spring) Current research topics.


PHYS 8802. Nuclear Physics II. (3 cr.; Student Option; Periodic Fall) Properties of nuclei based on hadronic and quark-gluon degrees of freedom. Relativistic field theory at finite temperatures and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nucleus-nucleus collisions, astrophysics and cosmology. prereq: 8801 or instr consent

PHYS 8850. Advanced Topics in Nuclear Physics. (3 cr.; max 9 cr.; Student Option; Fall Odd Year) Research topics. prereq: 8802 or instr consent

PHYS 8888. Thesis Credit: Doctoral. (1-24 cr. max 100 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

PHYS 8900. Seminar: Elementary Particle Physics. (1 cr. max 6 cr.; S-N or Audit; Every Fall & Spring) Elementary particle physics, high energy physics, particle astrophysics and cosmology.

PHYS 8901. Elementary Particle Physics I. (3 cr.; Student Option; Every Fall) Types of fundamental interactions. Exact and approximate symmetries and conservation laws. Gauge quanta: gluons, photons, W and Z bosons, gravitons. Fundamental fermions: leptons and quarks. Isotopic and flavor SU(3) symmetries of strong interaction. Heavy hadrons. Amplitudes and probabilities. Quantum chromodynamics. prereq: 8001 or instr consent


PHYS 8950. Advanced Topics in Elementary Particle Physics. (3 cr.; max 9 cr.; Student Option; Periodic Fall) Research topics. prereq: 8902 or instr consent

PHYS 8994. Research in Physics. (1-12 cr. max 24 cr.; Student Option; Every Fall, Spring & Summer) Research under faculty direction. prereq: instr consent

PHYSiology (PHSL)

PHSL 3050. Physiology From Cells to Systems. (3 cr.; A-F only; Every Summer) Basic physiology of human cells and organ systems, including nerve, muscle, cardiovascular, respiratory, renal, digestive, endocrine, metabolic and reproductive systems. Critical thinking about physiological concepts through active learning exercises involving analysis and manipulation of ideas. Apply concepts in basic research or clinical settings. prereq: BIOL 1009 or equiv [including eukaryotic cellular biology], [CHEM 1021, CHEM 1022] or 1 yr of college-level chemistry

PHSL 3051. Human Physiology. (4 cr.; Student Option; Every Fall & Spring) How major organ systems function (nerve, muscle, circulation, respiration, endocrine, renal, gastrointestinal, temperature regulation and energy metabolism). Three one-hour lectures, two-hour lab. prereq: [BIOL 1009 or 1 yr college bio]. 1 yr college chem

PHSL 3061. Principles of Physiology. (4 cr.; Student Option; Every Fall) Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, gastrointestinal, renal, endocrine, muscle, peripheral and central nervous systems), cellular transport processes,
PHSL 3062W. Research Paper for Physiology Majors. (WI; 1 cr.; A-F or Audit; Every Fall & Summer) Students write a research paper on a topic of interest, mentored by a faculty member. Prereq: concurrent registration is required (or allowed) in 3061, physiology major, 1 yr [college chem, physics], math through integral calculus.

PHSL 3095. Problems in Physiology. (1-5 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Individualized study in physiology. Students address a selected problem in physiology through library or lab research, supervised by physiology faculty. Prereq: concurrent registration is required (or allowed) in college physiology, instr consent.

PHSL 3701. Physiology Laboratory. (2 cr.; A-F or Audit; Every Fall) Experiments in physiology. Emphasizes quantitative aspects, including analysis of organ systems. Prereq: Physiology major.

PHSL 4021. Advanced Physiology and Bioengineering: Bionic Human. (3 cr.; A-F only; Every Spring) "Six million dollar man" theme used to present physiology of different organ systems. Human organs versus advanced synthetic devices. Artificial heart, kidney, lung. Eye versus digital camera. Artificial intelligence of pattern recognition. Web-based course. prereq: 3061 or 3063 or 5061 or instr consent.

PHSL 4031. Physiological Discussions: Contemporary Topics. (2 cr.; A-F only; Every Spring) Students read, critically evaluate, present, and discuss research in cellular and organ system physiology. Journal club setting led by faculty members. prereq: 3061 or 3063 or 5061 or instr consent.

PHSL 4095H. Honors Problems in Physiology. (2-4 cr.; A-F or Audit; Every Fall, Spring & Summer) Students pursue a selected topic in physiology through library or lab research supervised by physiology faculty. Prereq 83061, physiology honors candidate, approval of director of undergrad studies in physiology.

PHSL 4242. Professional Skills Development for Biomedical Scientists. (2 cr.; A-F only; Spring Even Year) Students will gain valuable experience in professional development for bio-medical science, applicable to academic, clinical, biotech, pharma, medical and other career paths. This course features essential professional skills development, including critical evaluation of the scientific literature, oral short presentations, development of research project specific aims, and development of individual WOW statements (aka the Bill Gates elevator pitch). Students will gain knowledge of grant mechanisms and on strategies and mechanics to writing a winning grant. Students will evaluate funded research projects, develop and write their own grant, (possibly based on their previous PHSL 3062W paper or other experiences) and perform peer review critiques of their submitted grants. There are no conventional tests in this class. Prereq: PHSL 3062W is recommended.

PHSL 4700. Cell Physiology. (3 cr.; A-F or Audit; Every Fall) Critical cell functions. Regulation of pH, volume, intracellular electrolyte composition, calcium signaling, membrane potential dynamics, motility, aspects of intercellular communication. prereq: [3051 or 3061 or BIOL 3211], [CHEM 1022 or equiv], [MATH 1272 or equiv]

PHSL 4900. Advanced Physiology Teaching Laboratory. (1-6 cr. [max 12 cr.]; A-F only; Every Fall & Spring) Teaching in undergrad physiology labs. Instructional sessions, hands-on teaching experiences. prereq: [3051 or [3061, 3071]]. instr consent

PHSL 5061. Principles of Physiology for Biomedical Engineering. (4 cr.; Student Option; Every Fall) Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, renal, gastrointestinal, endocrine, muscle, central and peripheral nervous systems), cellular transport processes, and scaling in biology. Prereq: Biomedical engineering grad, one yr college chem and physics and math through integral calculus.

PHSL 5094. Research in Physiology. (1-5 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Independent lab research project in physiology, supervised by physiology faculty. Prereq: instr consent.

PHSL 5095. Problems in Physiology. (1-5 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty. Prereq: instr consent.

PHSL 5096. Integrative Biology and Physiology Research Advances. (1 cr. [max 4 cr.]; S-N only; Every Fall & Spring) Attend/participate in IBP Fall/Spring seminar series. Seminars given by faculty, invited speakers, students. Exposure to key topics. How to present seminars, prereq: instr consent.

PHSL 5101. Human Physiology. (5 cr.; Student Option; Every Spring) Survey of human physiology: Cardiovascular, muscle, respiratory, gastrointestinal, nutrition, renal physiology. Integrative, systems approach. Emphasizes normal function. prereq: Grad student

PHSL 5115. Clinical Physiology I. (3 cr.; A-F or Audit; Every Fall) Cellular mechanisms, disease states and clinical applications of excitable tissues: cellular transport, neurophysiology, skeletal muscle physiology, cardiovascular physiology. Prereq: instr consent.

PHSL 5116. Clinical Physiology II. (3 cr.; A-F or Audit; Every Spring) Cellular mechanisms, disease states and clinical applications of metabolic systems: respiratory physiology, renal physiology, acid base physiology, metabolism, gastrointestinal physiology, endocrine physiology, physiology of pregnancy and labor. Prereq: instr consent.

PHSL 5197. Stress Physiology. (1 cr.; A-F only; Every Spring) Journal club format. Meets weekly to examine foundations of stress, historical progress, development of stress, modern stress physiology. Focus on stress-induced pathology with attention to cardiovascular, metabolic, neuroendocrine disorders. Prereq: instr consent, grad student standing or physiology undergraduate major are recommended. Undergraduates are strongly encouraged to have taken 3061 or equivalent.

PHSL 5201. Computational Neuroscience I: Membranes and Channels. (3 cr.; Student Option; Every Fall) Neural excitation (ion channels, excitation models, effects of neural morphology) using UNIX workstations to simulate empirical results. Includes the Hodgkin-Huxley model, nonlinear dynamic systems analysis, voltage and ligand gated ion channels, ion transport theories, and impulse initiation and propagation. prereq: calculus through differential equations.

PHSL 5350. Humans in Extreme Environments. (2 cr.; Student Option; Every Spring) Physiological systems, human factors, psychological reactions. Countermeasures to enhance performance and prevent negative health consequences. Readings, required paper, final exam. prereq: [3061 or equiv]. instr consent.

PHSL 5444. Muscle. (3 cr.; Student Option; Every Spring) Muscle membranes: structures, mechanisms, and physiological roles of channels/pumps. Muscle contraction: force generation by actin/myosin. prereq: 3061 or 3071 or 5061 or BioC 3021 or BioC 4331 or instr consent.

PHSL 5510. Advanced Cardiac Physiology and Anatomy. (2-3 cr.; Student Option; Every Spring) Fundamental concepts, advanced topics related to clinical/biomedical cardiac physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course. prereq: instr consent.

PHSL 5511. Advanced Neuromuscular Junction Physiology. (2-3 cr.; max 2 cr.; Student Option; Every Summer) Fundamental concepts and advanced topics related to clinical/biomedical aspects of neuromuscular junction physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course. prereq: instr consent.

PHSL 5525. Anatomy and Physiology of the Pelvis and Urinary System. (1-2 cr.; A-F only; Every Spring)
Two-day intensive course. Pelvis, perineum, and urinary system with cadaveric dissection. Structure/function of pelvic and urinary organs, including common dysfunction and pathophysiology. Laboratory dissections, including kidneys, ureters, urinary bladder, pelvic viscera and perineum (male or female), pelvic floor, vascular and nervous structures. Grand rounds section. prereq: One undergraduate anatomy course, one undergraduate physiology course, instr consent

PHSL 5540. Advanced Exercise Medicine: Physiology and Bioenergetics. (1-2 cr.; Student Option; Periodic Fall)
Three-day intensive course. Physiology, bioenergetics, nutrition, and sports medicine. Focuses on application of principles to treatment of diseases and functional deficits. Lectures, demonstrations, hands-on experiences in an exercise medicine facility. prereq: [Grad student or practicing health professional], instr consent

PHSL 5700. Cell Physiology. (4 cr.; A-F only; Every Fall)
Control mechanisms in maintaining homeostasis with respect to critical cell functions. Regulation of pH, volume, nutrient transport, intracellular electrolyte composition, membrane potential. Aspects of intercellular communication. prereq: [Two semesters of physics/chemistry, calculus, one semester of systems-level physiology] or instr consent

PHSL 6051. Systems Physiology. (4 cr.; A-F or Audit; Every Spring & Summer)
General physiology, endocrine, circulatory, respiratory, digestive, energy metabolism, and renal physiology examined at molecular, cellular, and organ level. Emphasizes homeostasis and basic regulatory aspects of physiological processes of organ systems. prereq: [Prev or current] neuroscience course; [biochemistry, human anatomy] recommended

PHSL 8216. Selected Topics in Autonomic and Neuroendocrine Regulation. (1 cr.; S-N or Audit;)
Advanced seminar.

PHSL 8222. Central Regulation of Autonomic Function. (3 cr.; A-F or Audit; Periodic Fall)
Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Offered fall of odd-numbered years. prereq: NSC 5561 or instr consent

PHSL 8232. Critical Reading of Journal Articles in Physiology. (2 cr. [max 4 cr.]; A-F only; Every Spring)
Integrative physiology, critical reading of current scientific literature related to lecture topics in the Human Physiology course. prereq: concurrent registration is required (or allowed) in PHSL 5101, instr consent

PHSL 8242. Professional Skills
Development For Biomedical Scientists. (1 cr. A-F only; Every Spring)
Strategies/mechanics of writing grant proposal. NIH style section of grant review. Scientific presentations, dissecting scientific literature, PubMed/NIHrepor tool. prereq: instr consent

PHSL 8294. Research in Physiology. (1-18 cr.; Student Option; Every Fall, Spring & Summer)
Directed laboratory research. prereq: Grad cellular and integrative Phsl major, instr consent

PHSL 8310. Advanced Topics in Cellular Physiology. (1 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Discussion of primary research publications. Topics vary by semester. prereq: instr consent

PHSL 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(Optional) prereq: Master's student, adviser and DGS consent

PHSL 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(Optional) prereq: Doctoral student, adviser and DGS consent

PHSL 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHSL 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall & Spring)
Their Thesis: Master's prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHSL 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PBS 8081. Integrative Plant Biology: Connecting Molecules to Ecosystems. (3 cr.; A-F only; Every Fall)
Fundamental questions in plant/fungal biology. Research approaches. Students read/evaluate primary literature. Critical analysis, written summaries, oral presentations. Research in plant/fungal biology, ranging from molecular to ecosystem levels. prereq: Plant biological sciences grad student or instr consent

PBS 8082. Current Topics in Plant Biology: Structure-Evolution-Ecology. (1 cr.; S-N or Audit; Every Spring)
Background information and review of selected current literature. For first-year students in plant biological sciences and other biological science graduate programs.

PBS 8123. Research Ethics in the Plant and Environmental Sciences. (0.5 cr.; S-N or Audit; Every Spring)

PBS 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
FTE: Master's prereq: Master's student, adviser and DGS consent

PBS 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
FTE: Doctoral student, adviser and DGS consent

PBS 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PBS 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall & Spring)
Their Thesis: Master's prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PBS 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Their Thesis: Doctoral prereq: Passed prelim oral or adviser approval

PBS 8900. Seminar. (1-2 cr. [max 4 cr.]; S-N or Audit; Every Fall & Spring)
Current scientific research.

PBS 8901. Preparation of Research Proposals. (2 cr.; S-N only; Every Fall)
Grant writing process. Strategies and ethical standards for research proposal preparation/review. Students prepare an original proposal and critique work of others. prereq: Plant biological sciences PhD student

PBS 8910. Journal Club. (1 cr. [max 4 cr.]; S-N or Audit; Periodic Fall, Spring & Summer)
Critical evaluation of selected current literature.

PBS 8993. Directed Studies. (1-5 cr. [max 15 cr.]; Student Option; Every Fall, Spring & Summer)
Directed Studies prereq: PBio grad student, instr consent

PBS 8994. Research. (1-5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Independent research determined by student's interests, with consultation with faculty mentor. Prereq: PBio grad student, instr consent

**Plant Biology (PBIO)**

**PBIO 1212. Plant Biotechnology and Society.** (TS; 3 cr. [max 6 cr.]; Student Option; Every Spring)
Importance of plants to humans. How human interaction with plants has profoundly affected human societies, how human technology has changed our interaction with plants and affected the environment. Development of transgenic plants. Biofuels.

**PBIO 4321. Minnesota Flora.** (3 cr.; Student Option; Fall Even Year)
Practical skills for identifying plant species/surveying Minnesota vegetation to students of biology, environmental sciences, resource management, horticulture. Integrates botany, ecology, evolution, earth history, climate, global change in context of local plant communities. Labs/Saturday field trips explore Minnesota plants/plant communities. Prereq: One semester college biology

**PBIO 4404. Developmental Plant Anatomy.** (WI; 3 cr.; Student Option; Periodic Spring)
Introduction to the microscopic structure and development of plants at the cell, tissue, and organ level. Emphasis on relationships between anatomy and the ontogeny, phylogeny, and ecology of seed plants with some reference to lower vascular plants. Prereq: Biol 2022 or Biol 3007

**PBIO 4412. Plant Physiology and Development.** (3 cr.; A-F only; Every Fall)
PBIO 4412/5412 - Plant Physiology and Development (3.0 cr; Prereq-Biol 2022 or Biol 3002 or Biol 3007, Biol/Bioc 3021 or Biol 4331; fall, every year) An upper-division class to introduce students physiological and biochemical bases of plant systems with emphasis on higher plants. Units I and II cover traditional plant physiological topics such as water relations, mineral nutrition, transport, photosynthesis, and respiration. Unit III describes plant growth and development along developmental lines and the complete life cycle of seed plants from germination to senescence. Prereq: Biol 2022 or Biol 3002 or Biol 3007, Biol/Bioc 3021 or Biol 4331

**PBIO 4511. Flowering Plant Diversity.** (3 cr.; Student Option; Spring Odd Year)

**PBIO 4516W. Plant Cell Biology: Writing Intensive.** (WI; 3 cr.; Student Option; Periodic Fall)
Structure, function, and dynamic properties of plant cellular components. How cellular structures function and contribute to cell growth. Cell fate/development. Developing a clear/concise writing style for incisive criticism of scientific papers. Prereq: [Biol 2022 or Biol 3002 or Biol 3007], [Biol/C 3021 or Biol 3021 or Biol 400] 3

**PBIO 4601. Topics in Plant Biochemistry.** (WI; 3 cr.; A-F only; Every Spring)
Biochemical analysis of processes unique to photosynthetic organisms. Photosynthesis and carbon dioxide fixation. Synthesis of carbohydrates, lipids, and derivatives. Aromatic compounds such as lignin, other natural products. Functions of natural products. Prereq: [Biol 1002 or Biol 1009 or Biol 2003], Chem 2301

**PBIO 4793W. Directed Studies: Writing Intensive.** (WI; 1-7 cr.; S-N or Audit; Every Fall, Spring & Summer)
Individual study on selected topics or problems. Emphasizes readings, use of scientific literature. Written report. Prereq: instr consent

**PBIO 4794W. Directed Research: Writing Intensive.** (WI; 1-6 cr.; S-N or Audit; Every Fall, Spring & Summer)
Lab or field investigation of selected areas of research, including written report. Prereq: instr consent, dept consent

**PBIO 4993. Directed Studies.** (1-7 cr.; S-N or Audit; Every Fall, Spring & Summer)
Individual study on selected topics or problems. Emphasizes selected readings, use of scientific literature. Prereq: instr consent

**PBIO 4994. Directed Research.** (1-6 cr. [max 42 cr.]; S-N or Audit; Every Fall, Spring & Summer)
Lab or field investigation of selected areas of research. Prereq: instr consent

**PBIO 5009. Current Questions in Fungal Biology.** (2 cr.; A-F or Audit)
Diversity of fungi and their interactions with other organisms. Pathogenic/mutualistic interactions with animals/plants. Use of fungal systems for drug discovery and understanding pathogenicity, signal transduction, morphogenesis, and evolution.

**PBIO 5301. Plant Genomics.** (3 cr.; Student Option; Every Fall)
Introduction to genomics. Emphasizes plants and relevant model organisms. DNA marker/sequencing technology, comparative genomics, whole genome sequencing, DNA chips/microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison/cluster algorithms, visualization tools. Prereq: [Intro course in genetics, intro course in biochemistry] or instr consent

**PBIO 5412. Plant Physiology and Development.** (3 cr.; Student Option; Every Fall)
Physiological and biochemical bases of plant systems with emphasis on higher plants. Prereq: Biol 2022 or Biol 3002 or Biol 3007, Biol/Bioc 3021 or Biol 4331

**PBIO 5514. Plant Molecular Genetics and Development.** (3 cr.; Student Option; Every Fall)
Survey topics in plant molecular biology. How advances in molecular/genomic biology are used to understand plant physiology and developmental biology. Uses of transgenic plants in research/biotechnology. Prereq: BioC 3021 or Biol 3021 or Biol 4003 or BioC 4332 or equiv

**PBIO 5516. Plant Cell Biology.** (3 cr.; Student Option; Periodic Fall)
Structure, function, and dynamic properties of plant cellular components such as organelles, cytoskeleton, and cell wall. How cellular structures are assembled, how it contributes to cell growth/division. Cell fate/development. Responses to hormones and external signals. Prereq: Biol 2022 or Biol 3007 or Biol 3022, Biol 3021 or BioC 3021 or Bio 4003

**PBIO 5601. Topics in Plant Biochemistry.** (3 cr.; A-F or Audit; Every Spring)
Biochemical analysis of processes unique to photosynthetic organisms. Photosynthesis and carbon dioxide fixation. Synthesis of carbohydrates, lipids, and derivatives. Aromatic compounds such as lignin, other natural products. Functions of natural products. Prereq: [Biol 1002 or Biol 1009 or Biol 2003], Chem 2301

**PBIO 5860. Special Topics.** (1-3 cr. [max 18 cr.]; Student Option; Every Fall, Spring & Summer)
Topics vary, see Class Schedule.

**Plant Pathology (PLPA)**

**PLPA 1005. Plants Get Sick Too.** (BIOL; 4 cr.; Student Option; Every Fall)

**PLPA 1942. Topics: Freshman Seminar.** (TS; 3 cr.; A-F or Audit; Every Fall & Spring)
Topics specified in class catalog.

**PLPA 2001. Introductory Plant Pathology.** (3 cr.; Student Option; Every Spring)
Biology of the major groups of plant pathogens, symptoms and signs of plant disease, plant disease diagnosis, and principles of disease management. Lecture and laboratory. Prereq: BIOL 1009 or equiv

**PLPA 2003. Plague, Famine, and Beer: The Impact of Microscopic Organisms on Human Civilization.** (HIS; 3 cr.; Student Option; Every Fall)
Impacts that microbes have made on course of human civilization. Negative influences of major human/plant infectious disease. Positive benefits attained by harnessing power of microbes. Scale of history includes prehistoric to present day. Projected future impacts.

**PLPA 3003. Diseases of Forest and Shade Trees.** (3 cr.; Student Option; Every Spring)
Diseases of trees in urban and forested areas. Biology, ecology and control of tree diseases. Labs provide experience identifying disease agents and learning appropriate integrated control procedures.
PLPA 3090. Research in Plant Pathology. (1-4 cr.; Student Option; Every Fall, Spring & Summer) Assignment of special problems to undergraduates desiring opportunity for independent research in plant pathology.

PLPA 4096. Professional Experience Program: Internship. (1-3 cr. [max 6 cr.]; S-N or Audit; Every Fall & Spring) Supervised practicum with professional experience in plant pathology and related industries including the Plant Disease and "Dial-U" clinics. Evaluative reports and consultations with faculty advisers and employers. prereq: COAFES undergrad, complete internship contract available in COAFES Career Services before registering; UC only

PLPA 5003. Diseases of Forest and Shade Trees. (3 cr.; Student Option; Every Spring) Diseases of trees in urban and forested areas. Biology, ecology, and control of tree diseases. Identifying disease agents, integrated control procedures. Laboratory.

PLPA 5090. Issues in Plant Pathology. (1-4 cr.; Student Option; Every Fall, Spring & Summer) See Class Schedule or department for current offerings.

PLPA 5103. Plant-Microbe Interactions. (3 cr.; Student Option; Every Spring) Genetics, physiology, molecular biology of plant-microbe interactions. Communication between plant/microbes, signal transduction, control of gene expression, symbiosis/parasitism, plant host response mechanisms, plant disease physiology. prereq: Intro course in plant pathology or molecular biology or equiv

PLPA 5202. Field Plant Pathology. (2 cr.; Student Option; Every Summer) Characteristics of a variety of plant diseases. Field trips to observe symptoms and effects of diseases, and to learn about prevention and control of diseases in field, forest, golf course, greenhouse, nursery, orchard, and urban environments.

PLPA 5203. Introduction to Fungal Biology. (3 cr.; Student Option; Every Fall) Fungi are a critical component of the diversity and function of terrestrial ecosystems, affecting decomposition, plant nutrient uptake, and agricultural practices. Key components of fungal biology, including ecology, genetics, life cycles and diversity. Labs provide hands on experience with a diverse range of organisms. prereq: BIOL 1009 or equiv

PLPA 5300. Current Topics in Molecular Plant Pathology. (1-2 cr.; S-N only; Every Fall) Interactive class. Students read, discuss, and critique publications in molecular plant pathology. Focus on articles, examining from different dimensions (underlying principles, experimental strategies, data analysis, impact on the broader discipline). prereq: instr consent

PLPA 5301. Plant Genomics. (3 cr.; Student Option; Every Fall) Plants and model organisms. DNA sequencing, comparative genomics, genome structure and function, DNA chips/microarrays, RNA expression, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, and visualization tools. prereq: Intro course in genetics or instr consent

PLPA 5444. Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions. (3 cr.; A-F or Audit; Every Fall) Concepts and recent research in the ecology, epidemiology, and evolutionary/coalventory biology of plant-microbe interactions spanning the range from parasitic to mutualistic in agricultural and natural habitats. prereq: Intro plant pathology or advanced biology coursework recommended

PLPA 5480. Principles of Plant Pathology. (3 cr.; Student Option; Every Fall) Diseases that affect plants, microbiology and microbial and plant interactions. Mycology and select diseases caused by fungi within Ascomycota, Basidiomycota, and the fungal-like Oomycota. Diseases caused by bacteria, nematodes, viruses, parasitic plants and abiotic damage. Lecture and Lab. prereq: BIOL 1009 or equiv

PLPA 5560. Plant Disease Resistance and Applications. (3 cr.; A-F or Audit; Every Spring) Fundamentals of disease resistance in plants and the genetics of host-parasite interactions as they relate to the sustainable control of plant diseases. Examples explored at the Mendelian, populational, and molecular level of organization. prereq: 2001, BIOL 4003

PLPA 5599. Special Topics in Plant Pathology. (1-8 cr.; Student Option; Every Fall, Spring & Summer) Workshops on topics in plant pathology. See Class Schedule or department for current offerings.

PLPA 5605. Supervised Classroom or Extension Teaching Experience. (2 cr.; S-N or Audit; Every Fall, Spring & Summer) Teaching experience in one of the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

PLPA 8090. Advanced Procedures and Research in Plant Pathology. (1-8 cr.; Student Option; Every Fall, Spring & Summer) Special assignment in lab and field problems in pathological research. If taking for PLPA teaching requirement: 2 credits=1 full semester of teaching experience; 1 credit=1/2 semester of teaching experience

PLPA 8103. Plant-Microbe Interactions. (3 cr.; Student Option; Every Spring) Genetics, physiology, and molecular biology of plant-microbe interactions. Communication between plants/microbes. Signal transduction, control of gene expression, symbiosis/parasitism, plant host response mechanisms, plant disease physiology. prereq: Intro course in plant pathology or molecular biology or equiv

PLPA 8104. Plant Virology. (2 cr.; A-F only; Every Spring) Characteristics, biology, epidemiology, and control of plant diseases caused by viruses. prereq: 5480

PLPA 8105. Plant Bacteriology. (2 cr.; Student Option; Every Spring) For graduate students interested in bacteria that cause plant diseases. Disease cycles, epidemiology, pathogenesis, and means of disease control. The lab section will focus on techniques used to identify bacteria, for inoculating plants, and isolating bacteria from plant material. prereq: 5480


PLPA 8200. Seminar. (1 cr.; A-F only; Every Fall & Spring) Critical review and presentation of current problems and progress in plant pathology.

PLPA 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

PLPA 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

PLPA 8500. Perspectives in Plant Pathology. (2 cr. [max 4 cr.]; S-N or Audit; Every Fall) Integrative overview of the field. For Ph.D. students nearing end of formal classroom experience.

PLPA 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PLPA 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PLPA 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Polish (PLSH)

PLSH 1101. Beginning Polish. (5 cr.; Student Option; Periodic Fall)
Develop basic proficiency in listening, speaking, reading, and writing and become acquainted with Polish culture. First of four courses designed to satisfy CLA language graduation requirement.

PLSH 1102. Beginning Polish. (5 cr.; Student Option; Periodic Spring)
Develop basic proficiency in listening, speaking, reading and writing and to acquaint students with Polish culture. Second of four courses designed to satisfy CLA language graduation requirement. prereq: 1101 or equiv

PLSH 3002. Intermediate Polish. (5 cr.; Student Option; Fall Odd Year)
Conversation, composition, advanced grammar, translation, and readings in appropriate literature. Fourth in a sequence of courses designed to satisfy CLA language graduation requirement. prereq: 3001 or equiv

PLSH 4101. Beginning Polish for Graduate Research. (5 cr.; Student Option; Periodic Fall)
Develop basic proficiency in listening, speaking, reading, and writing and become acquainted with Polish culture. prereq: Fourth sem course in another language or grad student

PLSH 4102. Beginning Polish for Graduate Research. (5 cr.; Student Option; Periodic Spring)
Develop basic proficiency in listening, speaking, reading and writing and to acquaint students with Polish culture, prereq: 4101, [fourth sem course in another language or grad student]

PLSH 4104. Intermediate Polish for Graduate Research. (5 cr.; Student Option; Periodic Fall)
Conversation, composition, advanced grammar, translation, and readings in appropriate literature. prereq: 4103

PLSH 5993. Directed Studies. (1-3 cr.; Student Option; Periodic Fall)
Guided individual reading or study in Polish language, literature, and culture.

Political Science (POL)

POL 1001. American Democracy in a Changing World. (SOCS; 4 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to politics/government in the United States. Constitutional origins/development, major institutions, parties, interest groups, elections, participation, public opinion. Ways of explaining politics, nature of political science. Emphasizes recent trends.

POL 1001H. Honors Course: American Democracy in a Changing World. (SOCS; 4 cr.; A-F only; Every Fall & Spring)
Introduction to politics/government in the United States. Constitutional origins/development, major institutions, parties, interest groups, elections, participation, public opinion. Ways of explaining politics, nature of political science. Emphasizes recent trends.

POL 1019. Indigenous Peoples: A Global Perspective. (GP; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Colonial experiences of selected indigenous peoples in Americas, Eurasia, Pacific Rim.

POL 1025. Global Politics. (GP,SOCS; 4 cr.; Student Option; Every Fall, Spring & Summer)
Study of international relations and issues in contemporary world affairs. Forms of state interaction from violent conflict to cooperation and integration; activities of international institutions; transnational relations involving non-state actors such as international businesses, human rights networks, and environmental movements.

POL 1025H. Honors: Global Politics. (GP,SOCS; 4 cr.; A-F or Audit; Every Fall & Spring)
Introduction to international relations/issues in contemporary world affairs. War, peace, nuclear proliferation. Politics of humanitarian intervention. Global monetary/trading systems. Activities of international institutions/non-governmental organizations. prereq: Honors student

POL 1054. Puzzles in World Politics. (GP,SOCS; 4 cr.; Student Option; Every Fall, Spring & Summer)
Political life. Repression, democracy, rights, corruption, gender, political change. Guest lectures by political science professors.

POL 1054H. Honors: Puzzles in World Politics. (GP,SOCS; 4 cr.; A-F Only; Every Fall & Spring)
Political life. Repression, democracy, rights, corruption, gender, political change. Guest lectures by political science professors who are experts on different parts of world. prereq: Honors student

POL 1201. Political Ideas and Ideologies. (CIV,HIS; 4 cr.; Student Option; Every Fall, Spring & Summer)
Analysis of key concepts and ideas (e.g., freedom, equality, democracy) as they are constructed by major theories and ideologies (liberalism, conservatism, socialism, etc.).

POL 1234. Citizen U: Building Tomorrow's Citizens Today. (3 cr.; A-F only; Every Spring)

POL 1903. Freshman Seminar. (3 cr.; A-F only; Every Fall & Spring)
Topics specified in Class Schedule. prereq: Fr or no more than 30 cr

POL 1905. Freshman Seminar. (3 cr.; Student Option; Every Fall & Spring)
Topics specified in Class Schedule. prereq: Freshman

POL 1942. Topics: Freshman Seminar. (TS; 3 cr.; Student Option; Periodic Fall & Spring)
Topics titles printed in Class Schedule. prereq: Freshman

POL 3070. Distinguished Undergraduate Research Internship. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Interns work closely with a faculty mentor on supervised projects related to faculty research. Through these activities, interns will deepen research, organizational, and communication skills that will prove useful for further training in political science or for other careers.

POL 3080. Faculty-Supervised Individual Internships. (3-13 cr. [max 15 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Internship with government or community organizations arranged by the department and awarded competitively each spring semester. prereq: instr consent, dept consent

POL 3085. Quantitative Analysis in Political Science. (MATH; 4 cr.; A-F or Audit; Every Fall & Spring)
Empirical research techniques. Testing a political hypothesis using data. Topics such as setting up research question in political science, research design, and techniques of data analysis.

POL 3085H. Honors Course: Quantitative Analysis in Political Science. (MATH; 4 cr.; A-F only; Every Fall & Spring)
Empirical research techniques/how one tests a political hypothesis using data. Topics such as setting up a research question in political science, proper research design, and basic techniques of data analysis. prereq: Honors student

POL 3108H. Honors Tutorial: Thesis Preparation and Political Science Inquiry. (3 cr.; A-F only; Every Spring)
Advance research skills and prepare to write senior thesis. Political science research. Develop thesis topic, test ideas in a structured/collegial setting. prereq: Pol sci major, honors

POL 3110H. Honors Thesis Credits. (1-4 cr.; A-F only; Every Fall, Spring & Summer)
Individual research/ writing of departmental honors thesis. prereq: 3109, pol sci, honors, dept consent

POL 3210. Topics in Political Theory. (3 cr. [max 18 cr.]; Student Option; Every Fall & Spring)
Topics in Political Theory, as specified in the Class Schedule.

POL 3225. American Political Thought. (CIV; 3 cr.; Student Option; Every Fall, Spring & Summer)
Puritans, American Revolution, Constitution, pro- and anti-slavery arguments, civil war, reconstruction, industrialism, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, women's suffrage, red scares, Great Depression, free speech, pluralism, multiculturalism. prereq: Suggested prerequisite POL 1201

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
POL 3235W. Democracy and Citizenship. (CIV,WI; 3 cr.; Student Option; Every Fall & Spring)

POL 3237. Practicum: Democracy and Citizenship. (1 cr.; Student Option; Every Fall & Spring)
Students complete at least 2 hours/week of a community service-learning or individual civic engagement project. prereq: concurrent registration is required (or allowed) in POL 3235W, instr consent

POL 3251W. Power, Virtue, and Vice: Ancient and Early Modern Political Theory. (WI; 3 cr.; Student Option; Periodic Fall)
Ancient and early modern political thinking confronts basic questions of political order.

POL 3252W. Revolution, Democracy, and Empire: Modern Political Thought. (AH, WI, CIV; 3 cr.; Student Option; Spring Even Year)
Thinkers, discourses, events that craft understanding of revolution, democracy, empire. Emergence of democracy/democratic institutions alongside problems of religious zealotry, political hierarchy/exclusion, market economies, cultural marginalization. prereq: Suggested prerequisite 1201

POL 3265. Ideas and Protest in French Postwar Thought. (AH, CIV; 3 cr.; Student Option; Every Fall & Spring)
Examine events, political/ethical challenges, intellectuals who shaped France in its century of politics/protest. Historical documents, cultural media, philosophical texts. Thinkers range from film-maker Gillo Pontecorvo to philosopher-playwright Jean-Paul Sartre to philosopher Michel Foucault.

POL 3308. Congressional Politics and Institutions. (SOC); 3 cr.; Student Option; Every Fall, Spring & Summer)
Origin/development of U.S. congressional institutions, parties, committees, leaders, lobbying/elections, and relations between Congress/executive branch. Relationship of campaigning/governing, nature of representation, biases of institutional arrangements.

POL 3309. Justice in America. (; 3 cr.; Student Option; Every Fall & Spring)
American judiciary. Selection of judges. How/why these individuals/institutions behave as they do. What influences judicial decisions. What impact decisions have. Why people comply with them. prereq: 1001 or 1002 or instr consent

POL 3310. Topics in American Politics. (; 3 cr.; max 15 cr.; Student Option; Every Fall, Spring & Summer)
Topic in American politics, as specified in Class Schedule.

POL 3310H. Topics in American Politics. (; 3 cr.; Student Option; Periodic Fall & Spring)
Topics in American politics.

POL 3317. Food Politics: Actors, Arenas, and Agendas. (SOC); 3 cr.; A-F or Audit; Every Fall & Spring)
How food is grown, transported, processed, consumed. Examine how various political actors interact in complex policy arena that is food. Explore various resources, arguments, evidence used by participants in food politics. Investigate institutional, cultural, moral rules of engagement that provide structure in which political contenders attempt to advance economic interests/ideological agendas.

POL 3319. Education and the American Dream. (DSJ, SOC; 3 cr.; A-F or Audit; Every Fall)
Introduction to politics and education in the United States. Equality of educational opportunity, educating democratic citizens, school finance, role of political institutions in making educational policy. Efforts to reform/ remake American education, including charter schools and private school vouchers.

POL 3321. Issues in American Public Policy. (; 3 cr.; Student Option; Periodic Fall)
Politics of policy process. Agenda formation, formulation, adoption, implementation, evaluation. Attention to selected policy areas.

POL 3323. Political Tolerance in the United States. (; 3-4 cr.; Student Option; Periodic Spring)
Political importance of civil liberties in American society. Tolerance as a political phenomenon. Issues such as free speech, privacy, religion, race, gender.

POL 3325. U.S. Campaigns and Elections. (; 3 cr.; A-F or Audit; Fall Even Year)

POL 3327. Suburbs, Stadiums, and Scandals: The Politics of American Cities. (3 cr.; Student Option; Periodic Fall & Spring)
Study of politics and policy in the contemporary American city; role of local government in a federal system; evolution of cities in the United States; forms and structures of local government; local politics and patterns of power and influence; special topics in Minnesota local politics. prereq: 1001, non-pol sci grad major or equiv or instr consent

POL 3365. Government and Medicine. (; 3 cr.; Student Option; Periodic Fall, Spring & Summer)
Why is the United States the only industrialized nation that lacks national health insurance? Should the government regulate health care? Who should address these issues? Introduction to American government. Health care policy, constitution, elections, congress, the presidency.

POL 3410. Topics in Comparative Politics. (; 3 cr.; max 9 cr.; Student Option; Every Fall, Spring & Summer)
Topics of current analytical or policy importance to comparative politics. Topics vary, as specified in Class Schedule.

POL 3451W. Politics and Society in the New Europe. (GP, WI; 3 cr.; Student Option; Fall Even, Spring Odd Year)
Changing politics/society of Europe. Generational change/values, political parties, welfare state, future of European integration, political stability, democratization.

POL 3464. Politics of Inequality. (; 3 cr.; A-F or Audit, Every Fall & Spring)
Causes/consequences of economic inequality in the USA and Europe. America and European countries in contrast to one another. What differences there are and whether they matter.

POL 3474. Russian Politics: From Soviet to Post-Soviet Regimes. (3 cr.; A-F or Audit; Every Fall & Spring)
A study of the domestic politics of the Soviet Union. Overview of communism's roots and foundations. Study of the post-Soviet transition in Russia while comparing and contrasting the different republics. Finally, a focus on religious and ethnic conflict within Russia today.

POL 3475. Islamist Politics. (; 3 cr.; A-F or Audit; Every Fall)

POL 3477. Political Economy of Development. (GP, SOC; 3-4 cr.; Student Option; Every Fall, Spring & Summer)
Political processes/problems associated with economic development. Political economy of underdevelopment/development. Problems of state building, development of political institutions.

POL 3479. Latin American Politics. (GP; 3 cr.; Student Option; Every Fall, Spring & Summer)

POL 3481H. Governments and Markets. (; 4 cr.; A-F or Audit; Periodic Fall & Spring)
Connection between democracy and markets. Experiences of countries in North America and Europe. prereq: 1054 or instr consent

POL 3489W. Citizens, Consumers, and Corporations. (CIV, WI; 3 cr.; Student Option; Spring Even Year)
How ordinary people can act collectively to hold corporations accountable for their activities; have on communities/nations. Mobilizing as citizens through mass protests, lobbying politicians, and pursuing claims through court system. Mobilizing as consumers through purchasing decisions.

POL 3701. American Indian Tribal Governments and Politics. (DSJ, HIS; 3 cr.; A-F or Audit; Fall Even Year)

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
POL 3733. From Suffragettes to Senators: Gender, Politics & Policy in the U.S. (DSJ; 3 cr.; A-F or Audit; Every Spring)
Overview to field of gender/politics. Examine role women play in U.S. policy process. How public policies are “gendered.” How policies compare to feminist thinking about related issue area. Theories of role(s) gender plays in various aspects of politics.

POL 3739. Politics of Race, Class, and Ethnicity. (3 cr.; Student Option; Every Fall, Spring & Summer)
How race/ethnicity/class interact in political process. Political conflict through comparative analysis of United States, South Africa, Brazil.

POL 3752. Chicana/o Politics. (DSJ; SOCS; 3 cr.; Student Option; Every Fall & Spring)

POL 3766. Political Psychology of Mass Behavior. (SOCS; 3 cr.; Student Option; Every Fall & Spring)
How political behavior of citizens and political elites is shaped by psychological factors, including personality, attitudes, values, emotions, and cognitive sophistication. Political activism/apathy, leadership charisma, mass media, group identifications, political culture.

POL 3767. Political Psychology of Elite Behavior. (CIV; 3 cr.; Student Option; Periodic Spring)
Intersections of politics, personality, and social psychology. Focuses on political leaders and elites. Usefulness of psychological theories for conducting political analysis. Role of individual, of group processes, of political/social cognition, and of context in political decision-making.

POL 3769. Public Opinion and Voting Behavior. (SOCS; 3 cr.; Student Option; Every Fall & Spring)
Major factors influencing electoral decisions/political attitude formation/change.

POL 3785. Persuasion and Political Propaganda. (3 cr.; A-F or Audit; Every Fall & Spring)
Introduction to persuasion and political propaganda. Persuasion theories relevant to designing effective political propaganda. Applying theories to analyze WWII/WWII propaganda posters, films, and political campaign commercials. Use of fiction as propaganda tool.

POL 3785H. Persuasion and Political Propaganda. (3 cr.; A-F only; Fall Even, Spring Odd Year)
Persuasion theories relevant to designing effective political propaganda. Applying theories to analyze WWII/WWII propaganda posters, films, and political campaign commercials. Use of fiction as propaganda tool.

POL 3810. Topics in International Relations and Foreign Policy. (3 cr.; [max 6 cr.]; Student Option; Every Fall & Spring)
Analysis of selected issues in contemporary international relations. Topics vary, as specified in Class Schedule.

POL 3833. The United States and the Global Economy. (3 cr.; Student Option; Periodic Fall & Spring)
Domestic and international politics of the United States, foreign economic policy (trade, aid, investment, monetary, and migration policies). Effects of policies and international economic relations on the U.S. economy and U.S. politics.

POL 3835. International Relations. (GP; SOCS; 3 cr.; Student Option; Every Fall, Spring & Summer)
Introduction to theoretical study of international relations. How theoretical perspective shapes one's understandings of structure/practices of global politics.

POL 3872W. Science, Industry, and Social Change: The Political Economy of Global Environmental Cooperation. (WI; 4 cr.; Student Option; Periodic Fall & Spring)
Emergence of environment as key aspect of global political agenda. Non-governmental/governmental international organizations. Politics of protection of atmosphere, rain forest, seas, other selected issues. International security, environment.

POL 3873W. Global Citizenship and International Ethics. (CIV; WI; 3 cr.; Student Option; Fall Odd, Spring Even Year)
Case studies of ethics in intervention, war, weapons, foreign aid, environmental practices, and human rights are used to examine the global ethical responsibilities of individual citizens and public officials; effectiveness of transnational social movements in influencing policy at domestic and international levels.

POL 4210. Topics in Political Theory. (3 cr.; [max 9 cr.]; A-F or Audit; Every Fall & Spring)
Topics in political theory, as specified in Class Schedule.

POL 4253. Modernity and Its Discontents: Late Modern Political Thought. (3-4 cr.; Student Option; Fall Even, Spring Odd Year)

POL 4275. Domination, Exclusion, and Justice: Contemporary Political Thought. (3 cr.; Student Option; Periodic Fall & Spring)
Urgent political debates in major works of contemporary political thought from World War II to present. Relationships between force/freedom. Ideology/truth. Authority/resistance. Ideas may include communitarianism, feminism, postcolonialism, postmodernism, socialism. prereq: 1201 recommended

POL 4280. Topics in Political Theory. (3 cr.; [max 8 cr.]; Student Option; Periodic Fall & Spring)
Topics in historical, analytical, or normative political theory. Topics vary.

POL 4310. Topics in American Politics. (3 cr.; [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
See Class Schedule for description. prereq: 1001 or equiv or instr consent

POL 4315W. State Governments: Laboratories of Democracy. (WI; 4 cr.; Student Option; Periodic Fall & Spring)
Political behavior, governmental institutions, and public policies in American states; comparison among states, between state and national government, with special attention given to Minnesota. prereq: 1001 or equiv, non-pol sci grad major or instr consent

POL 4317. Becoming Stupid: Anti-Science in American Politics. (3 cr.; Student Option; Every Fall)
History of anti-intellectualism in American politics; Investigation of anti-science as the most powerful expression of political culture today; political parties and their stance on science; political ideology as an aggressive alternative to science; propaganda and funding for science.

POL 4322. Rethinking the Welfare State. (3 cr.; Student Option; Periodic Fall & Spring)
Discuss competing arguments about welfare states in advanced industrial countries. Are welfare states the result of sectional interests, class relations, or citizenship rights? Compare American social policy with policies in other western countries.

POL 4403W. Constitutions, Democracy, and Rights: Comparative Perspectives. (GP; WI; 3 cr.; Student Option; Fall Even, Spring Odd Year)

POL 4410. Topics in Comparative Politics. (3 cr.; [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Topics of current analytical or policy importance to comparative politics. Topics vary, as specified in Class Schedule.

POL 4461W. European Government and Politics. (GP; WI; 4 cr.; Student Option; Fall Odd, Spring Even Year)
European political institutions in their social settings; power and responsibility; governmental stability; political decision making, government and economic order. prereq: 1054 or 3051 or non-pol sci grad or instr consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
POL 4463. The Cuban Revolution Through the Words of Cuban Revolutionaries. (GP; 3 cr.; Student Option; Every Fall) Cuban Revolution. Leadership/strategy, perspectives of Cubans/leaders. prereq: 1025 or 1054 or equiv

POL 4465. Democracy and Dictatorship in Southeast Asia. (GP; 3 cr.; Student Option; Fall Even Year) Southeast Asia's increasingly important role in global political/economic affairs. U.S. involvement in region. Progress toward and resistance to democratic political systems. Economic development.

POL 4473W. Chinese Politics. (GP,WI; 3 cr.; Student Option; Every Fall) Focuses on fundamental conflicts in Chinese society; the democracy movement, human rights, class divisions, gender struggles, environmental issues, and capitalist vs. socialist development strategies. Secondary topics include Chinese foreign relations and domestic and foreign political issues in Taiwan.

POL 4477. Struggles and Issues in the Middle East. (4 cr.; Student Option; Periodic Fall) Turkey, Iran, Israel, and selected Arab states. Domestic politics of religious/secular, ethnic, economic, environmental, and other policy/identity issues. Regional politics of water access, Israeli/Palestinian/Arab world relationships, oil and the Persian/Arabian Gulf, and human rights. prereq: 1054 or 3051 or non-pol sci grad or instr consent

POL 4478W. Contemporary Politics in Africa and the Colonial Legacy. (GP; WI; 4 cr.; Student Option; Every Spring) Examines how current politics in mainly, though not exclusively, sub-Saharan Africa have been shaped by the pre-colonial and colonial processes. Reality of independence; recurrent political and economic crises, global context and prospects for effective democracy. prereq: 1054 or 3051 or non-pol sci grad or instr consent

POL 4481. Governments and Markets. (3-4 cr.; Student Option; Periodic Fall & Spring) Connection between democracy and markets. Experiences of countries in North America and Europe. prereq: 1054 or instr consent

POL 4485. Human Rights Policy: Issues and Actors. (CIV; 3 cr.; Student Option; Every Fall) Politics of human rights issue emergence; relevant international, regional, and domestic norms; consequences of state repression; measurement of human rights abuses and remedies; human rights promotion by states, political parties, international organizations, NGOs, social movements, faith-based organizations, and providers of international development assistance.

POL 4487. The Struggle for Democratization and Citizenship. (4 cr.; Student Option; Periodic Fall & Spring) Origins of democratic process. Emphasizes how disenfranchised fought to become included. History of democratic movement from its earliest moments to present. Attempts to draw a balance sheet.

POL 4492. Law and (In)Justice in Latin America. (3 cr.; A-F or Audit; Every Spring) How law and justice function in contemporary Latin America. Similarities/differences within/between countries and issue areas. Causes behind varied outcomes. Effectiveness of different reform efforts. Transitional justice, judicial review, judicial independence, access to justice, criminal justice (police, courts, and prisons), corruption, non-state alternatives. Issues of class, race/ethnicity, and gender.

POL 4494W. US-Latin American Relations. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) US foreign policy toward Latin America. Immigration, trade policy, relations with Cuba, drug war, relations with Venezuela.

POL 4495. Politics of Family, Sex, and Children. (DSJ; 3 cr.; A-F or Audit; Every Fall & Spring) Political fights over volatile issues of family, sex, and children. Diversity of family life in the United States as a source of disharmony and inequality. Same-sex couples, interacial families, polygamous communities, reproductive equality for people with disabilities, targeting of immigrant children, teen sex & pregnancy, working mothers, childfree advocates. Citizen efforts aimed at reconciling communities with harshly clashing beliefs.

POL 4497. Patronage & Corruption. (GP; 3 cr.; A-F or Audit; Every Fall & Spring) Examines dysfunction within state apparatus in specific forms of patronage, corruption, clientalism. Why such dysfunction persists/what factors drive it to change.

POL 4501W. The Supreme Court and Constitutional Interpretation. (CIV, WI; 3 cr.; Student Option; Every Fall) Historical/analytical approaches to Court's landmark decisions. Theory/techniques of judicial review. Relations Court's authority to wider political/social context of American government.

POL 4502W. The Supreme Court, Civil Liberties, and Civil Rights. (CIV, WI; 3 cr.; Student Option; Every Spring) Supreme Court's interpretation of Bill of Rights, 14th amendment. Freedom of speech, press, religion, crime/punishment; segregation/desegregation, affirmative action; abortion/privacy.

POL 4507. Law, Sovereignty, and Treaty Rights. (3 cr.; Student Option; Periodic Fall, Spring & Summer) History of American Indian law and the post-contact effects of colonial and U.S. law on American Indians through the 20th century.

POL 4525W. Federal Indian Policy. (WI; 3 cr.; Student Option; Periodic Fall, Spring & Summer) Formulation, implementation, evolution, comparison of Indian policy from pre-colonial times to self-governance of new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature on policies.

POL 4737W. American Political Parties. (WI; 4 cr.; Student Option; Fall Odd, Spring Even Year) The American two-party system; party influence in legislatures and executives; decline of parties and their future. prereq: 1001 or equiv or instr consent

POL 4766. America, the Unusual?: American Political Culture in Comparative Context. (CIV; 3 cr.; Student Option; Fall Even, Spring Odd Year) Empirical analysis of basic political values. Individualism, freedom, equality. Democratic principles, materialism, capitalism, citizenship, patriotism, heroism. prereq: suggested 1001 or equiv

POL 4771. Race and Politics in America: Making Sense of Racial Attitudes in the United States. (DSJ; 3 cr.; Student Option; Periodic Fall) In this course, we look at what Americans believe about race and politics, how racial attitudes differ across racial groups, and how racial attitudes have changed over time. We also explore the deeper social and psychological sources of people's racial attitudes, with an eye to how political science can confront the problem of racism.

POL 4773W. Advocacy Organizations, Social Movements, and the Politics of Identity. (DSJ; WI; 3 cr.; Student Option; Every Fall & Spring) Advocacy organizations/social movements as agents of democratic representation/political change in American politics/policy-making. Organizations/movements that represent racial/ethnic minorities, women, religious conservatives, lesbian, gay, bisexual, transgender people, low-income people.

POL 4810. Topics in International Politics and Foreign Policy. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Analysis of selected issues in contemporary international relations. Topics vary, as specified in Class Schedule.

POL 4867W. United States Foreign Policy Toward the Middle East. (GP; WI; 4 cr.; Student Option; Every Fall) U.S. foreign policy toward Israeli-Palestinian issue in Turkey, Iran, Iraq, etc. Mideast politics, debates, actions. Rationales for U.S. engagement with region. Readings of Middle East authors. prereq: Jr or sr

POL 4878W. Israeli-Palestinian Situation. (GP; WI; 4 cr.; Student Option; Every Fall & Spring) Situation as clash of two communities. History, politics, respective narratives of each community. Divisions within each community that are consequential for reconciliation. Examples of reconciliation literature from both communities.

POL 4883W. Global Governance. (WI; 3 cr.; Student Option; Periodic Fall, Spring & Summer)
American politics. prereq: grad student or instr consent
POL 5310. Topics in American Politics. (; 3 cr.; Student Option; Every Fall & Spring)
See Class Schedule for description.
POL 5315. State Governments: Laboratories of Democracy. (WI; 4 cr.; Student Option; Periodic Fall)
Political behavior, governmental institutions, and public policies in American states.
Comparison among states, between state and national government. Emphasizes Minnesota.
prereq: grad student or instr consent
POL 5322. Rethinking the Welfare State. (3-4 cr. [max 3 cr.]; Student Option; Periodic Fall & Spring)
Competing arguments about welfare states in advanced industrial countries. Whether welfare states result from sectional interests, class relations, or citizenship rights. Compares American social policy with policies in other western countries. prereq: grad student

POL 5327. Politics of American Cities and Suburbs. (; 3 cr.; Student Option; Periodic Fall)
Development & role of American local government. Forms and structures. Relationships with states and federal government. Local politics and patterns of power/influence. prereq: Credit will not be granted if credit has been received for: : 4327; [1001 or 1002], [non-pol sci grad major or equiv] or instr consent

POL 5331. Thinking Strategically in Domestic Politics. (; 3-4 cr. [max 3 cr.]; Student Option; Periodic Fall)
Applications of rational-choice and game theories to important features of domestic politics in the United States and elsewhere. prereq: Credit will not be granted if credit has been received for: : 4331; grad student

POL 5403. Comparative Constitutionalism. (; 3 cr.; Student Option; Fall Even, Spring Odd Year)

POL 5410. Topics in Comparative Politics. (; 1-3 cr.; Student Option; Every Fall & Spring)
Topics of current analytical or policy importance. Topics vary, see Class Schedule. prereq: grad student

POL 5461. European Government and Politics. (WI; 4 cr.; Student Option; Every Spring)
European political institutions in their social settings. Power and responsibility. Governmental stability. Political decision making. Government and economic order. prereq: grad student or instr consent

POL 5465. Democracy and Dictatorship in Southeast Asia. (GP; 3 cr.; Student Option; Fall Even Year)
Southeast Asia's increasingly important role in global political/economic affairs. U.S. involvement in region. Progress toward and resistance to democratic political systems. Economic development.

POL 5477. Struggles and Issues in the Middle East. (; 4 cr.; Student Option; Periodic Fall)
Turkey, Iran, Israel, and selected Arab states. Domestic politics of religious/secular, ethnic, economic, environmental, and other policy/identity issues. Regional politics of water access, Israeli/Palestinian/Arab world relationships, oil and Persian/Arabian Gulf, human rights. prereq: Credit will not be granted if credit has been received for: : 4477; 1054 or 3051 or non-pol sci grad student or instr consent

POL 5485. Human Rights Policy: Issues and Actors. (; 3 cr.; Student Option; Every Fall)
Politics of human rights issue emergence; relevant international, regional, and domestic norms; correlates of state repression; measurement of human rights abuse and remedies; human rights promotion by states, political parties, international organizations, NGOs, social movements, faith-based organizations, and providers of international development assistance.

POL 5502. Supreme Court, Civil Liberties, and Civil Rights. (; 3 cr.; Student Option; Every Spring)
Supreme Court's interpretation of Bill of Rights, 14th amendment. Freedom of speech, press, religion. Crime/punishment. Segregation/ desegregation, affirmative action. Abortion/privacy. prereq: Credit will not be granted if credit has been received for: : 4502; 1001 or 1002 or equiv or non-pol sci grad student or instr consent

POL 5525. Federal Indian Policy. (; 3 cr.; A-F or Audit; Periodic Fall)
Formulation, implementation, evolution, comparison of Indian policy from pre-colonial times to self-governance of new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature on policies. prereq: Credit will not be granted if credit has been received for: : 4525, AmIn 4525; grad student

POL 5737. American Political Parties. (; 3 cr.; Student Option; Periodic Fall)
American two-party system. Party influence in legislatures/executives. Decline of parties, their future. prereq: grad student or instr consent

POL 5767. Public Opinion and Voting Behavior. (; 3 cr.; Student Option; Every Fall & Spring)
Major factors influencing electoral decisions. Political attitude formation/change. Data analysis lab required. prereq: grad student or instr consent

POL 5810. Topics in International Politics and Foreign Policy. (; 3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Selected issues in contemporary international relations. Topics vary, see Class Schedule.
POL 5833. The United States in the Global EconomyUS For Econ Policy. (3-4 cr. [max 3 cr.]; Student Option; Periodic Fall) Domestic/international politics of United States. Foreign economic policy (trade, aid, investment, monetary, migration policies). Effects of policies and international economic relations on U.S. economy/politics. prereq: Consent Credit will not be granted if credit has been received for: 4833; grad student; 3835 recommended

POL 5885. International Conflict and Security. (3 cr.; Student Option; Periodic Fall) Alternative theories of sources of militarized international conflict. Theories applied to past conflicts. Theories’ relevance to present. prereq: Grad student

POL 5970. Individual Reading and Research. (1-4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. Prereq instr consent, dept consent, college consent.

POL 8060. Research Proseminar in Political Science. (2 cr. [max 8 cr.]; S-N only; Every Fall & Spring) Readings, discussion, guest speakers. Topics vary by semester.

POL 8070. Advanced Research and Writing in Political Science. (2 cr. [max 4 cr.]; S-N only; Every Fall & Spring) Commentary/guidance at all stages of dissertation research process. From conceptualization of topic/project to editing of nearly final drafts.

POL 8101. Introduction to Political Science. (3 cr.; A-F or Audit; Every Fall & Spring) History, scope, and methods of political science as a discipline; current subfields; major research programs (including statism, pluralism, institutionalism, realism, behavioralism, rational choice, and critical theory); problems of theory, interpretation, concept-formulation, comparison, measurement and experimentation; designs for research. prereq: Grad pol sci major or instr consent

POL 8104. Professional Development I. (2 cr. [max 4 cr.]; S-N only; Every Spring) The objectives of this course are as follows: (1) to provide students with professional advice that will help them move with dispatch through the graduate program; (2) to learn the formal and informal norms of the discipline; and (3) to help them prepare to do independent research and dissertation research. prereq: 1st year Pol graduate student

POL 8105. Professional Development II. (1 cr. [max 2 cr.]; S-N or Audit; Every Spring) Research ethics. Skills for teaching undergraduate courses in political science. Completion of dissertation prospecti or early chapters. prereq: Pol sci student, ABD, dept consent

POL 8106. Quantitative Political Science I. (3 cr.; Student Option; Every Fall) This course provides a thorough grounding in the quantitative analysis of political science data. The emphasis is on how to analyze such data, interpret statistical results, and summarize and report the findings. By the end of the term you will (1) know how to describe variables; (2) test hypotheses; (3) use measures of association to quantify the relationship between two variables while holding a third variable constant; (4) understand bivariate regression and the basics of multiple regression; (5) understand reliability and validity and how to assess these properties empirically; and (6) know how to use the STATA statistical software program. prereq: Political science grad major or instr consent

POL 8107. Quantitative Political Science II. (3 cr.; A-F only; Every Spring) Multiple linear regression model applied to political science data. How to use regression techniques to analyze data, interpret statistical results, and summarize/report the findings. Estimation of model. Underlying assumptions. Inference. Model diagnostics. Extensions of model. prereq: Political science grad major or instr consent

POL 8120. Core Course in Political Methodology: Modeling Political Processes. (3 cr.; Student Option; Fall Odd, Spring Even Year) Methods used and potential for creating models of political processes. Designing political institutions, discerning/forecasting election outcomes, producing early warnings of international conflicts, increasing turnout in elections. Using mathematics to study political strategic and collective decision making in committees/legislatures. Using statistics to measure political variables, design experiments with human subjects, and test micro/macro political theories. prereq: Pol sci grad major or instr consent

POL 8122. Positive Theory. (3 cr.; Student Option; Every Fall) Survey of positive political theory and rational-choice models. Information and transaction costs; institutions; models of elections, voting, coalitions. prereq: Grad pol sci major or instr consent

POL 8124. Game Theory. (3 cr.; Student Option; Every Spring) Application of noncooperative game theory in political science. Equilibrium concepts, bargaining, repeated games, games of incomplete information, signaling games, reputation, learning in games. prereq: [8122, grad pol sci major] or instr consent

POL 8125. Dynamic Analysis. (3 cr.; Student Option; Periodic Fall & Spring) Time series method, its application in political science. prereq: Pol sci grad student or instr consent

POL 8126. Qualitative Methods. (3 cr.; Student Option; Fall Even, Spring Odd Year) Qualitative methods in social science. Hands-on training through fieldwork projects. Interviewing, participant observation, narrative interpretation, ethical problems. Issues of gender/race in fieldwork. prereq: Grad student

POL 8127. Survey Research Methods: Measuring Public Opinion. (3 cr.; Student Option; Fall Even, Spring Odd Year) Theoretical/empirical issues in survey research methodology aimed at assessing political attitudes/behave (including questionnaire design, scientific sampling). Skill areas necessary to analyze, design, or conduct surveys to examine political phenomena. prereq: Pol sci grad major

POL 8131. Advanced Methods and Models. (3 cr.; Student Option; Every Fall) Introduction of statistical methodology and deductive modeling; issues in merging inductive and deductive research. Sample topics: parties and elections, probabilistic voting, strategic modeling of international relations. prereq: Grad pol sci major, 6 cr 81xx seminars or instr consent

POL 8160. Topics in Models and Methods. (3 cr.; max 12 cr.; Student Option; Every Fall & Spring) Seminars on selected topics, as specified in Class Schedule.

POL 8201. Understanding Political Theory. (3 cr.; Student Option; Every Fall & Spring) Key concepts/major approaches. prereq: Grad student or instr consent

POL 8215. Philosophy of Political Inquiry. (3 cr.; Student Option; Every Fall) Major schools in philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political issues raised by philosophy of science: liberalism, democracy, control multiculturalism. prereq: Grad pol sci major or instr consent

POL 8225. American Political Thought. (3 cr.; Student Option; Every Fall) Colonial era to present: Puritans, American Revolution, Constitution, rise of individualism, pro- and anti-slavery arguments, civil war and reconstruction, industrialism, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Great Depression; growth of American power at home and abroad. prereq: Grad pol sci major or instr consent

POL 8235. Democratic Theory. (3 cr.; Student Option; Periodic Fall & Spring) Competing models of democracy: classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of “democracy”; social science models of and findings on democracy. prereq: Grad pol sci major or instr consent

POL 8251. Ancient and Medieval Political Thought. (3 cr.; Student Option; Every Fall) Politics and ethics in Greece, Rome, Christendom: Thucydides, Socrates, Plato, Aristotle, Cicero, Augustine, Aquinas, Marsilius. prereq: Grad pol sci major or instr consent

POL 8252. Early Modern Political Thought. (3 cr.; Student Option; Every Fall) Theorists and texts from Renaissance to French Revolution. Selectively includes
POLE 0253. Late Modern Political Thought. (3 cr.; Student Option; Every Fall & Spring)

Theoretical responses to and rival interpretations of Western economic, society, politics, and democratic culture in the modern age; theories of history; class struggle; the end of metaphysics and the death of God; technology and bureaucracy; psychology of culture, in Hegel, Marx, Tocqueville, Mill, Nietzsche, Weber, Freud. prereq: Grad pol sci major or instr consent

POLE 0260. Topics in Political Theory. (3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)

Readings and research in special topics or problems. prereq: Grad pol sci major or instr consent

POLE 0275. Contemporary Political Thought. (3 cr.; Student Option; Every Fall)

From approximately World War II to the present. Survey of range of texts or intensive focus on such authors as Adorno, Arendt, Derrida, Foucault, Habermas, Horkheimer, Rawls, Said. Sample topics: feminism, postmodernism, communitarianism, Frankfurt School, postcolonialism. prereq: Grad pol sci major or instr consent

POLE 0301. American Politics. (3 cr.; Student Option; Periodic Fall & Spring)

Seminar on main themes of theory and research in American politics, institutions, law, and policy. Major works on individual, mass, elite, and institutional behavior and their relationship to each other. Foundation for advanced seminars in American politics. prereq: Grad pol sci major or instr consent

POLE 0302. Public Opinion and Political Behavior. (3 cr.; Student Option; Every Fall)

Major theoretical perspectives/research on public participation, voting behavior, public opinion. Voter turnout, importance of party identification, effects of campaigns, long-term change in public opinion, designing/conducting research. prereq: Grad pol sci major or instr consent

POLE 0303. Political Parties. (3 cr.; Student Option; Every Fall)

Party systems and subsystems; party organizational characteristics, goals, and incentives; distribution of power and authority within the party; chief party functions; party as an organizer of governmental power; determinants of party structure and role. prereq: Grad pol sci major or instr consent

POLE 0305. Interest Groups and Social Movements. (3 cr.; Student Option; Every Fall & Spring)

Theoretical/empirical work on role of interest groups and social/political movements in American politics and policy-making processes. Theories of interest group and social/political movement formation, maintenance, and decline. How interest groups and social/political movements attempt to influence public policy. Impact/effectiveness groups/movements as agents of democratic representation, particularly for marginalized groups. prereq: Grad pol sci major or instr consent

POLE 0307. Proseminar in Political Psychology I. (2 cr.; S-N or Audit; Every Fall)

Readings, discussion, and guest speakers. Topics vary by semester. prereq: Grad pol sci major or pol psych minor or instr consent

POLE 0308. Proseminar in Political Psychology II. (2 cr.; S-N or Audit; Every Spring)

Readings, discussion, and guest speakers. Topics vary by semester. prereq: Grad pol sci major or pol psych minor or instr consent

POLE 0311. Political Psychology and Socialization. (3 cr.; A-F or Audit; Every Fall & Spring)

Introduction to political psychology. Personality and politics; political cognition, emotion, and political behavior; political expertise; media and politics; aggression, authoritarianism, and political behavior; altruism and politics. prereq: Grad pol sci major or pol psych minor or instr consent

POLE 0312. Legislative Process. (3 cr.; Student Option; Every Fall & Spring)

Introduction to study of legislative politics; theories of legislative institutions and individual behavior; congressional elections; congressional committees, parties, and leaders. prereq: Grad pol sci major or instr consent

POLE 0313. Executive Process. (3 cr.; Student Option; Every Fall)

Tension between leadership and democracy in context of American presidency in terms of President's relationship with federal bureaucracy, Congress, and making of diplomatic and military policy. prereq: Grad pol sci major or instr consent

POLE 0314. Judicial Process. (3 cr.; Student Option; Every Fall)

Judicial systems and roles; selection of judges; organizing and supporting litigation; influences on judicial decisions; impact and enforcement of judicial decisions; courts and other institutions of government. prereq: Grad pol sci major or instr consent

POLE 0320. Social Psychology of Prejudice and Intergroup Relations. (3 cr.; A-F or Audit; Every Fall)

Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.

POLE 0321. Urban Politics. (3 cr.; A-F or Audit; Every Fall)

Selection of local leadership; relationship of political system to governmental forms and social institutions; role and impact of political institutions; policymaking at local level; studies in policy problems; the emerging metropolis. prereq: Grad pol sci major or instr consent

POLE 0325. State Politics and Intergovernmental Relations. (3 cr.; Student Option; Every Fall)

Theoretical approaches to comparative study of state politics: study of political culture and behavior, governmental institutions, and public policy at state level; federalism. prereq: Grad pol sci major or instr consent

POLE 0331. Constitutional Law. (3 cr.; Student Option; Every Fall)

Overview of substantive and theoretical debates in American constitutional law; role of law and constitutional interpretation in shaping American political institutions and American politics. prereq: Grad pol sci major or instr consent

POLE 0333. FTE: Master's. (1 cr.; No Grade; Associated; Every Fall, Spring & Summer)

No description. prereq: Master's student, adviser and DGS consent

POLE 0335. Public Policy. (3 cr.; Student Option; Every Fall)

Theoretical approaches: incrementalism, innovation and policy learning, comparative policy outputs, policy process models, interest groups, and selected areas of public policy. prereq: Grad pol sci major or instr consent

POLE 0337. Welfare State Theories and American Social Policy. (3 cr.; Student Option; Every Fall)

Rival theoretical explanations for cause and nature of welfare state development in context of four American social policies: social security, welfare, education, and healthcare. prereq: Grad pol sci major or instr consent

POLE 0360. Topics in American Politics. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)

Readings and research in special topics or problems. prereq: instr consent

POLE 0401. International Relations. (3 cr.; Student Option; Every Fall & Spring)

Basic theories/approaches to study of international politics. Surveys representative work/central issues of scholarship. prereq: Grad pol sci major or dept consent

POLE 0402. International Security. (3 cr.; Student Option; Spring Odd Year)

Introduction to contending theories of international conflict/security. prereq: Grad pol sci major or instr consent

POLE 0403. International Norms and Institutions. (3 cr.; Student Option; Periodic Fall & Spring)

Origins, roles, and effectiveness of international norms and institutions; theoretical explanations and debates. Institution of sovereignty; rational choice versus constructivist perspectives; role of international law, international organizations, and non-governmental organizations; and international society and transnational cultural norms. prereq: Grad pol sci major or instr consent

POLE 0404. International Hierarchy. (3 cr.; Student Option; Periodic Fall)

Asymmetric structures and processes of international relations; systemic conditions and
implications of informal empire and structures of hegemony; cultural productions of difference and inequality. prereq: Grad pol sci major or instr consent

POL 8405. International Political Economy. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring) Theoretical and policy issues in international economic relations. Different approaches for understanding outcomes in international economy. Trade, finance, labor markets, creation and maintenance of international regimes, and “globalization” of economic liberalism. prereq: Grad pol sci major or instr consent

POL 8406. Politics of International Finance. (; 3 cr. ; Student Option; Periodic Fall & Spring) Relationship between workings of the international political system and that of international markets for currency and capital. prereq: Grad pol sci major or instr consent

POL 8407. Morality in World Politics. (; 3 cr. ; Student Option; Periodic Fall & Spring) Approaches to normative theorizing and empirical research on moral norms in world politics. Theoretical topics: realism, communitarianism, consequentialism, constructivism, postmodernism, cultural relativism. Substantive issue areas: famine and foreign aid, just war theory, nuclear weapons, moral implications of technology, case study on war (Gulf War). prereq: Grad pol sci major or instr consent

POL 8408. International Relations of the Environment. (; 3 cr. ; Student Option; Periodic Fall) Theory and practice of international environmental politics. Emergence of environment as major issue of international relations. Diversities of agendas and politics. Imperatives, templates, resistance in global efforts to forge an applied politics of environmental sustainability. Selected cases. prereq: Grad pol sci major or instr consent

POL 8411. Political Psychology and Foreign Policy. (; 3 cr. ; Student Option; Periodic Fall & Spring) Foreign policy theories about decision makers and audiences. Impact of human nature, formal institutions, cultural and cross-cultural settings, and kinds of issues on foreign policy choice, control, and justification. prereq: Grad pol sci major or instr consent

POL 8412. American Foreign Policy. (; 3 cr. ; Student Option; Periodic Fall & Spring) U.S. policy toward foreign states and peoples: heritage, motivations, policy processes, what the public generally knows and wants, specific policies. Rise of internistic issues and decline of enemy-focused internationalism; implications for process and content of U.S. foreign policy. prereq: 8410 or instr consent

POL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

POL 8460. Topics in International Relations. (; 3 cr. [max 6 cr.]; Student Option; Every Fall & Spring) Readings and research in advanced topics or problems. Recent topics: global environmental issues, morality in world politics, and norms and institutions in world politics.

POL 8601. Introduction to Comparative Politics. (; 3 cr.; Student Option; Periodic Fall & Spring) Main theoretical approaches and issues: comparative method, the state and class; political culture; development, democratization, rational choice, social movements. prereq: Grad pol sci major

POL 8602. Families, Children, and the State. (; 3 cr.; A-F or Audit; Periodic Fall) Politics of family, sex, and children. Comparative perspective. Family autonomy vs. state authority. Political struggles over the definition of family, sex, and marriage. Crisis in fatherhood. Children's rights. Globalization of Western ideology of childhood. Political realities of third-world childhood. Theories of political efficacy in family/child advocacy.

POL 8603. European Government and Politics. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Main theories and approaches used to interpret European politics. Many of these theories have broad relevance for comparative politics, for example, theories about the state, cleavages and coalitional bases, parties and social movements, and constitutional structures and institutions have broad relevance for the field of comparative politics. prereq: Grad pol sci major or instr consent

POL 8605. Government and Politics in Africa. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Theoretical and methodological approaches to study of African politics, focusing on pre-colonial and colonial legacies for post-colonial reality. Local politics, social construction of identities, political economy of peasantry and working class, political development and decay, social movements, and prospects for democracy. prereq: Grad pol sci major or instr consent

POL 8606. Government and Politics of Russia and the Commonwealth of Independent States. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Framework for understanding politics of change underway in the former Soviet Union. Roots of current transformation, including causes and legacy of the Russian revolution and creation of the Soviet Union. Issues in current transformation, including nationalism, economic reform, and democratization. Prior knowledge of basic Soviet politics is assumed. prereq: Grad pol sci major or instr consent

POL 8611. Chinese Politics. (; 3 cr.; Student Option; Periodic Fall & Spring) Major issues since 1949: democratization, dissent, violence, gender, capitalist and socialist development strategies, inequality, effect of culture on politics, status of Taiwan. Current scholarly debates on Chinese politics. Professional methods for research on contemporary China. prereq: Grad pol sci major or instr consent

POL 8615. The Political Economy of Contemporary Japan. (; 3 cr.; Student Option; Periodic Fall & Spring) Major political and economic issues confronting the Japanese system; situation of Japanese case within comparative politics literature concerning role of the state in formulating economic and social policy making. Review of literature. Deregulation in key industries, welfare reform, tax reforms. prereq: Grad pol sci major or instr consent

POL 8619. Latin American Politics. (; 3 cr.; Student Option; Periodic Fall & Spring) Major bodies of theory on development, democracy and redemocratization, social movements, civil society, the state, and transnational linkages. prereq: Grad pol sci major or instr consent

POL 8633. Comparative Sociopolitical Change. (; 3 cr.; Student Option; Periodic Fall & Spring) Critical evaluation of literature and theoretical perspectives; comparative examination of social and political change and interrelationship between both processes; structure/agency nexus. prereq: Grad pol sci major or instr consent

POL 8637. Comparative Political Economy. (; 3 cr.; Student Option; Periodic Fall & Spring) Connections between democracy and markets, emphasizing experiences of countries in North America and Europe. prereq: Grad pol sci major or instr consent

POL 8641. Comparative Mass Political Behavior. (; 3 cr.; A-F or Audit; Fall Even, Spring Odd Year) Examined from a cross-national perspective. Development of political participation, mobilization and its effects, development of political cleavages and political parties as vehicles of conflict, modes of political behavior under varied systems of representation and varied party systems. prereq: Grad pol sci major or instr consent

POL 8643. Comparative Political Institutions. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Structure/operation of various political institutions in different settings. Theoretical approaches, comparative frameworks. Introduction to literature on political institutions. Preparation for comparative research on political institutions. prereq: Pol sci grad student or instr consent

POL 8660. Topics in Comparative Politics. (; 3 cr. [max 9 cr.]; Student Option; Every Fall & Spring) Readings in advanced topics or problems. Supervised research/training. Topics specified in Class Schedule.

POL 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral, up to 24 combined cr, permission number required for registration, doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr
PORT 1101. Beginning Portuguese. (3 cr.; Student Option; Every Fall & Summer)
Listening, speaking, reading, writing. Cultures of Portugal, Brazil, or Portuguese-speaking Africa. Workbook assignments, paired/small group activities.

PORT 1102. Beginning Portuguese. (3 cr.; Student Option; Every Spring)
Reading, writing, speaking, listening. Cultures of Portugal, Brazil, or Portuguese-speaking Africa. Workbook assignments, paired/small group activities. Meets concurrently with 1101.

PORT 1103. Intermediate Portuguese. (5 cr.; Student Option; Every Fall)
Emphasizes speaking, comprehension. Listening/writing skills based on Portuguese-language materials. Cultures of Portugal, Brazil, or Lusophone Africa. Grammar review. Compositions, short presentations. prereq: 1101 or instr consent

PORT 1104. Intermediate Portuguese. (5 cr.; Student Option; Every Spring)
Emphasizes speaking, comprehension. Listening/writing skills based on Portuguese-language materials. Cultures of Portugal, Brazil, or Lusophone Africa. Grammar review. Compositions, short presentations. prereq: 1103 or instr consent

PORT 1904. Freshman Seminar. (GP; 3 cr.; Student Option; Periodic Fall)
Topics specified in Class Schedule.

PORT 3001. Portuguese for Spanish Speakers. (4 cr.; Student Option; Every Fall, Spring & Summer)
Listening, speaking, reading, writing. Uses communicative approach. prereq: [SPAN 1004 or SPAN 1014 or SPAN 1044, SPAN LPE pass] or instr consent

PORT 3002. Business Portuguese for Spanish Speakers. (4 cr.; Student Option; Every Spring)
Basic communication skills in Portuguese. Cultural knowledge needed to function in business environment in Brazil. Designed for English speakers with proficiency in Spanish, but with no prior knowledge of Brazilian Portuguese or for students with limited knowledge of Portuguese. prereq: SPAN LPE pass. [SPAN 1004 or SPAN 1014 or SPAN 1044 or instr consent]

PORT 3003. Portuguese Conversation and Composition. (4 cr.; Student Option; Every Fall & Spring)
Development of oral/written skills. Cultural information from Portuguese-speaking world. prereq: 1104 or 3001 or Port LPE

PORT 3501W. Global Portuguese: 1300-1900. (3-3 cr.; Student Option; Every Fall)
Expressions of medieval/renaissance Portuguese culture/ colonial Brazilian culture through independence. Nineteenth century developments. Relation to new African empire, abolition of slavery, institution of Brazilian republic. prereq: 3003

PORT 3502W. Global Portuguese: 1900-present. (3-3 cr.; Student Option; Every Spring)
Significant expressions of Brazilian culture, from colonial period to present. Emphasizes 20th/21st centuries. Literature, history, visual/ sound culture, architecture. prereq: 3003

PORT 3800. Film Studies in Portuguese. (3 cr.; [max 9 cr.]; A-F or Audit; Periodic Fall)
FIlms from Portuguese-speaking world in their historical, (geo)political, and socioeconomic contexts. Films from Brazil, Portugal, or Lusophone Africa analyzed under interdisciplinary framework, noting aspects related to cinematography/rhetoric. prereq: 3003 or instr consent or dept consent

PORT 3910. Topics in Lusophone Literatures. (3 cr.; [max 9 cr.]; Student Option; Periodic Fall & Spring)
Issues studied through literature, visual, sound, media from one or more Portuguese-speaking countries. Topics may include gender/sexuality, postcolonialism/globalization, transatlantic studies. prereq: 3003

PORT 3920. Topics in Lusophone Cultures. (3 cr.; [max 9 cr.]; Student Option; Every Spring)
Critical studies of various aspects of Portuguese-speaking cultures (Portugal, Brazil, or Lusophone Africa). Topics may include popular music, visual/media culture, religion, diaspora, Amazon.

PORT 4001. Portuguese for Spanish Speakers and Graduate Student Research. (4 cr.; Student Option; Every Fall, Spring & Summer)
Listening, reading, speaking, writing. Uses communicative approach. prereq: [SPAN 1004 or SPAN 1014 or SPAN 1044, SPAN LPE pass] or instr consent

PORT 4101. Beginning Portuguese for Graduate Student Research. (5 cr.; Student Option; Every Fall)
Listening, speaking, reading, writing. Cultures of Portugal, Brazil, or Portuguese-speaking Africa. Workbook assignments, paired/small group activities. Meets concurrently with 1101.

PORT 4102. Beginning Portuguese for Graduate Student Research. (5 cr.; Student Option; Every Spring)
Reading, writing, speaking, listening. Cultures of Portugal, Brazil, or Portuguese-speaking Africa. Workbook assignments, paired/small group activities.
PORT 5970. Directed Readings. (1-4 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Lusophone studies (Portuguese-speaking Africa, Brazil, Portugal). Areas not covered in other courses. Students submit reading plans for particular topics, figures, periods, or issues. Prereq MA or PhD candidate, instr consent.

PORT 5990. Directed Research. (1-4 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Graduate-level research in literatures and cultures of the Portuguese-speaking world. Topics vary. Prereq Grad student or instr consent.

PORT 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PORT 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**Postsecondary Tchg and Lrng (PSTL)**

PSTL 1211. Sociological Perspectives: A Multicultural America. (DSJ, SOCS; 4 cr.; Student Option; Every Fall & Spring)
Introduction to sociological thinking through engaged, active learning, including service in community. Interaction of race, class, gender, age with greater societal institutions. Apply foundational understanding of sociology to real world situations.

PSTL 5306. College Student Mental Health. (2 cr.; A-F only; Every Spring)
Mental health of college students, ways colleges provide support for students with mental health concerns, basic skills all college faculty/staff need to provide support to students experiencing distress, self-care strategies for support givers.

**Power Systems, Pwr Electronics (PSE)**

PSE 6011. Electric Machines and Drives. (3 cr.; A-F or Audit; Every Fall & Spring)
Students learn various aspects of electric machines and drives under a steady state operation. Course provides overview of the components and control and a basic fundamental understanding for further learning. This course describes the principles behind how electric machines operate, in a way that they can be controlled in adjustable speed and position applications. In order to do so, power-electronics based converters are described in their functionality as well as the feedback control of speed and position in a system. Prereq: Circuit analysis ???. dc and sinusoidal ac in steady state using phasors; basic idea of diode, transistor and thyristor operation; Fourier analysis; Laplace Transform: Bode Plots, gain and phase margin; Electromagnetic field concepts, magnetic-circuit concepts

PSE 6021. Power Systems. (3 cr.; A-F or Audit; Every Fall & Spring)
Students will learn various aspects of electric power systems and receive an overview of the various components and control and a basic fundamental understanding for further learning. Course begins with examining various means of generating electricity and then transmitting it over power lines and cables; calculating power flow in an interconnected grid; various components such as transformers, synchronous generators, etc. that make up power systems. The middle-part of the course describes the requirements for voltage stability and keeping the generators operating synchronously under transient fault conditions. The last part of the courses deals with the protection of power systems against transmission line faults using protective relaying, and under transient over-voltages by means of insulation coordination using surge arrestors. Prereq: Circuit analysis ???. dc and sinusoidal ac in steady state using phasors; basic idea of diode, transistor and thyristor operation; Fourier analysis; Laplace Transform; Electromagnetic field concepts, magnetic-circuit concepts

PSE 6031. Power Electronics. (3 cr.; A-F or Audit; Every Fall & Spring)
Course on power electronics, an enabling technology, with a focus on its various applications, basic converter structures and how these converters are used and controlled in these applications. By exploiting the commonality of various converters, students get a much deeper and broader understanding. The concentration of this course will be on switch-mode power electronics where the transistors such as MOSFETs and IGBTs are used as semiconductor switches - either ON or OFF. The terminal characteristics of these devices will be discussed for designing converters in which they are used in order to calculate conduction and switching losses for thermal management and design trade-offs; however, in analyzing the voltage transfer ratios in various converter topologies and in their feedback control, these semiconductor devices and the associated passive components will be considered ideal. The last part of the course will discuss thyristor-based converters used at very high power levels in electric-utility applications. Prereq: Circuit analysis ???. dc and sinusoidal ac in steady state using phasors; basic idea of diode, transistor and thyristor operation; Fourier analysis; Laplace Transform: Bode Plots, gain and phase margin; Electromagnetic field concepts, magnetic-circuit concepts

PSE 6041. Power Generation Operation and Control. (3 cr.; A-F or Audit; Every Fall & Spring)
Power system operations and economics is a topic important to understanding how decisions are made in hour by hour control of a power system and in planning of new power system facilities. The cost of power starts with acquiring fuel and in buying and selling power with neighboring electric companies and in markets. The course builds on the characteristics of large generating facilities to include how they are operated to minimize cost while meeting the requirement to supply load and keep equipment operating within safe margins. This necessarily brings into focus the transmission system which connects generators to loads and several sections of the course are devoted to transmission system operation and analysis. Students will be introduced to new optimization methods and new analysis methods used in the power industry. Prereq: Advanced calculus, linear algebra, Laplace transforms, circuit analysis - dc and sinusoidal ac in steady state using phasors; basic power systems analysis including three phase per unit systems, real and reactive power calculations, power flow calculations, basic probability and statistics, basic time series analysis of signals.

**Preventive Science Minor (PREV)**

PREV 8001. Prevention Science Core. (3 cr.; Student Option No Audit; Every Spring)

PREV 8005. Prevention Science Capstone Course. (1 cr.; Student Option No Audit; Periodic Fall)
Topics for preservation research project. Students discuss possible projects with faculty/peers. Students present final proposal for research project.

**Product Design (PDES)**

PDES 2701. Creative Design Methods. (3 cr.; A-F only; Every Fall)
Introduction to a variety of creativity and idea generation tools with an emphasis on innovative product concept development. Students apply different toolsets to an ongoing project. Starting with a general theme, students explore problems and concepts, practice using a variety of idea generation tools, and learn methods of evaluating and selecting concepts. Customer needs, benchmarking, and intellectual property.

PDES 2702. Concept Sketching. (3 cr.; A-F only; Every Fall)
Sketching and marker rendering for communication of conceptual product design. Free-hand two-point perspective. Weekly drawing assignments and presentations. Students keep a sketchbook to develop ideas and drawings.

PDES 2703. Concept Visualization and Presentation. (3 cr.; A-F only; Every Spring)
This class is a continuation of sketching and rendering for communication of conceptual product design, building upon the principles of 2702 Concept Sketching. Emphasis is placed
on refining sketches and ideas for presentation. Each week during lecture, students learn a different toolset and apply it to weekly drawing assignments.

PDES 3703. Product Form and Model Making. (4 cr.; A-F only; Every Fall) Principles of 3D design. Applications to visual expression and product design. Model making tools/techniques. Elements of visual communication. Function/form development. Projects, exercises. Individual reviews, group critiques. prereq: PDes major, completion of at least one-half of professional sequence, plan submitted/approved in advance by [adviser, internship supervisor], written consent of faculty supervisor, instr consent

PDES 3704. Computer-Aided Design Methods. (3 cr.; A-F only; Every Spring) Overview of how to make well-modeled, properly illuminated, carefully composed digital models of existing/conceptual objects.

PDES 3705. History and Future of Product Design. (3 cr.; A-F only; Every Spring) History, evolution, and trajectory of modern industrial/product design. Human relationships to consumer goods, including production aspects and consumption aspects.

PDES 3706. Designing for Manufacture. (4 cr.; A-F only; Every Fall) Hands-on exposure to a number of common manufacturing methods and the considerations in product design. Students will be able to apply the theory of design for manufacturing (DFM) and design for assembly (DFA) to other manufacturing processes.

PDES 4193. Directed Study in Product Design. (1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent study in product design under tutorial guidance. prereq: Undergrad, instr consent

PDES 4701W. Capstone Research Studio. (WI; 4 cr.; A-F only; Every Fall) Students synthesize and apply design and research techniques (including: user research/ethnography, ideation, conceptual design, prototyping) to a senior capstone project. Projects can be team-directed or client-sponsored and are intended to demonstrate competency in fundamental design skills, communicating design processes, and the ability to apply design processes to develop new products and services while addressing real-world constraints. The first part of the two-course sequence focuses on user research, documentation, and concept ideation.

PDES 5193. Directed Study in Product Design. (1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent study in product design under tutorial guidance. prereq: Grad, instr consent

PDES 5701. Creativity, Idea Generation, and Innovation. (3 cr.; A-F only; Every Fall) Introduction to a variety of creativity and idea generation tools with an emphasis on innovative product concept development. Students apply different toolsets to an ongoing project. Starting with a general theme, students explore problems and concepts, practice using a variety of idea generation tools, and learn methods of evaluating/selecting concepts. Customer needs, benchmarking, and intellectual property.

PDES 5702. Concept Sketching and Rendering. (3 cr.; A-F only; Every Fall) Sketching and marker rendering for communication of conceptual product design. Free-hand 2-point perspective. Weekly drawing assignments/presentations. Students keep a sketchbook to develop ideas/drawings.


PDES 5704. Computer-Aided Design Methods. (3 cr.; A-F only; Every Spring) Overview of how to make well-modeled, properly illuminated, and carefully composed digital models of existing/conceptual objects. prereq: Senior or grad student

PDES 5705. History and Future of Product Design. (3 cr.; A-F only; Every Spring) History, evolution, and trajectory of modern industrial/product design. Human relationships to consumer goods, including production aspects and consumption aspects.

PDES 5706. Designing for Manufacture. (4 cr.; A-F only; Every Fall) Hands-on exposure to a number of common manufacturing methods and the considerations in product design. Students will be able to apply the theory of design for manufacturing (DFM) and design for assembly (DFA) to other methods that may not be taught in this course. prereq: PDes 5704 or CAD experience.

PDES 5711. Toy Product Design. (4 cr.; A-F only; Every Spring) Product design process with a focus on creativity and designing for play. Project-centric. Students work in small teams of 5-6 members to design and prototype new toys with the help of local industry and children.

PDES 6192. Readings in Product Design. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring) Independent study; review of books and periodicals under tutorial guidance. prereq: Grad, instr consent

PDES 8193. Directed Study in Product Design. (1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent study in product design under tutorial guidance. prereq: Grad, instr consent

Prosthodontics (PROS)

PROS 7110. Classic Prosthodontic Literature Review. (2 cr.; A-F or Audit; Every Fall & Spring) Selected historical literature. Current research, its implications for present-day restorative dental therapy. prereq: instr consent

PROS 7120. Current Literature Review. (1-3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Summer) Historical development of maxillofacial prosthetics, interdisciplinary relationships in treatment of maxillofacial patient.

PROS 7161. Applied Biomaterials. (2 cr.; A-F or Audit; Every Summer) Principles governing manipulation of materials used in restorative dental practice. The physical and mechanical properties and the biocompatibility of dental materials to oral tissues. prereq: instr consent

PROS 7171. Principles of Maxillofacial Care. (2 cr.; A-F or Audit; Every Fall & Summer) Treatment, biomechanics, and technical procedures associated with fabrication, fitting, and servicing of various types of oral and facial prostheses.

PROS 7200. Advanced Clinical Prosthodontics I. (5 cr.; A-F or Audit; Every Fall, Spring & Summer) Practical clinical experience in examination, diagnosis, treatment planning, and various phases of treatment of patients with complex restorative dental problems. New and unfamiliar concepts and techniques. prereq: instr consent

PROS 7210. Advanced Technical Restorative Dentistry. (2 cr.; A-F or Audit; Every Summer) Residents are exposed to technical aspects of complete denture, removable partial denture, fixed partial denture construction, associated use of implants, considerations related to temporomandibular dysfunction (TMD). prereq: instr consent; offered concurrently with course on dental materials, head/neck anatomy.
Psychology (PSY)

PSY 1001. Introduction to Psychology. (SOC; 4 cr.; Student Option; Every Fall, Spring & Summer)
Scientific study of human behavior. Problems, methods, findings of modern psychology.

PSY 1001H. Honors Introduction to Psychology. (SOC; 4 cr.; A-F only; Every Fall & Spring)
Scientific study of human behavior. Problems, methods, findings of modern psychology.
prereq: Honors.

PSY 1902. Freshman Seminar. (DSJ; 3 cr.; Student Option; Every Fall)
Topics specified in Class Schedule. prereq: Fr

PSY 1905. Freshman Seminar. (3 cr.; max 6 cr.; A-F or Audit; Every Fall & Spring)
Topics specified in class schedule.

PSY 1907W. Freshman Seminar. (DSJ,WI; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule. prereq: freshman

PSY 1942. Freshman Seminar. (TS; 3 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring)
Topics specified in Class Schedule. prereq: Fr

PSY 3001V. Honors Introduction to Research Methods. (WI; 4 cr.; A-F only; Every Spring)
Concepts/procedures used to conduct/evaluate research, especially in social sciences. Benefits/limitations of traditional research methods. Evaluating scientific claims. prereq: [1001, 2081/3801 or equiv] or dept consent, PSY major, honors student

PSY 3001W. Introduction to Research Methods. (WI; 4 cr.; Student Option; Every Fall, Spring & Summer)
Concepts/procedures used to conduct/evaluate research, especially in social sciences. Benefits/limitations of traditional research methods. Evaluating scientific claims. prereq: [1001, 2081 or 3801 or equiv] or dept consent

PSY 3011. Introduction to Learning and Behavior. (3 cr.; Student Option; Every Fall)
Methods/findings of research on learning and behavior change. Twentieth-century theoretical perspectives, including contemporary models. Emphasizes animal learning and behavioral psychology. prereq: 1001

PSY 3031. Introduction to Sensation and Perception. (3 cr.; Student Option; Every Fall & Spring)
Psychological, biological, and physical bases of sensory experience in humans and animals. Emphasizes senses of vision/hearing. prereq: PSY 1001

PSY 3051. Introduction to Cognitive Psychology. (3 cr.; Student Option; Every Fall, Spring & Summer)
Scientific study of the mind in terms of representation and processing of information. Research and theory on cognitive abilities such as perception, attention, memory, language, and reasoning. Aspects of computational modeling and neural systems. prereq: 1001

PSY 3061. Introduction to Biological Psychology. (3 cr.; Student Option; Every Fall, Spring & Summer)
Neurophysiology/neuroanatomy, neural mechanisms of motivation, emotion, sleep-wakefulness cycle, learning/memory in animals/humans. Neural basis of abnormal behavior, drug abuse, prereq: 1001 or BIOL 1009 or NSci 1100 preq: 1001 or BIOL 1009 or NSci 1100

PSY 3101. Introduction to Personality. (3 cr.; Student Option; Every Fall, Spring & Summer)
Major theories, issues, facts about personality and personality assessment. Review of important historical/contemporary perspectives (e.g., psychoanalysis, humanistic psychology, trait psychology, behaviorism, evolutionary psychology) on human nature/individuality.
preq: 1001

PSY 3121. History and Systems of Psychology. (3 cr.; Student Option; Every Fall & Spring)
Survey of the history, methods, and content of modern psychological theory, research, and application. Schools of psychology (e.g., structuralism, functionalism, behaviorism, Gestalt psychology) and central theories of psychology reviewed in their historical and philosophical context. preq: PSY 1001

PSY 3135. Introduction to Individual Differences. (3 cr.; Student Option; Every Fall & Spring)
Differential methods in studying human behavior. Psychological traits. Influence of age, sex, heredity, environment in individual/group differences in ability, personality, interests, social attitudes. prereq: [1001, 3801 or equiv] or instr consent

PSY 3201. Introduction to Social Psychology. (3 cr.; Student Option; Every Fall, Spring & Summer)
Overview of theories/research in social psychology. Attitudes/persuasion, social judgment, the self, social influence, aggression, prejudice, helping, and applications. preq: 1001 or instr consent

PSY 3206. Introduction to Health Psychology. (3 cr.; Student Option; Every Spring)
preq: 1001

PSY 3301. Introduction to Cultural Psychology. (3 cr.; A-F or Audit; Every Fall & Spring)
Theories/research on how culture influences basic psychological processes (e.g., emotion, cognition, psychopathology) in domains that span different areas of psychology (e.g., social, clinical, developmental, industrial-organizational) and of other disciplines (e.g., anthropology, public health, sociology). prereq: 1001

PSY 3511. Introduction to Counseling Psychology. (3 cr.; Student Option; Every Fall, Spring & Summer)
History, theories, and research related to counseling psychology. Development/application of counseling theories to diverse populations. Psychological research on counseling process. Psychological mechanisms that promote change in people's lives. prereq: 1001

PSY 3604. Introduction to Abnormal Psychology. (3 cr.; Student Option; Every Fall, Spring & Summer)
Diagnosis, classification, etiologies of behavioral disorders. preq: 1001

PSY 3617. Introduction to Clinical Psychology. (3 cr.; Student Option; Every Fall & Spring)
Historical developments, contemporary issues. Trends in psychological assessment methods, intervention strategies, and clinical psychology research. Theories behind, empirical evidence for, usefulness of psychological intervention strategies. preq: 3604 or 5604H

PSY 3633. Happiness: Integrating Research Across Psychological Sciences. (3 cr.; Student Option; Every Fall)
Nature of human happiness/fulfillment. Insights from cognitive, personality, and social psychology, and from biology and economics. Integrative approach to feelings that make life worth living. preq: 3001W or 3001V or instr consent

PSY 3666. Human Sexuality. (3 cr.; Student Option; Periodic Fall & Spring)
Overview of theories, research, and contemporary issues in human sexual behavior from an interdisciplinary perspective. Sexual anatomy/physiology, hormones/sexual differentiation, cross-cultural perspectives on sexual development, social/health issues, and sexual dysfunction/therapy. preq: 1001

PSY 3711. Psychology in the Workplace. (3 cr.; Student Option; Every Fall & Spring)
Application of psychological theory/research to recruitment, personnel selection, training/development, job design, work group design, work motivation, leadership, performance assessment, job satisfaction measurement. preq: 1001, [3081/3801 or equiv] or SOC 2550 or instr consent

PSY 3801. Introduction to Psychological Measurement and Data Analysis. (MATH; 4 cr.; Student Option; Every Fall, Spring & Summer)
Descriptive/basic inferential statistics used in psychology. Measures of central tendency, variability, t tests, one-way ANOVA, correlation, regression, confidence intervals, effect sizes. Psychological measurement. Graphical data presentation. Statistical software. preq: High school algebra, [PSY 1001 or equiv]; intended for students who plan to major in psychology

PSY 3801H. Honors Introduction to Psychological Measurement and Data Analysis. (MATH; 4 cr.; A-F only; Every Fall)
Descriptive/basic inferential statistics in psychology. Measures of central tendency,
variability, t tests, one-way ANOVA, correlation, regression, confidence intervals, effect sizes. Psychological measurement. Graphical data presentation. Statistical software. prereq: [1001 or equiv], high school algebra, honors; intended for students who plan to major in psychology

**PSY 3901W. Major Project - Research Laboratory.** (WI; 3 cr.; A-F only; Every Fall, Spring & Summer) Completion of undergraduate major project. prereq: [3801 or equiv], 3001W, completion of five courses from three distribution areas, PSY major, senior

**PSY 3902W. Major Project - Individual Interests.** (WI; 3 cr.; A-F only; Every Fall, Spring & Summer) Completion of undergraduate major project. prereq: [3801 or equiv], 3001W, completion of five courses from three distribution areas, PSY major, senior

**PSY 3903W. Major Project - Community Engagement.** (WI; 3 cr.; A-F only; Every Fall, Spring & Summer) Completion of undergraduate major project. prereq: [3801 or equiv], 3001W, completion of five courses from three distribution areas, PSY major, senior

**PSY 3960. Undergraduate Seminar in Psychology.** (WI; 1-5 cr. [max 45 cr.]; Student Option; Every Fall, Spring & Summer) Undergraduate seminars in subjects of current interest in psychology. prereq: 1001

**PSY 3993. Directed Study.** (1-6 cr. [max 24 cr.]; Student Option; Every Fall, Spring & Summer) Independent reading leading to paper or to oral or written exam. Prereq instr consent, dept consent, college consent.

**PSY 3996. Undergraduate Fieldwork and Internship in Psychology.** (WI; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Supervised fieldwork/internship in community/industry pertinent to formal academic training in psychology. prereq: 1001, instr consent, dept consent, college consent

**PSY 4011. Applied Behavior Analysis.** (3 cr.; Student Option; Every Spring) Fundamental concepts of applied behavior analysis. Practical techniques of behavior modification with humans/animals. Emphasizes functional analyses of behavioral deficits/excesses, development/implementation of programs to bring about meaningful behavior change. prereq: 3011 or instr consent

**PSY 4012. Behavior Analysis and Autism.** (4 cr.; A-F or Audit; Every Spring) Off-campus work with autistic children, under professional supervision. Professional ethics, social responsibility, scientific methods, moral philosophy. At least eight hours per week, for 12 weeks, at service-learning site. One on-campus evening meeting per week, prereq: Individual auto transportation, instr consent

**PSY 4032. Psychology of Music.** (3 cr.; Student Option; Every Spring) Sound, hearing, music perception. Cognitive neuroscience of music appreciation/production. Concepts in perception/production of sound/music. Music psychology topics. Recent primary research. prereq: Grad or [jr or sr], [3011 or 3031 or 3051 or 3061] or instr consent

**PSY 4036. Perceptual Issues in Visual Impairment.** (3 cr.; Student Option; Periodic Fall) Challenges/capabilities of people who are blind or have low vision. Reading, space perception, mobility. Strengths/weaknesses of adaptive technology. prereq: 1001 or instr consent

**PSY 4207. Personality and Social Behavior.** (3 cr.; A-F or Audit; Every Fall) Conceptual/methodological strategies for scientific study of individuals and their social worlds. Applications of theory/research to issues of self, identity, and social interaction. prereq: 3101 or 3201 or honors or grad student or instr consent

**PSY 4501. Psychology of Women and Gender.** (3 cr.; Student Option; Every Spring) Theory/research regarding psychology of women and psychological sex differences/similarities. Issues unique to women (e.g., pregnancy). Research comparing men/women in terms of personality, abilities, and behavior. prereq: [jr or sr], psych major) or instr consent

**PSY 4520. Psychology of Stress and Trauma.** (3 cr.; A-F only; Every Spring) This course covers the major theories and research findings related to stress and trauma, including the effects of stress and trauma on mental and physical health, factors related to more effective coping with stress/trauma and interventions designed to decrease the negative effects of stress and trauma. The course focuses on both research methods and personal application of research findings. prereq: PSY 1001 and 3001W

**PSY 4902V. Honors Project.** (WI; 1-6 cr.; A-F or Audit; Every Fall, Spring & Summer) Critical literary review or empirical study. prereq: instr consent, dept consent

**PSY 4960. Seminar in Psychology.** (1-4 cr. [max 16 cr.]; Student Option; Periodic Fall & Spring) Seminars in subjects of current interest in Psychology. prereq: [1001, psych major] or instr consent

**PSY 4993. Directed Research: Special Areas of Psychology and Related Sciences.** (1-6 cr.; [max 48 cr.]; Student Option; Every Fall, Spring & Summer) Directed research projects in psychology. prereq: instr consent, dept consent

**PSY 4994V. Honors Research Practicum.** (WI; 4 cr.; A-F only; Every Spring) Practical experience conducting psychological research. Preparation for completion of honors thesis. Research ethics, practical aspects of conducting psychological research, writing research reports. Students assist faculty and advanced graduate students in research. prereq: [3001W or 3001V], psych major, honors

**PSY 4996H. Honors Internship/Externship.** (1-6 cr.; A-F only; Every Fall, Spring & Summer) Supervised internship/externship experience in a community/utopia or industrial setting relevant to formal academic training/objectives. prereq: Honors, instr consent, dept consent, college consent

**PSY 5012. Learning and Cognition in Animals.** (4 cr.; Student Option; Every Fall) Review/evaluation of key questions, methods, theories, and data about forms of learning and elementary cognitive processes. Emphasizes animal models. Implications for human learning/behavior. prereq: 3011 or 4011 or honors or grad student or instr consent

**PSY 5014. Psychology of Human Learning and Memory.** (3 cr.; A-F only; Spring Odd Year) Human memory encoding/retrieval. How we adaptively use memory. Brain systems that support memory. Episodic/semantic memory. Working/short-term memory. Procedural memory. Repetition priming. Prospective remembering. Autobiographical memory. prereq: 3011 or 3051 or honors or grad student

**PSY 5015. Cognition, Computation, and Brain.** (3 cr.; Student Option; Spring Even Year) Human cognitive abilities (perception, memory, attention) from different perspectives (e.g., cognitive psycholological approach, cognitive neuroscience approach). prereq: [Honors or grad] or [jr or sr], [3011 or 3031 or 3051 or 3061]] or instr consent

**PSY 5018H. Mathematical Models of Human Behavior.** (3 cr.; A-F only; Periodic Fall) Mathematical models of complex human behavior, including individual/group decision making, information processing, learning, perception, and overt action. Specific computational techniques drawn from decision theory, information theory, probability theory, machine learning, and elements of data analysis. prereq: Math 1271 or instr consent

**PSY 5031W. Perception.** (WI; 3 cr.; Student Option; Fall Odd Year) Cognitive, computational, and neuroscience perspectives on visual perception. Topics include color vision, pattern vision, image formation in the eye, object recognition, reading, and impaired vision. prereq: 3031 or 3051 or instr consent

**PSY 5036W. Computational Vision.** (WI; 3 cr.; Student Option; Fall Even Year) Applications of psychology, neuroscience, computer science to design principles underlying visual perception, visual cognition, action. Compares biological/physical processing of images with respect to image formation, perceptual organization, object perception, recognition, navigation, motor control. prereq: [3031 or 3051], [Math 1272 or equiv]) or instr consent

**PSY 5037. Psychology of Hearing.** (3 cr.; Student Option; Periodic Fall) Biological and physical aspects of hearing, auditory psychophysics, theories and models
PSY 5063. Introduction to Functional MRI. (3 cr.; A-F only; Every Fall)
How to understand and perform a brain imaging experiment. Theory and practice of functional MRI experimental design, execution, and data analysis. Students develop experimental materials/acquire and analyze their own functional MRI data. Lectures/lab exercises. prereq: Jr or sr or grad or inst consent

PSY 5064. Brain and Emotion. (3 cr.; A-F or Audit; Spring Odd Year)
Introduction to affective neuroscience. How brain promotes emotional/motivated behavior in animals/humans. Biological theories of emotion in historical/current theoretical contexts. Fundamental brain motivational systems, including fear, pleasure, attachment, stress, and regulation of motivated behavior. Implications for emotional development, vulnerability to psychiatric disorders. prereq: 3061 or 5061 or inst consent

PSY 5065. Functional Imaging: Hands-on Training. (3 cr.; Student Option; Every Spring)
Basic neuroimaging techniques/functional magnetic resonance imaging (fMRI). First half of semester covers basic physical principles. Second half students design/execute fMRI experiment on Siemens 3 Tesla scanner. prereq: [3801 or equiv], [3061 or NSCI 3101], inst consent

PSY 5101. Personality Psychology. (3 cr.; Student Option; Spring Odd Year)
Current theory and research on personality functioning and personality structure. Descriptive, biological, evolutionary, cognitive, developmental, cultural, and narrative perspectives on personality. prereq: [3001W or equiv], [honors undergrad or grad student]

PSY 5135. Psychology of Individual Differences. (3 cr.; Student Option; Periodic Spring)
Differential methods in study of human behavior. Psychological traits. Influence of age, sex, heredity, and environment in individual/group differences in ability, personality, interests, and social attitudes. prereq: [3001W or equiv] or [5862 or equiv] or inst consent

PSY 5136. Human Abilities. (3 cr.; Student Option; Every Spring)
Theory, methods, and applications of research in human abilities. Intelligence, aptitude, achievement, specific abilities, information processing/learning and intelligence, aptitude/treatment interactions, and quantitative measurement issues. prereq: [3001W or 3001V], [3135 or 5135], [5862 or equiv] or inst consent

PSY 5202. Attitudes and Social Behavior. (3 cr.; Student Option; Periodic Spring)
Theory/research on social psychology of beliefs/attitudes. Persuasion principles. prereq: 3201 or inst consent

PSY 5204. Psychology of Interpersonal Relationships. (3 cr.; A-F only; Periodic Fall)
Introduction to interpersonal relationship theory/research findings. prereq: Honors or grad student or inst consent

PSY 5205. Applied Social Psychology. (3 cr.; Student Option; Spring Odd Year)
Applications of social psychology research/theory to domains such as physical/mental health, education, the media, desegregation, the legal system, energy conservation, public policy, prereq: 3201 or grad student or inst consent

PSY 5207. Personality and Social Behavior. (3 cr.; A-F or Audit; Every Fall)
Conceptual/methodological strategies for scientific study of individuals and their social worlds. Applications of theory/research to issues of self, identity, and social interaction. prereq: 3101 or 3201 or honors or grad student or inst consent

PSY 5501. Vocational and Occupational Health Psychology. (3 cr.; Student Option; Every Spring)
Survey of history, concepts, theories, methods, and findings of vocational/occupational health psychology. Burnout, personality, violence, stressors/stress-relations, counter productive behaviors, coping in workplace. Vocational development/assessment, career decision-making/counseling, person-environment fit. prereq: 3001W or equiv or inst consent

PSY 5707. Personnel Psychology. (3 cr.; Student Option; Every Fall)
Application of psychological research/theory regarding individual differences, psychological measurement, decision making, and learning to personnel selection, performance assessment, and occupational training. Job analysis, recruitment, selection decisions, performance appraisals, and training design, evaluation, and practice. prereq: [3001W or equiv], 3711

PSY 5708. Organizational Psychology. (3 cr.; Student Option; Every Spring)
Psychological causes of behavior in work organizations. Consequences for individual fulfillment and organizational effectiveness. Individual differences, social perception, motivation, stress, job design, leadership, job satisfaction, teamwork, organizational culture. prereq: [3001W, 3711] or psy grad or inst consent

PSY 5862. Psychological Measurement: Theory and Methods. (4 cr.; Student Option; Every Fall)
Types of measurements (tests, scales, inventories) and their construction. Theory/research of measurement of reliability/validity. prereq: 3801H or MATH 1271 or grad student

PSY 5865. Advanced Psychological and Educational Measurement. (4 cr.; Student Option; Spring Odd Year)

PSY 5960. Topics in Psychology. (1-4 cr.; max 8 cr.; Student Option; Periodic Fall, Spring & Summer)
Special course or seminar. Topics listed in Class Schedule. prereq: PSY 1001; [jr or sr or grad student]

PSY 5993. Research Laboratory in Psychology. (3 cr.; max 18 cr.; Student Option; Every Fall & Spring)
Laboratory instruction and seminars in faculty research areas. prereq: instr consent, dept consent

PSY 8004. Philosophical Psychology. (3 cr.; S-N or Audit; Periodic Spring)
Selected philosophical/methodological problems. prereq: Grad student or inst consent

PSY 8010. Advanced Topics in Learning. (3 cr.; max 12 cr.; S-N or Audit; Periodic Spring)
Contemporary topics in learning and behavior theory. prereq: 5012 or inst consent

PSY 8026. Neuro-Immune Interactions. (3 cr.; Student Option; Periodic Fall)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis.

PSY 8036. Topics in Computational Vision. (; 3 cr. [max 12 cr.]; Student Option; Every Spring) Recent research in visual psychophysics, visual neuroscience, and computer vision. prereq: 5031 or 5036 or equiv or instr consent.


PSY 8041. Proseminar in Perception. (; 3 cr.; A-F or Audit; Fall Odd Year) Seminar. Advanced topics in auditory and visual perception. Lecture, discussion, and student-led presentations of research papers on core topics of the peripheral visual and auditory systems, cortical representations, behavioral and brain-imaging methods, and computational approaches to understanding/simulating perception. prereq: Psy grad student or instr consent.

PSY 8042. Proseminar in Cognition, Brain, and Behavior. (; 3 cr.; A-F or Audit; Fall Even Year) Advanced topics in cognition, brain, and behavior. Lecture, discussion, and student-led presentations of research papers on core topics of attention, memory, emotion, categorization, thinking, and language, and intersections between these areas. prereq: Psy grad student or instr consent.

PSY 8055. Seminar: Cognitive Neuroscience. (; 3 cr.; Student Option; Spring Odd Year) Recent advances in analysis of neural bases of cognitive functions. prereq: 5015 or instr consent.

PSY 8056. Seminar: Psychology of Language. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Selected topics in psycholinguistics. prereq: Grad psych major or instr consent.

PSY 8061. Neuropsychopharmacology. (; 3 cr.; A-F or Audit; Fall Even Year) Relationships between biochemical, neurophysiological, psychological, and behavioral effects of drugs. Research in neuropsychopharmacology, behavioral pharmacology, and pharmacology of addiction. prereq: 5xxx coursework in biological psych or neuroscience or pharmacology or instr consent.

PSY 8070. Seminar: Psychopharmacology. (; 1-3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Basic issues, contemporary research. Lectures, student presentations. prereq: instr consent.

PSY 8111. Biological, Cognitive, Affective, Social, Developmental and Historical Aspects of Psychopathology. (; 4 cr.; A-F or Audit; Every Fall) Descriptive psychopathology. Theory/research. Evaluation of current experimentation in various behavior disorders. prereq: Clinical psych grad student, instr consent.


PSY 8202. Close Relationships. (; 3 cr.; Student Option; Periodic Fall) Classic/contemporary theory/research on close relationships. Emphasizes romantic relationships. prereq: 5204 or instr consent.

PSY 8203. Impression Management. (; 3 cr.; Student Option; Periodic Fall) Classic and contemporary theory and research concerning interpersonal strategies of impression management and interplay between private and public self. prereq: Grad psych major; 8208 recommended; instr consent.

PSY 8204. Social Psychology of Prejudice and Intergroup Relations. (; 3 cr.; A-F or Audit; Periodic Fall) Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.

PSY 8205. Principles of Social Psychology. (; 3 cr. [max 15 cr.]; Student Option; Every Fall) Contemporary theoretical positions and related research. prereq: Psy PhD student.

PSY 8206. Proseminar in Social Psychology. (; 1 cr. [max 5 cr.]; S-N only; Every Spring) Current research topics in social psychology. prereq: [PSY 8205, Social Psych PhD student] or instr consent.

PSY 8208. Social Psychology: The Self. (; 3 cr.; A-F or Audit; Every Spring) Social psychological theory and research concerning the self and social behavior. prereq: Psych background especially in personality and soc psych.


PSY 8210. Law, Race, and Social Psychology. (; 3 cr.; A-F only; Periodic Fall) Interdisciplinary seminar. Scientific foundations for and legal implications of implicit (vs explicit) racial or gender bias in four socio-legal domains: criminal law, affirmative action, employment discrimination, and legislative redistricting. prereq: 2nd or 3rd yr law student or PhD student in social science doctoral program.

PSY 8211. Proseminar in Political Psychology I. (; 1 cr.; S-N or Audit; Periodic Fall & Spring) Readings, discussion, and guest speakers. Topics vary each semester. prereq: Political Psychology grad minor.

PSY 8212. Proseminar in Political Psychology II. (; 1 cr.; S-N or Audit; Periodic Fall & Spring) Readings, discussion, and guest speakers. Topics vary each semester. prereq: Political Psychology grad minor.

PSY 8333. FTE: Master’s. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent.

PSY 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent.

PSY 8501. Counseling Psychology: History and Theories. (; 3 cr.; Student Option; Every Fall) Introduction to history of counseling psychology and to primary theoretical orientations used by counseling psychologists. For each theory: basic principles, application to counseling practice, and research support. prereq: Counseling psych grad student or instr consent.

PSY 8502. Assessment in Counseling Psychology. (; 3 cr.; Student Option; Every Spring) Principles and practice. Emphasizes psychometric assessment. History, foundations in measurement, basic methods, survey of instruments, test interpretation evaluation, ethics. prereq: Counseling psych grad student or instr consent.

PSY 8503. Interviewing and Intervention. (; 3 cr.; Student Option; Every Fall) Skills-based course: conceptualization of counseling process, stages of counseling, development of counseling skills, and strategies for behavior change. prereq: Counseling Psy grad student or instr consent.

PSY 8510. Counseling Psychology Beginning Practicum: General. (; 1-6 cr.; S-N only; Every Fall) Beginning applied experiences in counseling psychology settings. prereq: Counseling Psy grad student.

PSY 8511. Counseling Psychology Beginning Practicum: General. (; 1-6 cr.; S-N only; Every Fall) Beginning applied experiences in counseling psychology settings. prereq: Counseling Psy grad student.

PSY 8514. University Counseling Practicum I. (; 4-6 cr.; S-N only; Every Fall) Integrates science with supervised practice in University Counseling and Consulting.
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Developing issues/trends in current research, research methodological advances, and implementation practices. Recent important/controversial developments. prereq: instr consent

**PSY 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**PSY 8814. Analysis of Psychological Data.** (4 cr.; Student Option; Every Fall)

**PSY 8815. Analysis of Psychological Data.** (4 cr.; Student Option; Every Spring)

**PSY 8881. Seminar: Quantitative and Psychometric Methods.** (3 cr. [max 15 cr.]; Student Option; Every Fall)
Reviews individual research on current topics in psychological measurement.

**PSY 8882. Seminar: Quantitative and Psychometric Methods.** (3 cr. [max 15 cr.]; Student Option; Every Spring)
Reviews, individual research on current topics in psychological measurement.

**PSY 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

**PSY 8935. Readings in Behavioral Genetics and Individual Differences Psychology.** (1 cr. [max 10 cr.]; S-N or Audit; Every Fall & Spring)
Each week participants read and discuss one or two primary research articles. prereq: 5135, 5137 or instr consent

**PSY 8937. Seminar in Human Behavioral Genetics.** (3 cr. [max 9 cr.]; Student Option; Every Spring)
Advanced topics vary with each offering. Sample topics: gene identification in complex human traits, behavioral genetics of alcoholism, twin-family methodology. prereq: 5137 or instr consent

**PSY 8960. Graduate Seminar in Psychology.** (1-4 cr. [max 36 cr.]; Student Option; Every Fall & Spring)
Graduate seminar in subject of current interest in psychology. prereq: Psychology grad student or instr consent

**PSY 8993. Directed Studies: Special Areas of Psychology and Related Sciences.** (1-6 cr. [max 36 cr.]; Student Option; Every Fall & Spring)
Special area of psychology or a related science. prereq: instr consent

**Public Affairs (PA)**

**PA 1005. Great Debates of Our Time: U.S. Policy and Politics.** (CIV; 3 cr.; A-F or Audit; Every Spring)
Topical political/policy debates with prominent government officials/experts. Constitutional crisis over authority/roles of legislative/executive branches. Visiting lecturers, in-class simulations, readings.

**PA 1401. Public Affairs: Community Organizing Skills for Public Action.** (CIV; 3 cr.; A-F only; Every Spring)
Public affairs work, roles of citizens in democratic way of life. Community organizing skills, their importance for public affairs. Negotiations among diverse audiences, understanding different interests, mapping power relationships. Relevant public affairs and governance theory.

**PA 1961W. Personal Leadership in the University.** (WI; 3 cr.; A-F only; Every Fall, Spring & Summer)
Examine personal views of leadership, differences between personal/positional leadership, leadership ethics/values, personal leadership strengths/abilities.

**PA 3002. Basic Methods of Policy Analysis.** (SOCS; 3 cr.; A-F or Audit; Every Fall)

**PA 3003. Nonprofit and Public Financial Management.** (3 cr.; A-F or Audit; Every Fall)

**PA 3481. Cedar Riverside: Where The World Meets MN.** (3 cr.; A-F only; Periodic Spring)
The Cedar Riverside Neighborhood: Where the World Meets Minnesota is an immersion course in our Cedar Riverside neighborhood that parallels the immersion experience of study abroad. The course encourages civic engagement and will provide opportunity to learn and work in the Cedar Riverside community while examining questions of leadership, power, cultural diversity and social change. Students will participate in class-based discussion seminars, neighborhood excursions and community work. Throughout the immersion experience, students are challenged to question, think, and respond thoughtfully to current issues facing the Cedar-Riverside community and cultivate leadership skills. Students can expect to gain new frameworks for understanding leadership and civic engagement in a domestic cultural context, deepened skill in identifying complex problems, strategic questioning, reflection and meaning making, as well as consciousness of relationship between self, world and text/ theory.

**PA 3961. Leadership, You, and Your Community.** (3 cr.; A-F only; Every Fall & Spring)
How do effective leaders create positive systemic change within complex systems? What is community and how does it shape the work of leadership? Students examine leadership from a multi-dimensional and multicultural perspective and critically examine leadership theories in authentic, complex community settings.

**PA 3971. Leadership Minor: Field Experience.** (3 cr.; A-F only; Every Fall & Spring)
Students apply and integrate leadership theory in a community experience, think critically about their positional leadership roles, extrapolate the experience to future leadership issues within their specific fields, and work through challenges of positional leadership.

**PA 3990. General Topics in Public Policy.** (1-3 cr. [max 9 cr.]; Student Option; Every Spring & Summer)
General topics in public policy.

**PA 3991. Independent Study.** (1-3 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Independent study, prereq: instr consent

**PA 4101. Nonprofit Management and Governance.** (3 cr.; Student Option; Every Fall & Spring)
Managing/governing nonprofit/public organizations. Theories, concepts, real-world examples. Governance systems, strategic management practices, effect of different funding environments, management of multiple constituencies.

**PA 4144. Social Entrepreneurship.** (3 cr.; A-F only; Every Fall)
Introduction to field of social entrepreneurship. Prepares current/future managers/leaders to create, develop, lead socially entrepreneurial organizations/initiatives. prereq: Junior or senior

**PA 4190. Topics in Public and Nonprofit Leadership and Management.** (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall, Spring & Summer)
Topics in public/nonprofit leadership/management.

**PA 4200. Urban and Regional Planning.** (3 cr.; Student Option; Every Fall & Spring)
Fundamental principles of urban/regional land-use planning. Introduction to planning theory
and its applications. Political-economic context of urban/regional planning.

**PA 4290. Topics in Planning.** (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Topics in social policy.

**PA 4414. Child Human Rights: Work and Education.** (3 cr.; Student Option; Spring Odd Year) International child labor issues. Options for improving child well-being, including policies/programs that have potential to affect the lives of millions of children.

**PA 4490. Topics in Social Policy.** (1-1.5 cr.; max 9 cr.; Student Option; Periodic Fall & Spring) Topics in social policy.

**PA 4790. Topics in Science, Technology, and Environmental Policy.** (1-3 cr. [max 6 cr.]; Student Option; Periodic Spring) Selected topics in the field of science, technology, and environmental policy. Topics vary.

**PA 4890. Topics in Global Policy.** (1-1.5 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) Topics in global policy. Topics vary.

**PA 4961W. Leadership for Global Citizenship.** (GP;WI; 3 cr.; A-F only; Every Fall & Spring) In this final, writing intensive capstone course, students pull together the threads of leadership theory and practice worked with over the course of the Leadership Minor. In addition, students gain experience working with diverse leaders from around the world, mapping political contexts, and planning their own global leadership path within their specific field.

**PA 4971. Directed Study, Leadership Minor.** (1-4 cr. [max 15 cr.]; Student Option No Audit; Every Fall, Spring & Summer) Design/carry out independent study project under direction of leadership minor instructors/faculty. prerequisite: [9961 or OLPD 3302], consent of Leadership Minor Coordinator.

**PA 4972. Directed Research, Leadership Minor.** (1-4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Students complete individually arranged research project with Leadership Minor instructor. Contact Leadership Minor office for registration requirements. *Please note - The UMN's Credit policy can be found here: https://policy.umn.edu/education/studentwork. One credit represents, for the average University undergraduate student, three hours of academic work per week, averaged over the semester, in order to complete the work of the course to achieve an average grade. One credit equals 42 to 45 hours of work over the course of the semester (1 credit x 3 hours of work per week x 14 or 15 weeks in a semester equals 42 to 45 hours of academic work). Students should keep the above policy in mind while determining their project and the amount of credits for enrollment. The amount of enrolled credits also proportionally influences the amount of instructor contact hours/week. prerequisite: instructor consent.

**PA 5001. Intellectual Foundations of Public Action.** (1.5 cr.; Student Option; Periodic Fall & Spring) Evolution of intellectual approaches that underlie public planning, management, and policy analysis in a democratic society. How decision making is shaped by knowledge/values. Role of rationality, conceptual, descriptive/normative, and structure/process approaches.

**PA 5002. Introduction to Policy Analysis.** (1.5 cr.; A-F or Audit; Every Fall & Spring) Process of public policy analysis from problem structuring to communication of findings. Commonly used analytical methods. Alternative models of analytical problem resolution.

**PA 5003. Introduction to Financial Analysis and Management.** (1.5 cr.; A-F or Audit; Every Fall, Spring & Summer) Finance/accounting concepts/tools in public/nonprofit organizations. Fund accounting. Balance sheet/income statement analysis. Cash flow analysis. Public/nonprofit sector budgeting processes. Lectures, discussions, cases. prerequisite: Public policy major/minor or major in development practice, public affairs or liberal studies or grad nonprofit mgmt cert or instr consent.

**PA 5004. Introduction to Planning.** (3 cr.; A-F or Audit; Every Fall) Historical/innovative development of urban development as a profession. Intellectual foundations, planning theory. Roles of urban planners in U.S./international settings. Scope, legitimacy, limitations of planning/planning process. Issues in planning ethics/settings of diverse populations/stakeholders. prerequisite: Major/minor in urban/regional planning or instr consent.

**PA 5011. Management of Organizations.** (3 cr.; A-F or Audit; Every Fall & Spring) Challenges facing higher-level managers in public and nonprofit organizations in mixed economy and democratic republic. Distinctive features of public and nonprofit management, skills necessary for effective management, manager's role as creator of public value. Lectures, case discussions.

**PA 5012. The Politics of Public Affairs.** (3 cr.; A-F or Audit; Every Spring) Stages of policy making from agenda setting to implementation. Role and behavior of political institutions, citizens, social movements, and interest groups. Concepts of political philosophy. Theories of state. Team taught, interdisciplinary course. Small discussion sections.

**PA 5013. Law and Urban Land Use.** (1.5 cr.; A-F or Audit; Every Fall) Role of law in regulating/shaping urban development, land use, environmental quality, local/regional governmental services. Interface between public/private sector. prerequisite: Major or minor in urban/regional planning or instr consent.

**PA 5021. Economics For Policy Analysis and Planning I.** (3 cr.; A-F or Audit; Every Fall) Introduction to tools useful for public policy. Intermediate microeconomics, macroeconomics, and concepts of international trade. prerequisite: [Econ 1101 or equiv] or instr consent.

**PA 5022. Economics For Policy Analysis and Planning II.** (1.5-3 cr. [max 4.5 cr.]; A-F or Audit; Every Spring) Application of economic reasoning to various public policy issues. Cost-benefit analysis, nonmarket valuation, and tax analysis. prerequisite: [5021 or equiv], public policy major or instr consent.


**PA 5032. Regression Analysis.** (2 cr.; A-F or Audit; Every Spring) Bivariate/multivariate models of regression analysis, assumptions behind them. Problems using these models when such assumptions are not met. prerequisite: [5031 or equiv] or instr consent.

**PA 5033. Multivariate Techniques.** (2 cr.; A-F or Audit; Every Spring) Use of bivariate and multivariate statistical approaches for analyzing and evaluating public affairs issues and the assumptions behind the analytical approaches. Designed to help students read, understand, interpret, use, and evaluate empirical work used in social sciences by policy analysts and policy makers. prerequisite: [5032 or 5044 or equiv] or instr consent. May fulfill stats requirements in other programs.

**PA 5035. Survey Research and Data Collection.** (1.5 cr.; A-F only; Every Spring) Introduction to survey research methods. Emphasizes applications to policy/applied research. Research design choices (e.g., descriptive, experimental, case studies), sampling, variable specification, measurement. Conducting interviews, self-administered questionnaires. Qualitative techniques.

**PA 5041. Qualitative Methods for Policy Analysts.** (4 cr.; A-F only; Every Fall) Qualitative analysis techniques, examples of applications. Meet with researcher. Hands-on experience in designing, gathering, analyzing data.

**PA 5042. Urban and Regional Economics.** (2 cr.; A-F only; Every Spring) Evaluation of city existence/growth using economics. Economic forces in development of cities. Economic analysis of urban areas/land market. Economic analysis of planning issues in land use, transportation, housing, environment. prerequisite: [Major or minor in urban and regional planning, microeconomics course] or instr consent.

**PA 5043. Economic and Demographic Data Analysis.** (2 cr.; A-F only; Every Spring) Economic/demographic data analysis techniques for planning. Exposure to
Problem-based learning to analytical reasoning through social science research methods. Frequency distributions, descriptive statistics, elementary probability, statistical inference. Hypothesis testing. Cross-tabulation, analysis of variance, correlation. Simple regression analysis. prereq: Major in public affairs or public affairs certificate, [5055-5056 must be taken in same academic yr]

PA 5081. Working in Teams: Crossing Disciplines and Learning from Difference. (0.5 cr.; S-N only; Every Fall) Principles/skills necessary to create high-performing multi-disciplinary/multi-cultural teams. prereq: Major in development practice, public affairs, public policy, urban and regional planning, or sci, tech, and environ policy

PA 5021. Leadership, Reflective Practice, and Critical Theory: A Practicum. (2 cr.; Student Option; Every Spring) For students immersed in a cultural shift, organization, or leadership form who wish to learn how to negotiate international, cross-cultural/political contradictions. Critical approach to understanding adult learning. How to perceive and challenge dominant ideology, unmask power, contest hegemony, overcome alienation, and practice democracy. prereq: Grad student or instr consent

PA 5080. Capstone Preparation Workshop. (1 cr.; S-N only; Every Fall, Spring & Summer) Project management, qualitative research, and critical framework to complete Capstone course. Students write draft of client project group norms and client contract. prereq: concurrent registration is required (or allowed) in 8081

PA 5012. Leadership and Change in an Innovation Society. (1 cr.; S-N only; Every Fall & Spring) Models of change/leadership. How leaders can promote personal, organizational, and societal change. Case studies, action research. Framework for leadership/change in an innovation society. prereq: Grad student or instr consent

PA 5010. Policy and Program Analysis of Nonprofit Organizations. (3 cr.; Student Option; Every Fall) Theories, concepts, and real world examples of managerial challenges. Governance systems, strategic management practices, effect of funding environments, management of multiple constituencies. Types of nonprofits using economic/behavioral approaches. prereq: Grad student or instr consent

PA 5010. Leadership and Change in an Innovation Society. (1 cr.; S-N only; Every Fall & Spring) Models of change/leadership. How leaders can promote personal, organizational, and societal change. Case studies, action research. Framework for leadership/change in an innovation society. prereq: Grad student or instr consent

PA 5010. Strategic Human Resource Management. (3 cr.; A-F or Audit; Every Fall) Theory/practice of developing, utilizing, and aligning human resources to improve culture/outcomes of nonprofit/public organizations. HR strategy, individual diversity, leadership, selection, training, compensation, classification, performance appraisal, future HR practices. prereq: Grad student or instr consent

PA 5015. Integrative Leadership Seminar. (3 cr.; Student Option No Audit; Every Spring) Basic concepts, practices, people, and organizations associated with integrative leadership. Case materials, related readings, presentations, and interactive discussion. prereq: Grad student or instr consent

PA 5011. Financing Public and Nonprofit Organizations. (3 cr.; Student Option No Audit; Every Spring) Nonprofit board governance. Governance models, roles/responsibilities, ethics/dynamics. Current research/concepts along with students’ current board experiences to illuminate challenges/explore solutions that build board leadership competencies. prereq: Grad student or instr consent

PA 5010. Board leadership development. (1 cr.; S-N only; Every Fall & Spring) Nonprofit board governance. Governance models, roles/responsibilities, ethics/dynamics. Current research/concepts along with students’ current board experiences to illuminate challenges/explore solutions that build board leadership competencies. prereq: Grad student or instr consent


PA 5010. State and Local Public Finance. (3 cr.; Student Option; Every Spring) Theory/practice of financing. Providing public services at state/local level of government. Emphasizes integrating theory/practice, applying materials to specific policy areas, and documenting wide range of institutional arrangements across/within the 50 states. prereq: Grad or instr consent

PA 5114. Budget Analysis in Public and Nonprofit Organizations. (1.5 cr. [max 3 cr.]; Student Option; Every Spring) Techniques, terminology, concepts and skills for developing and analyzing operating
and capital budgets in public and nonprofit organizations. Budget analysis using case studies, problem sets, and spreadsheets. Time value of money, cost-benefit analysis, break-even analysis, sensitivity analysis, and fiscal analysis. prereq: PA 5003

PA 5116. Financing Public and Nonprofit Organizations. (1.5 cr. ; Student Option; Every Spring) Financial resource management for public and nonprofit organizations. Short-term and long-term debt management, retirement financing, and endowment investing. Conceptual frameworks and analytical techniques applied to real-world problems. Financial management in context of national and regional economies. prereq: PA 5003; credit will not be granted if credit already received for: PA 5111

PA 5122. Law and Public Affairs. (; 3 cr. ; Student Option; Every Spring) Overview of evolution of American legal system. Role of courts, legislatures, and political actors in changing law. How law is used to change public policy. prereq: Grad or inst consent


PA 5132. Mediation Training. (; 3 cr. ; Student Option: Periodic Fall & Spring) Creating an arena for mediation. Skills/expectations needed to mediate disputes between individuals, among groups: balanced (peer or colleague), imbalanced (power differentials). Role playing, group debriefing, critique. Cases. prereq: Grad student or inst consent

PA 5135. Managing Conflict: Negotiation. (3 cr. ; Student Option; Every Fall) Theories and frameworks used in negotiations. Navigating diverse audiences and an increasingly complex world. Negotiation in various arenas. Opportunities to practice skills and learn from experts. Structured exercises on issues such as compensation, union/conflicts and international development. Culture, emotions, gender and ethics in negotiation.

PA 5136. Group Process Facilitation for Organizational and Public/Community Engagement. (1 cr. ; Student Option No Audit; Every Summer) Group process facilitation components, theories, tools, techniques. Facilitator's role in group goals and processes. Facilitation in public policy. Cross-cultural challenges. Topics may include meeting management, group decision-making, conflict, participatory leadership, and other tools.

PA 5144. Social Entrepreneurship. (3 cr. ; A-F only; Periodic Fall & Spring) Introduction to field of social entrepreneurship. Prepares current/future managers/leaders to create, develop, lead socially entrepreneurial organizations/initiatives. prereq: Grad student or inst consent

PA 5145. Civic Participation in Public Affairs. (; 3 cr. ; A-F only; Every Spring) Critique/learn various approaches to civic participation in defining/addressing public issues. Readings, cases, classroom discussion, facilitating/experiencing engagement techniques. Examine work of practitioner, design engagement process. prereq: Grad student or inst consent

PA 5151. Organizational Perspectives on Global Development & Humanitarian Assistance. (3 cr. ; A-F only; Every Fall) Organizational analysis of international development and humanitarian assistance, including perspectives from sociology, political science, psychology, public administration, and management. Examines efforts of multiple organizational players, including NGOs, governments, bi-lateral and multi-lateral organizations, corporations, foundations, and international organizations. Critical analysis of aid organizations, especially regarding ways in which they reflect and create power and privilege, the manner in which individuals' needs and desires interact with, support, or challenge the needs of the organization, and how all of this is influenced by forces outside the boundary of the organization. Students practice developing actionable recommendations to improve the effectiveness of international aid organizations in the context of multiple (and often contested) understandings of global development needs and conflicting stakeholder demands. Readings, class discussions, mini-lectures, simulations, case analyses, group projects, oral presentations, memo writing, opinion writing.

PA 5152. Leadership to Address Global Grand Challenges. (1.5 cr. ; Student Option No Audit; Every Spring) Global grand challenges are novel, emergent, complex, and beyond the resources of any single sector to address. Skills-based course that introduces participants to integrative leadership strategies effective in addressing such challenges, with specific focus on leadership practices that foster collective action across diverse groups of people.

PA 5180. Topics in Executive Leadership. (; 0.5-3 cr. [max 6 cr. ] ; A-F only; Every Fall & Spring) Selected topics in executive leadership. prereq: instr consent

PA 5181. Public Safety Leadership I. (2-3 cr. ; Student Option No Audit; Every Fall) Public safety executive leadership, citizen engagement, and organizational change. Understanding the self and community. Leadership foundations and methods. Public trust and legitimacy. Community participation, inclusion and problem solving. This hybrid course meets 1-2 days per month with all other coursework completed online. It is a prerequisite for PA 5182: Public Safety Leadership II. prereq: Public or nonprofit officials with experience in or with public safety agencies, including law enforcement, fire, emergency management/medical services, or military.

PA 5190. Topics in Public and Nonprofit Leadership and Management. (; 1-3 cr. [max 9 cr. ] ; Student Option; Periodic Fall & Spring) Selected topics.

PA 5203W. Geographical Perspectives on Planning. (WI; 4 cr. ; Student Option; Every Fall) Includes additional weekly seminar-style meeting and bibliography project on topic selected in consultation with instructor. prereq: Grad student or inst consent

PA 5204. Urban Spatial and Social Dynamics. (3 cr. ; Student Option; Every Spring) Behavioral theories of internal spatial arrangement, functioning, characteristics of cities at macro level/how they produce system of cities. Factors influencing urban spatial structure over time. Urban form, land use/rent. Spatial expression of economic, social, political forces. prereq: urban/regional planning Major/minor in or public affairs PhD or inst consent

PA 5211. Land Use Planning. (3 cr. ; A-F only; Every Fall) Physical/spatial basis for land use planning at community/regional level. Role of public sector in guiding private development. Land use regulations, comprehensive planning, growth management, innovative land use planning/policies. prereq: Major or minor in urban/regional planning or inst consent

PA 5212. Managing Urban Growth and Change. (; 3 cr. ; Student Option; Fall Even Year) Theory/practice of planning, promoting, and controlling economic growth/change in urban areas. Economic development tools available to state/local policymakers, historic context of their use in the United States. legal, social, and economic implementation constraints. Interactions among economic, social, and demographic trends. prereq: Grad student or inst consent

PA 5213. Introduction to Site Planning. (; 3 cr. ; Student Option; Fall Odd Year) Analyzing/preparing graphic plans for development or redevelopment of property. Site planning issues, process, opportunities, details, and techniques. Hands-on preparation of a site plan. Site visits, lectures, research, presentations, exam, in-class exercises. prereq: Grad student or inst consent

PA 5215. Computer Applications in Land Use Planning. (; 3 cr. ; Student Option; Every Spring) Geographical information system software, simulation modeling of land use/development, 3D software, the Internet. Project applications in citizen participation/decision-making. Meets weekly in mostly lab setting. prereq: Grad student or inst consent

PA 5221. Private Sector Development. (; 3 cr. ; Student Option; Every Spring) Roles of various participants in land development. Investment objectives, effects of
regulation. Overview of development process from private/public perspective. prereq: [Grad or instr consent]; college algebra required

PA 5231. Transit Planning and Management. (; 3 cr.; Student Option; Every Fall) Principles/techniques related to implementing transit systems. Historical perspective, characteristics of travel demand, demand management. Evaluating/benchmarking system performance. Transit-oriented development. Analyzing alternative transit modes. System design/finance. Case studies, field projects. prereq: Grad student or instr consent

PA 5232. Transportation Policy, Planning, and Deployment. (; 4 cr.; Student Option; Fall Odd Year) Development of transportation policy, making of transportation plans, deployment of transportation technologies. Lectures, interactive case studies, role playing. prereq: Sr or grad student or instr consent

PA 5233. Sustainable Transportation. (3 cr.; A-F or Audit; Spring Odd Year) Concepts of sustainability in movement of people/goods in cities. Techniques/best practices/methods for planning/implementing interventions to improve social, economic, environmental sustainability of communities. prereq: Grad or instr consent

PA 5242. Environmental Planning, Policy, and Decision Making. (; 3 cr.; A-F only; Periodic Spring) Theory and practice. Ethical, legal, and institutional frameworks relative to a range of environmental issues. Innovative environmental decision making informed by collaboration, conflict resolution, adaptive management, and resilience thinking. prereq: Grad or instr consent

PA 5251. Strategic Planning and Management. (3 cr.; Student Option No Audit; Periodic Spring) Theory and practice of strategic planning and management for public and nonprofit organizations and networks. Strategic planning process, management systems; stakeholder analyses. Tools and techniques such as purpose expansions, SWOT analyses, oval mapping, portfolio analyses, and logic models.

PA 5253. Designing Planning and Participation Processes. (3 cr.; A-F only; Every Fall) Theory/practice of design, implementation, evaluation of planning/participation processes. Types of planning. Stakeholders, including underrepresented groups. Costs/benefits of participation. Participant roles. Planning/participation tools/techniques. prereq: Major or minor in urban/regional planning or instr consent

PA 5261. Housing Policy. (; 3 cr.; A-F or Audit; Every Spring) Institutional/environmental setting for housing policy in the United States. Competing views of solving housing problems through public intervention in the market. Federal/local public sector responses to housing problems. prereq: Grad or instr consent

PA 5271. Geographic Information Systems: Applications in Planning and Policy Analysis. (; 3 cr.; Student Option; Every Fall) Introduction to GIS. Applications in public planning and policy analysis. Operational skills in GIS software. Mapping analysis of U.S. Census material. Local/state government management/planning. Spatial statistical analysis for policy/planning. prereq: Major in urban/regional planning or instr consent

PA 5281. Immigrants, Urban Planning and Policymaking in the U.S. (; 3 cr.; A-F or Audit; Every Fall) Social, political, economic experiences of contemporary U.S. immigrants. Draws from sociology, economics, demography, political science, public affairs. Local government policies/plans. Cities/suburbs as contexts for immigrants. Interactions between immigrant communities/urban planners/policymakers. prereq: Grad student or instr consent

PA 5290. Topics in Planning. (; 0.5-4 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Selected topics.

PA 5301. Population Methods & Issues for the United States & Global South. (3 cr.; Student Option; Periodic Spring) Basic demographic measures/methodology. Demographic transition, mortality, fertility. Perspectives on nonmarital fertility, marriage, divorce, cohabitation. Cultural differences in family structure, aging, migration, refugee movements, population policies. Discussion of readings. prereq: Grad student or instr consent

PA 5311. Program Evaluation. (; 3 cr.; Student Option; Periodic Fall & Spring) Principal methods, primary applications of evaluation research as applied to programs/plans in health/social services, education, or the environment. Conducting evaluations. Becoming a critical consumer of studies. prereq: Grad student or instr consent

PA 5390. Topics in Advanced Policy Analysis Methods. (; 1-4 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Topics in advanced policy analysis methods.

PA 5401. Poverty, Inequality, and Public Policy. (3 cr.; Student Option; Every Fall) Nature/extent of poverty/inequality in the United States, causes/consequences, impact of government programs/policies. Extent/causes of poverty/inequality in other developed/developing countries. prereq: Grad or instr consent

PA 5405. Public Policy Implementation. (; 3 cr.; A-F or Audit; Spring Odd Year) Theory, tools, and practice of the implementation of public policy, particularly in areas involving public, private, and nonprofit organizations. Analytical approach focuses on multiple levels in policy fields to pinpoint and assess implementation challenges and levers for improvement.

PA 5412. Aging and Disability Policy. (; 3 cr.; Student Option; Periodic Fall & Spring) Policy debates concerning populations that are aging or disabled. Students learn/practice analyses in context of important health, social, and economic policy debates. Readings on current theory/evidence. prereq: Grad or instr consent

PA 5413. Early Childhood and Public Policy. (3 cr.; Student Option; Every Fall) State/federal/int'l policies/legislation touching first 5 years of child's life. Family, community, institutional roles in promoting children's social/cognitive/emotional development. Health, mental health, poverty, special needs, economic/social justice. Part of Early Childhood Pol cert. prereq: Grad or instr consent

PA 5414. Child Human Rights: Work and Education. (; 3 cr.; Student Option; Periodic Spring) International child labor issues. Options for improving child well-being, including policies/programs that have potential to affect the lives of millions of children. prereq: Grad student or instr consent

PA 5421. Racial Inequality and Public Policy. (; 3 cr.; A-F only; Periodic Fall & Spring) Historical roots of racial inequality in American society. Contemporary economic consequences. Public policy responses to racial inequality. Emphasizes thinking/analysis that is critical of strategies offered for reducing racism and racial economic inequality. prereq: Grad or instr consent

PA 5422. Diversity and Public Policy. (; 3 cr.; A-F only; Periodic Fall) Economics of diversity. Business/public administration cases for workplace diversity. Value of cultural competency in public/nonprofit organizations. Current policy debates on race, ethnicity, gender, sexual identity, and disability. prereq: Grad student or instr consent

PA 5431. Public Policies on Work and Pay. (3 cr.; Student Option; Every Spring) Public policies affecting employment, hours of work, and institutions in labor markets. Public programs impacting wages, unemployment, training, collective bargaining, job security, and workplace governance. Policy implications of the changing nature of work. prereq: [PA 5031 or equiv]; grad student) or instr consent

PA 5441. Education Policy and the State Legislature. (; 3 cr.; Student Option; Periodic Fall) How Minnesota legislature decides K-12 issues. Implications for higher education. How to increase one's influence in process. Discussions with persons who influence educational policy. Presentations. Field trip to state legislature, prereq: Grad or instr consent

PA 5442. Education Law and Policy. (3 cr.; Student Option No Audit; Periodic Fall) Education law and policy with focus on elementary/secondary. Topics include governance; interplay of federal, state and local law and policy; reform efforts; desegregation; achievement gap; role of teachers unions; and finance. Early childhood education discussed in connection with K-12 issues. prereq: Grad or instr consent
PA 5451. Immigration, Health and Public Policy. (3-4 cr.; A-F only; Every Fall & Spring)
How to access demographic, health, background information on U.S. immigrants. Characteristics and health needs of immigrants. Designing culturally competent health programs. How to advocate for needed policy changes to promote immigrant health and wellbeing. Community visits required. Online course. prereq: instr consent

PA 5452. Immigration and Public Policy. (3 cr.; Student Option; Periodic Fall & Spring)
How to employ an analytical framework to analyze a current immigration policy proposal. Topics vary (e.g., president's guest worker proposal, democratic alternative proposals). prereq: Grad student or instr consent

PA 5480. Topics in Race, Ethnicity, and Public Policy. (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Link between race/ethnicity and public policy. How to identify/measure racial/ethnic disparities and their historical/cultural origins and policy impacts and to craft politically feasible remedies. Topics may include criminal justice, housing, child welfare, and education. prereq: Jr or sr or grad student or instr consent

PA 5490. Topics in Social Policy. (1-4 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5501. Theories and Policies of Development. (3 cr.; Student Option; Every Fall)
What makes some countries wealthier than others, one group of people healthier and more educated than another? How does the behavior of rich nations affect poor nations? Origins of development thought, contemporary frameworks and policy debates. Economic, human, and sustainable development. prereq: Grad student or instr consent

PA 5503. Economics of Development. (3 cr.; A-F or Audit; Every Fall)
Economic growth, inequality, poverty, rural/urban labor markets, risk/insurance. Investments in human capital, credit markets, gender/household economics, governance/ institutional issues. Microfinance, conditional cash transfers, labor/education policies. prereq: PA 5501 or concurrent registration is required (or allowed) in PA 5501

PA 5511. Community Economic Development. (3 cr.; Student Option; Every Fall)
Contexts/motivations behind community economic development activities. Alternative strategies for organizing/initiating economic development projects. Tools/techniques for economic development analysis/ planning (market analysis, feasibility studies, development plans). Implementation at local level. prereq: Grad or instr consent

PA 5512. Workforce and Economic Development. (3 cr.; A-F or Audit; Spring Even Year)
Economic and workforce development examined from a U.S. context, exploring how rural and urban regional economies grow, why industries/employers locate where they do, and how workers decide where to live and work. Government and economic development practices related to businesses and innovation will also be addressed. prereq: Grad or instructor consent

PA 5521. Development Planning and Policy Analysis. (4 cr.; Student Option; Every Spring)
Techniques of development planning/ policy analysis at national, regional, and project levels. Effects of external shocks and government interventions on national/regional economies. Macroeconomic modeling, input- output analysis, social accounting matrices/ multipliers, project evaluation. prereq: 5031 or equiv recommended or instr consent

PA 5522. International Development Policy, Families, and Health. (3 cr.; Student Option; Periodic Spring)
Implications of paid/unpaid labor for development policy, using household as prism. Legal/cultural use of property rights. Financial effects of ill health. Caregiving. Work-family conflict, policies that alleviate it. Role of gender. Qualitativequantitative methods. Readings, lectures, discussions. prereq: Grad student or instr consent

PA 5561. Gender and International Development. (3 cr.; Student Option; Periodic Spring)
Women and men are affected differently by development and participate differently in policy formulation and implementation. Gender-sensitive perspective. Historical, political context. Global South. Policy, practice, and experience (theory and measurement; international, national, local stakeholders; effects of policy and practice on development). prereq: Grad or instr consent

PA 5590. Topics in Economic and Community Development. (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5601. Global Survey of Gender and Public Policy. (3 cr.; Student Option; Periodic Fall)
Examine gender equality/public policy from local, national, global perspective. Policy areas include women's human rights, girls' education, gender/military service, electoral systems. prereq: Grad or instr consent

PA 5621. Board Service in Women and Public Policy. (1 cr.; S-N only; Periodic Fall)
Students serve as full members of a board of directors for a women's movement organization. Organizational leadership. How to be an effective board member. Twin Cities feminist nonprofit organizations. prereq: instr consent

PA 5690. Topics in Women and Public Policy. (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Selected topics. prereq: Grad student or instr consent

PA 5701. Science and State. (3 cr.; Student Option; Periodic Fall & Spring)
Relationship between science and contemporary society. Nature of science: its values, processes, and ways of knowing. How science has influenced U.S. political institutions and political/judicial processes. Issues in current debate over U.S. science policy. prereq: Grad or instr consent

PA 5711. Science, Technology & Environmental Policy. (3 cr.; Student Option; Every Fall)
Interplay of science, technology, the environment, and society. Approaches from across the social sciences will cover how science and technology can create new environmental pressures as well as policy challenges in a range of spheres from climate change to systems of intellectual property and international development.

PA 5712. Science to Action: All Paths. (1.5 cr.; Student Option No Audit; Every Spring)
Understanding best practices for translating science to action for the common good, integrating action across multiple sectors; i.e., coordinating action by communities, government, for-profit, non-profit/NGO and academia. Case studies and theories are discussed to address societal grand challenge topic.

PA 5715. Survey of Current Issues in Science, Technology, and Environmental Policy. (1.5 cr.; A-F only; Every Spring)
Current topics in science, technology, and environmental policy. prereq: Grad or instr consent

PA 5721. Energy and Environmental Policy. (3 cr.; Student Option; Every Fall & Spring)
Impact of energy production/consumption choices on environmental quality, sustainable development, and other economic/social goals. Emphasizes public policy choices for energy/ environment, linkages between them. prereq: Grad or instr consent

PA 5722. Environmental and Resource Economics Policy. (3 cr.; Student Option; Every Spring)
Public policy associated with natural resource use and environmental protection. Develops/apply economic concepts/methodologies/policy mechanisms. Principles of environmental/resource economics. Issues related to renewable/nonrenewable resources and environmental pollution. Focuses on scientific/political aspects of policy. prereq: [Intermediate microeconomics, intermediate policy analysis, grad student] or instr consent

PA 5723. Water Policy. (3 cr.; Student Option; Every Spring)
Sociocultural, legal, economic, and environmental forces affecting supply/use of water by individuals, sectors, and governance institutions. Historical trends; water laws in United States and internationally. Institutional structures for managing water at federal, state, and local levels. Current water-related issues/policies. prereq: Grad student or instr consent

PA 5724. Climate Change Policy. (3 cr.; A-F or Audit; Every Fall)
Existing and proposed approaches to mitigate and adapt to climate change through policies.
that cross scales of governance (from local to
global) and impact a wide range of sectors.
Exploration of climate change policy from
a variety of disciplinary approaches and
perspectives, emphasizing economic logic,
ethical principles, and institutional feasibility.
How policy can be shaped in the face of a
variety of competing interests to achieve
commonly desired outcomes. Students
develop a deep knowledge of climate change
in particular countries through a team final
project. prereq: Intro microecon (such as Econ
1101 or equiv)
PA 5731. Emerging Technologies and Society. (3 cr.; A-F only; Periodic Fall & Spring)
Legal, public policy, social, economic, and
ethical implications of emerging
technologies (such as nanotechnology).
Perspective of stakeholders (federal agencies,
public, industry, environment, international
organizations) and public policies. Statutory
objectives/regulatory. Diversity of policy
problems. Research methodologies. prereq:
Grad student or inst consent
PA 5741. Risk, Resilience and Decision Making. (1.5 cr. [max 3 cr.]; Student Option No Audit; Every Spring)
Interplay between risk analysis, decision
making, and policy in the context of new
and emerging technologies, environmental
and human well-being, risk and resilience.
Assessment methods; risk management
processes, issues and methods; role/treatment
of uncertainty; factors in decision making;
risk-based rule making; public values; risk
communication and perception. Scientific,
technical, social, political, and ethical issues.
prereq: Grad student or inst consent
PA 5742. Interdisciplinary Environmental Study: Practice and Design. (1.5 cr.; Student Option No Audit; Every Fall)
Practice & design of interdisciplinary study
to support environmental policy-making.
Research design (models, experiments, quasi-
experiments, case study & meta-analysis)
from a range of disciplines. Their integration in
an overarching framework to address pressing
STEP issues (e.g., climate change, food
security, energy, future cities).
PA 5751. Urban Infrastructure Systems for Sustainable and Healthy Cities. (3 cr.; A-F or Audit; Every Summer)
Study social actors, engineered infrastructures/
natural systems as they, together, shape
health/sustainability outcomes for cities.
Understand role of infrastructure design,
planning, policy in sustainable cities. Learn
sustainability systems concepts, local-to-global
linkages, inter-disciplinary, inter-cultural skills.
prereq: Grad student or inst consent
PA 5752. Material-Energy Flows for a Sustainable Society. (3 cr.; A-F only; Every Fall)
Material and energy flows in the context of:
a) Economic and human development;
b) Resource scarcity, renewability and
recyclability; and c) As a source of
environmental pollution. Inter-disciplinary
approach, integrating core topics from
environmental economics, industrial ecology,
and human health risk assessment, in the
context of public policy.
PA 5790. Topics in Science, Technology, and Environmental Policy. (1-3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring)
Selected topics. prereq: Grad or inst consent
PA 5801. Global Public Policy. (3 cr.; Student Option; Every Spring)
Creation of rules, norms, institutions to regulate
global activities. Policy making. How global
policy making regulates interstate, national,
transnational activities. Creation/enforcement
of global rules. Applications to international
security, political economy. prereq: Grad or inst consent
PA 5802. Global Economic Policy. (3 cr.; Student Option; Every Fall)
Economic logic of globalization, national policy
objectives, international finance/financial
institutions, international trade and agreements
including regional pacts and the WTO, global
environmental and resource governance,
immigration and emigration, and development
challenges. prereq: Major in [public affairs or
public policy] or inst consent
PA 5805. Global Economics. (3 cr.; A-F only; Every Fall)
Global trade, exchange rates, finance,
international business, and migration in context
of theories and evidence that inform the
policies pursued at national level. Operation
of main international organizations dealing with
these issues will also be examined. prereq:
[5021 or equivalent] or inst consent
PA 5813. US Foreign Policy: The Institutional Basis. (3 cr.; Student Option No Audit; Every Fall)
The institutions that shape, influence and
manage U.S. foreign policy including their
origins and culture. Structure and function of
key foreign policy institutions. Academic and
policy critiques of the evolving institutional
realities, including the State Department
decision-making process; how institutions
relate to one another, the changing role of
institutions such as the Department of Defense,
intelligence agencies, and the Department of
Homeland Security in foreign policy.
Assessment of the role played by Congress,
the media, and the public, including non-
governmental organizations and lobbying
groups, as they seek to influence Executive
Branch foreign policy institutions. Meetings
virtually or in person with current or former
Washington policy-makers who provide insights
on real time issues and institutional realities.
PA 5814. Bilateral and Multilateral Diplomacy. (3 cr.; Student Option No Audit; Every Spring)
Theory, practice and profession of bilateral &
multilateral diplomacy. History of diplomacy;
norms, practices and international legal
bases; impact of technology, cultural changes
on diplomacy. Readings, discussions and
simulations teach how major powers/smaller
states, working alone or in blocs, use
diplomacy to achieve national and regional
goals.
PA 5821. Humanitarianism. (3 cr.; Student Option; Periodic Fall & Spring)
Foundations, logic, dynamics, dilemmas, and
consequences of humanitarianism, a form of
governance that operates in the name of--and
for--the international community. prereq: Grad
student or inst consent
PA 5822. International Security. (3 cr.; A-F only; Periodic Fall & Spring)
Theoretical constructs, current debates. Why
states fight wars. Causes/consequences of
war in Iraq. Effect of nuclear weapons on world
security. Terrorism, civil wars. Nonconventional
security threats. Selective abortion and world
(un)stability. Causes/effects of wartime sexual
violence. Environmental concerns and conflict.
prereq: Grad student or inst consent
PA 5823. Managing Global Crises: Humanitarian & Human Rights Challenges for Policy Makers & Practitioners. (3 cr.;
Student Option No Audit; Fall Even Year)
Examination of efforts by the international
community?governments, international
organizations, non-governmental organizations
(NGOs) and others?to respond to
humanitarian, recovery and reconstruction
challenges posed by civil conflict and complex
emergencies. Disasters related to natural
hazards, like storm surges and hurricanes.
Issues and institutions related to humanitarian
challenges and humanitarian suffering arising
among the world including security, disaster response
and human rights. The roles of the United
States and international and non-governmental
humanitarian organizations.
PA 5824. International Humanitarian Crisis Simulation. (1 cr.; S-N or Audit; Every Fall)
Students learn/practice humanitarian crisis
response skills reflecting international
standards through a multi-day, humanitarian
dynamic crisis simulation. Includes training in
international crisis response standards
(SPHERE) and population assessment, WASH
(water, sanitation and hygiene) for refugee
camps, nutrition, interactive shelter design/
planning, the international legal basis for
humanitarian response, safety and security
issues, psychosocial trauma awareness, and
field hospital scenarios. Composed of class
meetings and an on-site sector skill training and
field crisis simulation.
PA 5841. Women, Violence, and Armed Conflict. (3 cr.; A-F only; Periodic Fall & Spring)
Role of women in recent armed conflicts/
how women are affected by wartime as
combatants, civilians, victims, and perpetrators
of war violence. Conflicts in Sierra Leone,
Liberia and El Salvador, where women
participated in fighting forces in large numbers,
as well as women's roles in the Abu Ghraib
scandal, female suicide bombers, wartime
sexual violence. Policy solutions offered by
policymakers and NGOs to deal with problems
of gender-based violence. prereq: Grad student
or inst consent
PA 5851. Middle East Politics. (3 cr.; A-F only; Periodic Spring)
Middle East Politics examines the domestic,
regional, and transnational politics of the

Mid East and North Africa. It explores key policy-relevant issues in MENA such as external intervention/occupation, human rights, social movements, political economy, religion and politics, democratization and elections, civil society, and gender. prereq; Grad or instr consent

PA 5880. Exploring Global Cities. (1-3 cr. [max 6 cr.]; Student Option No Audit; Every Spring) Study abroad offered in cities across globe. Opportunities to study policy/planning issues in varied contexts from comparative/inter-cultural perspective. Study/work with practitioners/peers in field. Tanzania odd years/Austria even years. Additional countries may be added in future. prereq; Grad student or instr consent

PA 5885. Human Rights Policy: Issues and Actors. (3 cr.; Student Option; Every Fall) Politics of human rights issue emergence; relevant international, regional, and domestic norms; correlates of state repression; measurement of human rights abuse and remedies; human rights promotion by states, political parties, international organizations, NGOs, social movements, faith-based organizations, and providers of international development assistance.

PA 5886. Master of Human Rights Cohort Seminar I. (1 cr.; A-F only; Every Fall) The Master of Human Rights Cohort Seminar is a required course for all first-year MHR students. The course is intended to create a cohort group and ensure that all MHR students have an opportunity to work together to explore current issues related to human rights practice, focusing on emerging events or crises, and debates over policy, practice, or theory and for direct contact with and networking particularly with counterparts in the Global South. This course is in a series with, and taken before PA 5887. prereq; First-year MHR

PA 5887. Master of Human Rights Cohort Seminar II. (1 cr.; A-F only; Every Spring) The Master of Human Rights Cohort Seminar is a required course for all first-year MHR students. The course is intended to create a cohort group and ensure that all MHR students have an opportunity to work together to explore current issues related to human rights practice, focusing on emerging events or crises, and debates over policy, practice, or theory and for direct contact with and networking particularly with counterparts in the Global South. This course is in a series with, and taken after PA 5886.

PA 5890. Topics in Foreign Policy and International Affairs. (1-5 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Selected topics.

PA 5910. Developing Your Public Service Career. (1 cr.; S-N or Audit; Every Fall) Students investigate/analyze interests, skills, and abilities and combine them in a career plan. Develop tools to demonstrate abilities, document experiences/knowledge, and explore public service career options. prereq; [Major in [public affairs or public policy or urban/ regional planning] or [science, technology/ environmental policy] or development practice] or instr consent

PA 5920. Skills Workshop. (0.5-4 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Topics on public policy or planning skills. Topics specified in Class Schedule.

PA 5924. Intercultural Competence. (3 cr.; A-F only; Every Spring) Interacting with/working effectively with diverse populations. Researching ancestry. Analyzing cross-cultural communication issues in organizations. Prejudice, discrimination, group belonging. Analyze intercultural competence of global leader. prereq; Grad student or instr consent

PA 5925. Creating a Professional Online Portfolio. (1 cr.; S-N only; Every Spring) Build electronic portfolio reflecting knowledge/skills learned in coursework, internships, volunteer efforts, leadership roles, research activities. Promote professional selves using social networking platform. prereq; [MDP, MPA, MPP, MS-STEP, MURP] or instr consent

PA 5926. Presentation Skills: How to Inspire Your Audience and Change the World. (1 cr. [max 2 cr.]; Student Option No Audit; Every Fall) Learn techniques for making effective, persuasive presentations to different kinds of audiences. Practice is essential to improve speaking skills and reduce anxiety. Students practice by recording brief weekly presentations and making class presentations in a supportive environment. Techniques for using Powerpoint to create effective slides are practiced. Course components include presentation assignments; peer reviews; readings/videos and reflections; and class participation. May be repeated once.

PA 5927. Effective Grantwriting for Nonprofit Organizations. (1.5 cr.; A-F only; Every Fall & Spring) Grantwriting skills, processes, problem solving, and resources for nonprofit organizations. Researching and seeking grants. Communication with potential funders and generating financial support. Collaborating effectively with the organization and clients to create substantive, fundable proposals.

PA 5929. Data Visualization: Telling Stories with Numbers. (1.5 cr.; Student Option; Every Fall & Spring) Tools for communicating quantitative information in an intelligent, effective and persuasive way. Topics covered include 1) determining which types of statistical measures are most effective for each type of data and message; 2) determining which types of design to use for communicating quantitative information; and 3) designing graphs and tables that are intelligent and compelling for communicating quantitative information.

PA 5951. Humphrey Fellows Global Commons Seminar. (1 cr. [max 6 cr.]; S-N only; Every Fall) This seminar will introduce Humphrey International Fellows to the public policy, law, and human rights landscape of Minnesota and provide opportunities for professional growth and development in accordance with the goals of the Hubert H. Humphrey International Fellows Program. Through a series of lectures, presentations, trainings and site visits, fellows will be exposed to professional development opportunities, skill building, cultural education, leadership training and networking opportunities. Fellows will also have the opportunity to hear from experts in their fields of expertise, and learn best practices and strategies in public policy, law, and human rights advocacy.

PA 5952. Global Commons Seminar II. (2 cr.; A-F only; Every Spring) Research/presentations related to professional development projects. Each week selected students assign readings, deliver a presentation on their professional development project, and distribute a summary of the talk. Presentations are developed in collaboration with at least one faculty specialist in the subject area. prereq; HHH International fellow

PA 5971. Survey of Election Administration. (3 cr.; Student Option No Audit; Every Fall & Spring) Survey of building blocks of election administration, from voter registration to recounts.

PA 5972. Elections and the Law. (3 cr.; Student Option No Audit; Every Fall) Theories and basic structure of the American legal system. Experience with basic tools and skills for using the law to understand and analyze issues facing election administrators across the nation. Use of election-related and non-election related materials to prepare election administrators for interacting with counsel, legislators and the courts in carrying out their responsibilities.

PA 5973. Strategic Management of Election Administration. (2 cr.; Student Option No Audit; Every Fall) Strategic management for election administrators in the political environment. Election official tools and challenges. The role of the lawmaking process in budgeting and organizational planning.

PA 5974. Election Administration Capstone Project. (2 cr.; Student Option No Audit; Every Fall & Spring) Application of interdisciplinary methods, approaches, and perspectives from core courses. Written report of an election administration issue or problem in jurisdiction of student’s choice. Research best practices and possible solutions. Final paper or presentation with findings.

PA 5975. Election Design. (2 cr.; Student Option No Audit; Every Spring) Election administration design principles, including ballot and polling place design and poll worker training materials. Application of principles of field.

PA 5976. Voter Participation. (1 cr.; Student Option No Audit; Every Fall & Summer)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
PA 8331. Economic Demography. (3 cr.; A-F or Audit; Every Spring) Classical theory, advanced econometric methods, recent empirical work, and available datasets for research in economic demography. Topics include the economics of mortality, fertility, migration, marriage, women's labor supply, intra-family bargaining, and age structure. Students develop critical analysis and academic discourse skills through in-depth discussions and replications of papers, presentations, referee-style writing assignments, and a term paper. prereq: Grad-level economic theory (PA 5021 or equiv) and econometrics (PA 5033 or equiv) and instructor permission

PA 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

PA 8366. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr.

PA 8666. Advanced Topics in Economic and Community Development. (1-3 cr.; A-F or Audit; Periodic Fall & Spring) Uses social movement literature and histories of U.S. second-wave feminism to study feminist organizations. Recurring issues and conflicts within organizations and movements examined through comparative studies of feminism in Latin America, Eastern Europe, Britain, and Italy. Methods and sources for studying feminism.

PA 8844. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) FTE: Doctoral prereq: Doctoral student, adviser and DGS consent

PA 8461. Global and U.S. Perspectives on Health and Mortality. (3 cr.; Student Option) The health of populations in developing and developed countries is very different. Within countries, great health disparities exist between more advantaged and more disadvantaged populations. When crafting policies that aim to improve population health, it is crucial to know how to measure health and how to think about the health needs of the specific population in question. This course will provide an overview to the factors driving health, mortality, and aging across different populations. In addition, students will learn the best sources of data and measures to use to describe the health status of a population. They will also be able to assess policy options that address the health of their population.

PA 8490. Advanced Topics in Social Policy. (1-3 cr.; max 6 cr.); Student Option; Periodic Fall & Spring) Selected topics.

PA 8590. Advanced Topics in Economic and Community Development. (1-3 cr.; max 6 cr.); Student Option; Periodic Fall & Spring) Selected topics.

PA 8667. Women and Electoral Politics. (3 cr.; A-F or Audit;) Political science and women's studies literature on American women and electoral politics.

PA 8690. Advanced Topics in Women and Public Policy. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) Selected topics.

PA 8706. Interdisciplinary Research Seminar on Science, Technology, and Environmental Policy. (3 cr.; A-F only; Every Fall) Foundational understanding of conducting research on social and policy processes concerning science, technology, and the environment. Key concepts, literature, and new and emerging research directions will be explored with the objective of developing individual research programs. prereq: Public Affairs Ph.D. student with STEP subplan.

PA 8707. Interdisciplinary Sustainability Systems Research Seminar. (3 cr.; Student Option No Audit; Every Spring) Sustainability from systems perspective. Explores what environmental sustainability, health, and well being mean for people and the planet; how these attributes are measured and prioritized by different stakeholders, and how different social-ecological and infrastructural systems transition toward improved health and sustainability outcomes.

PA 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PA 8790. Advanced Topics in Science, Technology, and Environmental Policy. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) Selected topics.

PA 8811. Strategic Issues in International Economic Policy. (3 cr.; Student Option; Periodic Fall & Spring) Compares/contrasts experiences of industrial/developing countries in trade, investment, exchange rates, and immigration.

PA 8821. National Security Policy. (3 cr.; Student Option; Every Fall) Politics and economics of national security policy. Defense policy, military strategy, and weapons procurement. While emphasis is on the United States, other countries also discussed.

PA 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral thesis credit. prereq: [Max 18 cr per semester or summer], 24 cr required

PA 8890. Advanced Topics in Foreign Policy and International Affairs. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring) Selected topics.

PA 8921. Master's: Professional Paper (Individual Option). (1-3 cr.; Student Option; Every Fall, Spring & Summer) Students work under guidance of paper adviser and committee members to complete their Professional Paper (individual option). prereq: instr consent

PA 8922. Master's: Plan B. (1-3 cr.; Student Option; Every Fall, Spring & Summer) Masters of science in science, technology, and environmental policy majors work under guidance of paper adviser to complete their Plan B. prereq: instr consent

PA 8931. PhD Public Affairs Professional Skills I. (1 cr.; S-N or Audit; Every Summer) First of three professional skills workshops to prepare Public Affairs PhD students to be engaged scholars and public policy practitioners. Develop skills and tactics for leadership in public affairs scholarship.

PA 8932. PhD Public Affairs Professional Skills II. (1 cr.; S-N or Audit; Every Summer) Second of three professional skills workshops to prepare Public Affairs PhD students to be engaged scholars and public policy practitioners. Communicate complex policy problems and solutions with a wide variety of audiences.

PA 8933. PhD Public Affairs Professional Skills III. (1 cr.; S-N or Audit; Every Summer) Third of three professional skills workshops to prepare Public Affairs PhD students to be engaged scholars and public policy practitioners. Utilize communication platforms to engage diverse audiences. Build a digital portfolio to share research and accelerate teaching impact.

PA 8991. Independent Study. (0-5-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Independent study, prereq: Limit of 3 credits applied toward a Humphrey School of Public Affairs degree or certificate program, instr consent

Public Health (PUBH)

PUBH 20. Community Engagement. (0 cr.; No Grade Associated; Every Fall, Spring & Summer) Registration for course is officially documented on transcript. prereq: Academic faculty adviser consent
PUBH 1001. Success Over Stress (SOS). (2 cr; Student Option; Every Fall & Spring) Increases students' understanding of stress/ how to manage it and empower them to help others manage their stress. Holistic health perspective/impact of stress on all aspects of life. Causes, effects, and consequences of stress for students and society at large. Tools and resources to manage stress during college and throughout life. prereq: Undergrad or PSEO student

PUBH 1003. Alcohol and College Life (ACL). (2 cr; Student Option; Every Fall, Spring & Summer) How alcohol affects college life. Personal prevention strategies. Maximizing campus safety. Students receive instructions at their umn.edu email accounts on how to access/start course. Due dates for assignments. prereq: Fr or Soph or PSEO

PUBH 1004. Sexuality Matters. (2 cr; Student Option; Every Fall, Spring & Summer) Knowledge/skills to lead healthy sexual lives. Unbiased, medically accurate, evidence-based information/programs. Communication skills. Dispel sexuality/relationships myths. prereq: Undergrad or PSEO student

PUBH 1005. Sleep, Eat, and Exercise. (1 cr; Student Option; Every Fall & Spring) Living a balanced life while in college. Nutrition, sleep, physical activity. Techniques to promote self-awareness, reflection, goal setting, and action toward wellness. prereq: [Undergrad or PSEO] student

PUBH 3000. Topics: Public Health. (0.5-4 cr; max 80 cr; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest in public health.

PUBH 3001. Personal and Community Health. (2 cr; Student Option; Every Fall & Spring) Fundamental principles of health conservation and disease prevention.

PUBH 3003. Fundamentals of Alcohol and Drug Abuse. (2 cr; Student Option; Every Fall & Spring) Scientific, sociocultural, and attitudinal aspects of alcohol and other drug abuse problems. Emphasizes incidence, high-risk populations, prevention, and intervention.

PUBH 3004. Basic Concepts in Personal and Community Health. (4 cr; Student Option; Every Fall & Spring) Scientific, sociocultural, and attitudinal aspects of communicable and degenerative diseases, environmental and occupational health hazards, and alcohol and drug problems. Role of education in health conservation, disease control, and drug abuse.

PUBH 3005. Fundamentals of Alcohol and Drug Abuse for Teacher Education. (1 cr; Student Option; Every Fall, Spring & Summer) Scientific/socio-cultural aspects of alcohol/drug problems. Emphasizes role of education in health conservation and drug abuse prevention. prereq: Undergrad in Agricultural Edu or Career/Technical Edu or DirecTrack to Teaching or Early Childhood Edu or Elementary Edu Foundations or Music Edu or Special Educ

PUBH 3010. Public Health Approaches to HIV/AIDS. (2 cr; Student Option; Every Fall) Primary, secondary, and tertiary prevention. Community responses to HIV/AIDS in Minnesota. Medical, social service, and political responses.

PUBH 3040. Dying and Death in Contemporary Society: Implications for Intervention. (2 cr; Student Option; Every Spring) Concepts, attitudes, ethics, and lifestyle management in relation to dying, death, grief, and bereavement. Emphasizes intervention/educational aspects for community health/helping professionals and educators. prereq: Jr or Sr or instr consent

PUBH 3050. Practicum in Peer Education I. (2 cr; A-F or Audit; Every Fall) Multiple factors that influence health. Through various health promotion strategies, students build upon or gain skills such as public speaking, needs assessments, program planning, interpersonal communication, and program evaluation. prereq: Selected to serve as a hth advocate, instr consent

PUBH 3052. Practicum in Peer Education II. (2 cr; A-F or Audit; Every Spring) Multiple factors that influence health. Through health promotion strategies, students gain/ build skills such as public speaking, needs assessments, program planning, interpersonal communication, and program evaluation. prereq: Undergrad student demonstrated hth sci or hth ed interest, selected to serve as a hth advocate, instr consent

PUBH 3093. Directed Study: Public Health. (4 cr; Student Option; Every Fall, Spring & Summer) Directed study in selected public health problems or current issues. prereq: instr consent

PUBH 3100. Topics: Environmental Health. (2 cr; max 40 cr; Student Option No Audit; Every Fall, Spring & Summer) Topics of interest in environmental health.

PUBH 3107. Global Public Health and the Environment. (2 cr; A-F only; Every Fall) Environmental determinants of health/well-being of populations. Role of environment in public health. Population burden of disease. Variation of environmental public health determinants across global interconnectedness of activities/actions of people in different countries. prereq: [3001 or 3004 or 3202], [3106 or 3350], public health minor, instr consent

PUBH 3120. Injury Prevention in the Workplace, Community, and Home. (2 cr; Student Option; Every Spring) Injury Epidemiology: Analyses of major injury problems, affecting the public in the workplace, community, and home, using the epidemiologic model and conceptual framework; emphasis on strategies/program development for prevention and control. For students involved in the field of Occupational Health and Safety, this course provides a foundation essential to the development of programs for Occupational Injury Prevention and Control. prereq: Basic epidemiology course preferred but not required

PUBH 3123. Violence Prevention and Control: Theory, Research and Application. (2 cr; Student Option No Audit; Every Spring) The course will cover a range of topics including: definitions and characteristics of various forms of violence, prevalence and risk factors, health effects, and prevention initiatives. Sources and limitations of existing epidemiologic data, analytic challenges, research quality and ethics will be examined throughout the course. prereq: None

PUBH 3202. What is Public Health?. (2 cr; Student Option No Audit; Every Fall) Overview of public health: what it is, its origins, evolution, how it is structured/administered in the U.S. Mission, concepts, principles, and practices of population-based public health. Case studies. Career opportunities.

PUBH 3205. The Matrix of Global Health. (2 cr; A-F only; Every Summer) Basic principles of global health, including social influences on health/health disparities. How health is measured, how global burden of morbidity/mortality varies throughout world. Investigate relationship between social, political, economic, health systems that interface to influence health outcomes. prereq:

PUBH 3807. Global Health, Relief, Development and Religious and Non-religious NGOs. (3 cr.; max 6 cr.; Student Option; Every Spring) Intersection of global health, relief, development/roles. Interaction of intergovernmental/governmental agencies, religious/non-religious NGOs in humanitarian response, development/social welfare generation supporting global health.

PUBH 3893. Directed Study: Health Services Research and Policy. (1-4 cr.; max 16 cr.; Student Option; Periodic Fall, Spring & Summer) tbd prereq: instr consent

PUBH 3905. Nutrition for Public Health Promotion and Disease Prevention. (2 cr.; Student Option; Every Fall) Topics of contemporary interest. Concepts/facts about science of human nutrition discussed in relation to personal/community nutrition problems/concerns. Applied introductory course with labs. prereq: Jr or sr or instr consent

PUBH 3940. Concepts and Controversies in Public Health Nutrition and Health Promotion. (1 cr.; Student Option; Every Fall) Societal issues around public health nutrition and health promotion. Socioecological framework. Levels of influence on dietary intake, food choices, related health outcomes. Policy initiatives related to public health nutrition, health promotion and disease prevention. prereq: Jr or sr or instr consent

PUBH 3950. From Kid to Community: Personal, Social and Environmental Influences on Youth Obesity. (2 cr.; Student Option; Every Fall) Public health strategies for prevention of pediatric obesity. Includes overview of epidemiology of child/adolescent obesity focusing on social-ecological risk factors. Discussion of implications of risk factors for developing environmentally-focused interventions/programs. prereq: Students should have completed one basic, introductory nutrition course or equivalent or permission by instructor

PUBH 3955. Using Policy to Address Child & Adolescent Obesity Prevention. (1 cr.; Student Option; Every Spring) Overview of federal, state, local policy approaches. National initiatives for prevention of child/adolescent obesity. Specific policies will be discussed at local, state, federal levels. Extensive discussion on evidence of impact of policies on child/adolescent weight. prereq: basic nutrition course or instr consent

PUBH 4010. Summer Institute in Biostatistics. (4 cr.; A-F only; Every Summer) Introduction to biostatistics for undergraduate students. Meets every weekday, all day, for six weeks summer between junior or senior year. Fundamentals of biostatistics/epidemiology, statistical computing in R/SAS, clinical trials/statistical genetics. prereq: Student participant in the Division of Biostatistics SIBS (Summer Institute for Training in Biostatistics) research program.

PUBH 4410. Summer Institute in Biostatistics. (4 cr.; A-F only; Every Summer) Introduction to biostatistics for undergraduate students. Meets every weekday, all day, for six weeks summer between junior or senior year. Fundamentals of biostatistics/epidemiology, statistical computing in R/SAS, clinical trials/statistical genetics. prereq: Student participant in Division of Biostatistics SIBS (summer Institute for Training in Biostatistics) research program.

PUBH 5099. Topics: Epidemiology and Community Health. (1-4 cr.; max 8 cr.; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest in epidemiology, community health promotion, public health nutrition and maternal and child health. prereq: specified by course section.

PUBH 5230. Topics: Public Health Practice. (2 cr.; max 4 cr.; Student Option No Audit; Every Fall, Spring & Summer) Topics.

PUBH 5231. Emergency Preparedness: A Public Health Perspective. (2 cr.; A-F only; Every Spring) Public health emergency preparedness, response, recovery. Introduction to field’s core competencies. Various components of course, including online modules, intended to stimulate interactions among learners. Purpose, history, organization, functions, tools, activities used in field. prereq: Upper-level undergraduate students and grad/professional students in academic health sciences and fields related to public health emergency preparedness, response, and recovery. Credit will be not granted if student has completed the PUBH 5230 topic course with same title.

PUBH 6000. Topics: Community Health Education. (0.5-4 cr.; max 80 cr.; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest in community health education.

PUBH 6003. Fundamentals of Alcohol and Drug Abuse for Teacher Education. (1 cr.; Student Option; Every Fall, Spring & Summer) Scientific/socio-cultural aspects of alcohol/drug problems. Emphasizes role of education in health conservation and drug abuse prevention. prereq: Master of education student or instr consent

PUBH 6010. Public Health Approaches to HIV/AIDS. (3 cr.; Student Option; Every Fall) Survey of public health approaches to AIDS epidemic. Epidemiological/clinical features of HIV infection. Impact of AIDS on certain communities/populations. Behavior change
principles as they apply to AIDS interventions.
prereq: Grad student or professional school student or instr consent

**PUBH 6015. HIV/AIDS: Epidemiology and Public Health Interventions.** (2 cr.; Student Option; Every Fall)
Current/controversial issues related to HIV/ AIDS. Primary, secondary, and tertiary prevention. HIV/AIDS in resource-limited countries (including sub-Saharan Africa and Southeast Asia) and in marginalized populations. Evaluation of government policy for control of HIV/AIDS. prereq: [6320 or 6341 or equiv], [Epi or CHE or MCH or PUBH Nutr] MPH student or Epi PhD student or instr consent

**PUBH 6020. Fundamentals of Social and Behavioral Science.** (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Four major approaches to public health problems: psychosocial, economic, community, policy. Theory, implementation. Small groups practice skills. prereq: Public health [MPH or MHA or certificate] student or health journalism MA major or instr consent

**PUBH 6025. e-Public Health.** (2 cr.; Student Option; Spring Even Year)
Provide an overview of how technology may be used as a recruitment, assessment, and intervention tool in public health research and practice.

**PUBH 6034. Program Evaluation for Public Health Practice.** (3 cr.; Student Option; Every Spring)

**PUBH 6035. Applied Research Methods.** (3 cr.; Student Option; Every Fall)
Using forms, questionnaires, interviews. Literature searching, scale construction, item analysis, data coding, entry/analysis, report writing. Use of computer software to develop questionnaire/analyze data. prereq: 6034 recommended, [6414 or 6450 or equiv], [CHP, MCH or PUBH Nutr major or instr consent]

**PUBH 6040. Dying and Death in Contemporary Society: Implications for Intervention.** (2 cr.; Student Option; Every Spring)
Concepts, attitudes, ethics, and lifestyle management related to dying, death, grief, andbereavement. Emphasizes intervention and educational aspects for community health and helping professionals and for educators. prereq: [Grad or professional school] student or instr consent

**PUBH 6045. Skills for Policy Development.** (1 cr.; Student Option; Every Spring)
Skills relevant to policy development and implementation for public health-related issues.

**PUBH 6049. Legislative Advocacy Skills for Public Health.** (3 cr.; A-F only; Every Spring)
State legislature as arena for public health practice. Skills necessary to operate in that arena. Analyzing emergence, development, and resolution of legislative issues of public health importance.

**PUBH 6050. Community Health Theory and Practice I.** (3 cr.; Student Option; Every Fall)
Socioenvironmental factors influencing health-related behavior. Role of groups, institutions, social structures in encouraging healthy or unhealthy behavior. Role of interventions affecting social environment. Barriers to interventions. Individual behavior change theories. prereq: Community health promotion major or instr consent

**PUBH 6051. Community Health Theory and Practice II.** (3 cr.; A-F only; Every Spring)
Skill development for developing community health interventions, budgets, implementation plans, and grant proposals. Credit will not be granted if credit has been received for PUBH 6673.

**PUBH 6055. Social Inequalities in Health.** (2 cr.; Student Option; Every Fall)
Examine obesity epidemic, eating disorders, prevention and treatment approaches at multiple levels (individual, social, environmental, policy), links between obesity and eating disorders.

**PUBH 6100. Topics: Environmental Health.** (3 cr.; Student Option; Every Fall, Spring & Summer)
New course offerings/topics of interest in environmental health.

**PUBH 6101. Environmental Health.** (2 cr.; A-F only; Every Fall & Spring)
Principles of environmental health relating to macro/micro-environments and to products consumed or used by people. prereq: Public health [MPH or MHA or certificate] student or instr consent

**PUBH 6102. Issues in Environmental Health.** (2 cr.; A-F only; Every Fall, Spring & Summer)
Current issues, principles, and methods of environmental/occupational health practice. prereq: Public health [MPH or MHA or certificate] student or health journalism MA major or nursing MS student or instr consent

**PUBH 6103. Exposure to Environmental Hazards.** (2 cr.; A-F only; Every Fall)
Concepts, assessment, and control of exposure to biological, physical, and chemical hazards in the environment. Environmental health as an essential component of public health.

**PUBH 6104. Environmental Health Effects.** (2 cr.; A-F only; Every Fall)
Environment as a determinant of disease in humans. Identifying biological mechanisms/effects of chemical, biological, and physical agents on human health. Principles of toxicology as they apply to toxicant-human interactions. prereq: Basic science coursework; undergrad coursework in [biology, chemistry, biochemistry] recommended

**PUBH 6105. Environmental and Occupational Health Policy.** (2 cr.; A-F or Audit; Every Spring)
Environmental and occupational health policies, laws, concepts, and principles. Proposals/approaches for regulatory reform, approaches to policy analysis, phases/issues in

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
model and conceptual framework; emphasis on strategies/program development for prevention and control.

- PUBH 6121. Topics: Injury Prevention in the Workplace, Community, and Home. (2 cr.; Student Option; Every Fall, Spring & Summer) Selected projects in injury prevention.


- PUBH 6123. Violence Prevention and Control: Theory, Research, and Application. (2 cr.; Student Option; Every Spring) Analysis/critique of major theories and of epidemiological research pertinent to violence, including characteristics of violence and relevant risk factors, reporting/treatment protocols, and current/potential intervention efforts and prevention initiatives. Emphasizes interdisciplinary contributions to violence prevention/control.


- PUBH 6132. Air, Water, and Health. (2 cr.; A-F only; Every Spring) Issues related to providing adequate levels of clean air/water. Local water quantity/quality, air quality in developed/developing world, global air/water quality, policies meant to protect these resources.

- PUBH 6133. Global Health Seminar. (1 cr.; S-N only; Every Spring) Aspects of global health from public health perspective. Faculty/students from different backgrounds/programs lead/discuss presentations on global health topics. Prereq: Public health student or instr consent

- PUBH 6134. Sustainable Development and Global Public Health. (2 cr.; Student Option; Every Spring) Effects of globalization on social/sustainable development. Population, war, economics, urbanization, environment, water/sanitation, communicable/non-communicable conditions. New infectious/chronic diseases, food security/ environmental health. Prereq: Credit will not be granted if received for 6100 or 6365

- PUBH 6140. Occupational and Environmental Epidemiology. (2 cr.; Student Option; Every Spring) Principles/concepts in identifying health effects in workplace. Strategies for identifying excess risk, evaluating strengths/weaknesses of research techniques, assessing bias/confounding. Prereq: Coursework in epidemiology, biostatistics

- PUBH 6150. Interdisciplinary Evaluation of Occupational Health and Safety Field Problems. (3 cr.; Student Option; Every Spring) Guided evaluation of potential health/safety problems at work site, recommendations and design criteria for correction/evaluation of occupational health/safety programs. Prereq: 6170 or instr consent

- PUBH 6151. Occupational and Environmental Health Nursing Seminar. (1 cr. [max 6 cr.]; S-N only; Every Fall & Spring) Synthesize information from coursework/professional experience to enhance critical thinking/application to field of occupational/environmental health nursing. Prereq: Enrolled in OEHN program, MS, MPH, PhD degrees

- PUBH 6154. Climate Change and Global Health. (3 cr.; Student Option; Every Spring) Interconnected relationships between global climate change/human health. Develop computer models to predict climate change from natural/anthropogenic forces, predict human health outcomes as result of changing climate. Prereq: Students must have elementary computer skills.

- PUBH 6160. Systems Toxicology. (3 cr.; Student Option; Every Spring) Application of information regarding basic pharmacokinetic principles/metabolic systems to elucidate mechanisms of toxicity induced by xenobiotic compounds. Prereq: [Coursework in biochemistry, molecular biology, organic chemistry] or instr consent

- PUBH 6161. Regulatory Toxicology. (2 cr.; Student Option; Every Spring) In-depth introduction to laws (and associated regulations) of U.S. federal regulatory agencies, such as CPSC, EPA, FDA, OSHA, and DOT, that require/use toxicological data/information in their mission of protecting human/environmental health. Prereq: Background in toxicology or pharmacology or related field is recommended

- PUBH 6162. Biomarkers. (2 cr.; A-F only; Every Spring) Introduce current status of molecular biomarker research, including biomarkers of chemical exposures, genetic toxicity markers, genomics-based biomarkers of susceptibility, organ systems biomarkers. Progression of biomarker development/application from laboratory environment to clinical or population-based settings/development of public health policies/interventions. Prereq: Introductory courses in toxicology and exposure analysis recommended

- PUBH 6164. Toxicological Analysis. (2 cr.; A-F only; Every Fall) Methods in molecular toxicology. Research facilities at University. Field trips to local organizations employing modern toxicological

**PUBH 6181. Surveillance of Foodborne Diseases and Food Safety Hazards.** (2 cr.; Student Option; Every Fall)

**PUBH 6172. Industrial Hygiene Applications.** (2 cr.; Student Option; Spring Odd Year)
Recognition, evaluation, and control of occupational health/safety hazards. Practice application to specific industrial hygiene problems related to gases/vapors, aerosols, and physical agents. prereq: [6170, environmental health major] or instr consent

**PUBH 6173. Exposure to Physical Agents.** (2 cr.; Student Option; Spring Even Year)

**PUBH 6174. Control of Workplace Exposure.** (3 cr.; Student Option; Spring Odd Year)
Hierarchy of options for controlling human exposures to airborne contaminants, both gaseous/aerosol. Science/practice of process control/exhaust ventilation in workplaces/other indoor air spaces/air cleaning. Control of emissions to ambient environment.

**PUBH 6175. Environmental Measurements Laboratory.** (2 cr.; A-F only; Spring Even Year)
Measuring exposures to potentially hazardous agents in air or water. Sampling the agent. Preparing sample for analysis. Conducting analysis. Interpreting results. prereq: EH or instr consent

**PUBH 6176. Hazardous Materials and Waste Management.** (2 cr.; Student Option; Fall Even Year)
Generation, control, and disposal of hazardous materials/wastes. Recognizing, evaluating, controlling, and preventing hazards from chemicals that threaten occupational/environmental health. Lectures, case studies, workshops, field trips. prereq: [6170, courses in chemistry, organic chemistry] or equiv] or instr consent

**PUBH 6180. Topics: Foundations of Interprofessional Communication and Collaboration.** (0.5-4 cr.; max 30 cr.; S-N only; Periodic Fall)
First of three phases of the Center for Interprofessional Education's 1 HEALTH curriculum. Online hybrid course requiring students to attend small group face-to-face sessions. prereq: [MHA or MPH or MS] student

**PUBH 6210. Public Health Medicine Seminar.** (1 cr.; S-N or Audit; Every Fall & Spring)
Links between medical practice and public health practice. Emphasizes interdisciplinary public health interventions. Two relatively common medical problems serve to focus discussion about intersection of medicine and public health. prereq: [Public health medicine program MPH major or [MD degree or equiv], instr consent

**PUBH 6213. Hazardous Materials and Waste Management Laboratory.** (2 cr.; A-F only; Every Fall & Summer)

**PUBH 6190. Environmental Chemistry.** (3 cr.; Student Option; Every Fall)
Overview air, water, and soil chemistry. Pertinent environmental problems. Human/ecological multimedia exposures to chemicals in the environment. prereq: One course each in [gen chem, org chem] or instr consent

**PUBH 6191. Air Pollution.** (3 cr.; A-F or Audit; Every Spring)
Overview of many facets of air pollution. Primary/secondary sources. Transport mechanisms, including meteorological effects, atmospheric transformations of pollutants, and deposition processes involved in removal of pollutants. Human/ecosystem health effects, nuisance effects. Regulations/standards in place and under review that affect air pollution management. prereq: [General, organic chemistry] or instr consent

**PUBH 6192. Measurement and Properties of Air Contaminants.** (2 cr.; A-F or Audit; Every Fall)
Gaseous/particulate air contaminants, their occurrence in workplaces. Factors governing generation/dispersal. Criteria, rationales, and standards for measurement in workplace. Industrial hygiene measurement. Aerosol-related ill-health. prereq: Good grasp of [elementary physics, chemistry, mathematics including calculus]

**PUBH 6193. Advanced Topics in Human Exposure Science.** (2 cr.; A-F only; Every Fall)
Designing exposure studies for epidemiologic investigations and health risk assessments. Techniques to measure/estimate human exposures to hazardous agents in non-occupational and occupational environments. prereq: 6192 or instr consent

**PUBH 6200. Topics: Foundations of Interprofessional Communication and Collaboration.** (0.5-4 cr.; max 30 cr.; S-N only; Periodic Fall)
First of three phases of the Center for Interprofessional Education's 1 HEALTH curriculum. Online hybrid course requiring students to attend small group face-to-face sessions. prereq: [MHA or MPH or MS] student

**PUBH 6210. Public Health Medicine Seminar.** (1 cr.; S-N or Audit; Every Fall & Spring)
Links between medical practice and public health practice. Emphasizes interdisciplinary public health interventions. Two relatively common medical problems serve to focus discussion about intersection of medicine and public health. prereq: [Public health medicine program MPH major or [MD degree or equiv], instr consent

**PUBH 6271. Management and Organization Within the Ambulatory Care Facility.** (4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Ten-month program of on-campus residential (two-weeks) and off-campus study that includes periodic seminars and monthly sessions with clinical preceptors. Management, organizational behavior, problem solving, executive role. Personnel management, financial management, governance, clinicians, productivity, efficiency. prereq: Certificate of Management Studies in Health Services Administration ISP-I student or instr consent

**PUBH 6272. Management and Organization in Hospital and Health Care Systems.** (4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Ten-month program of on-campus (two-weeks) and off-campus study, seminar and monthly local classes with preceptors on management principles, organizational behavior, executive roles, problem solving, health care delivery, human resources, information systems, financial management, support, and patient care services/governance. prereq: Certificate of Management Studies in Health Services Administration ISP-I student or instr consent

**PUBH 6273. Patient Care Management and Organization Within the Hospital and Health Care Organization.** (4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Ten-month program including on-campus (two weeks) and off-campus study, seminar and monthly local classes with preceptors on management principles, organizational behavior, executive roles, problem solving, health care delivery, human resources, information systems, financial management, support, and patient care services/governance. prereq: Certificate of Management Studies in Health Services Administration ISP-I student or instr consent

**PUBH 6274. Administrative and Professional Relationships Within the Ambulatory Care Facility.** (4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Ten-month program. On-campus (two weeks), off-campus study. Seminar. Monthly local classes with preceptors on ethics, change theory, managed care, strategic planning, law capital finance, integrated services, joint ventures, financial planning, community health systems, prereq: Certificate of Management Studies in Health Services Administration ISP-II student or instr consent

**PUBH 6275. Administrative and Professional Relationships Within the Health Care Facility.** (4 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Ten-month program. On-campus (two weeks), off-campus study. Seminar. Monthly local classes with preceptors on ethics, change theory, managed care, strategic planning, medical staff, law, capital finance, integrated services, joint ventures, financial planning,
PUBH 6276. Administrative and Professional Relationships of Patient Care Administration. (4 cr.; [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Ten-month program. on-campus (two week), off-campus. Seminar. Monthly local classes with preceptors on ethics, change theory, managed care, strategic planning, law, capital finance, integrated services, joint ventures, financial planning, community health system. prerequisite: Certificate of Management Studies in Health Services Administration ISP-II student or instr consent

PUBH 6281. Immigrant Health Issues. (3-4 cr.; A-F only; Every Fall) How to access demographic, health, and background information on U.S. immigrants. Characteristics and health needs of immigrants. Designing culturally competent health programs. How to advocate for changes to promote immigrant health. Community visits required. prerequisite: Public health or grad student or instr consent


PUBH 6290. International Humanitarian Crisis Simulation. (1 cr.; S-N only; Every Fall) This three day simulation will be carried out using a ‘field exercise’ format. The goal will be to learn skills-through-doing in a dynamic crisis scenario, applying concepts and developing understanding in practice, through readings and in interactive didactic sessions. This will be a challenging experience that will require students to put into practice skills and teamwork recognized in humanitarianism classes and in the literature. The simulation will involve active team work, intense interaction with role players, and on-the-spot decision making in a way that closely resembles how field work is done in international humanitarian crises. Besides the pre- and post sessions, the first day on site will include content sessions. At the conclusion of the course students will write a final reflection paper. Please contact an instructor should you have concerns regarding physical challenges presented in extended outdoor activity in an extensive (but walkable) site, rain or shine. (For the field experience, equipment suggestions will be provided as will meals.)

PUBH 6299. Public Health Is a Team Sport: The Power of Collaboration. (1 cr.; S-N only; Every Summer) Cohesive group of interdisciplinary faculty/students develop innovative public health strategies. Students discuss books pertinent to public health and participate in case analysis utilizing core competencies of public health practice. prerequisite: [Public health practice or maternal/child health online] MPH student

PUBH 6300. Topics: Clinical Research. (0.5-4 cr.; [max 20 cr.]; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest in clinical research.

PUBH 6301. Fundamentals of Clinical Research. (3 cr.; Student Option; Every Fall) Concepts of clinical research design/implementation/analysis. Students will learn skills needed for research in humans.

PUBH 6303. Clinical Research Project Seminar. (2 cr.; S-N only; Every Spring) Students will present their thesis and give and receive feedback. Students must have their project underway.

PUBH 6305. Introduction to Clinical Research for Health Professionals. (2 cr.; Student Option; Every Spring) Design/implementation of clinical research protocols. IRB, FDA, and other regulations. Practical tools for survey management. prerequisite: [Bachelors degree or degree from health professional program or grad student in [dentistry or medicine or pharmacy or public health or veterinary medicine]], instr consent

PUBH 6320. Fundamentals of Epidemiology. (3 cr.; A-F only; Every Fall, Spring & Summer) This course provides an understanding of basic methods and tools used by epidemiologists to study the health of populations.

PUBH 6325. Data Processing with PC-SAS. (1 cr.; Student Option; Every Spring) Introduction to methods for transferring/processing existing data sources. Emphasizes hands-on approach to pre-statistical data processing and analysis with PC-SAS statistical software with a Microsoft Windows operating system.

PUBH 6333. Principles of Human Behavior I. (2 cr.; A-F or Audit; Fall Even Year) Theoretical perspective on etiology/modification of health behavior in individuals/communities. prerequisite: Epi PhD student or instr consent

PUBH 6334. Human Behavior II. (2 cr.; A-F or Audit; Spring Even Year) Critical evaluation of major behavioral public health intervention research. Experience in research designs/methods in health behavior intervention. prerequisite: [6333, Epidemiology grad student in behavioral track] or instr consent

PUBH 6336. Advanced Seminar in Infectious Disease Epidemiology. (1 cr.; [max 2 cr.]; S-N or Audit; Every Fall) Real-world applications of infectious-disease epidemiologic principles to contemporary/controversial issues. Development of prevention/control strategies. prerequisite: 6341, 6385

PUBH 6341. Epidemiologic Methods I. (3 cr.; A-F only; Every Fall) Subject matter science, research methodology. Study designs applied to human populations. Randomized trials. Four types of observational studies: cohort, case-control, cross-sectional, ecological. Causal inference, bias, effect modification. prerequisite: AHC student or instr consent

PUBH 6342. Epidemiologic Methods II. (3 cr.; Student Option; Every Spring) Methods and techniques for designing, implementing, analyzing, and interpreting observational epidemiologic studies, including cohort, case-control, and cross-sectional studies.

PUBH 6343. Epidemiologic Methods III. (4 cr.; Student Option; Every Fall) Analysis/interpretation of data from various epidemiological study designs. SAS used to demonstrate epidemiological/statistical concepts in data analysis. prerequisite: [6342, 6451] with a grade of at least B- or instr consent

PUBH 6344. Completing the Culinating Experience: Secondary Data Analysis. (2 cr.; Student Option; Every Spring) Opportunity to start and finish MPH project. Secondary data analysis of cross-sectional, case-control, or cohort studies. Develop study question. Describe methods of study. Writing and interpreting results of analyzed data.

PUBH 6348. Writing Research Grants. (2 cr.; A-F only; Every Fall) Focuses on NIH-type grants. Mechanisms of grant development/writing, principles of informed consent, budget development, grant-review process, identifying funding sources. prerequisite: [8341 or 8341], [6450 or 7401], [Epidemiology PhD or Clinical Research MS student] or instr consent

PUBH 6350. Epidemiologic Methods III: Lab. (1 cr.; Student Option; Every Fall) Hands-on SAS programming to provide applied understanding of SAS Code presented in class examples. prerequisite: 6325 or concurrent registration is required (or allowed) in 6325 or 6420 or concurrent registration is required (or allowed) in 6343 or 6420 or concurrent registration is required (or allowed) in 6420 or instr consent

PUBH 6355. Pathophysiology of Human Disease. (4 cr.; Student Option; Every Fall) Compendium of human diseases relevant to public health professionals. Focuses on cardiovascular disease, cancer, and infectious disease. Presented from epidemiologic perspective. Significance of diseases in terms of prevalence, incidence, morbidity, and mortality. Risk factors, prevention strategies. prerequisite: Epidemiology major or public health nutrition major or instr consent

PUBH 6363. Design and Analysis of Group-Randomized Trials in Epidemiology. (3 cr.; Student Option; Every Spring) Community, school-based, and work-site trials. Trials involving randomization of other identifiable groups to study conditions. Experimental and quasi-experimental designs and threats to their validity.

PUBH 6365. Epidemiology of Global Health. (2 cr.; Student Option; Every Fall)

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Burden due to infectious/noninfectious diseases within middle-/low-income countries. Underlying risk factors that lead to emergence/spread. Diseases of international public health significance. Epidemiologic research methods to describe/analyze disease determinants. prereq: [6320, 6341, instr consent] or master's or doctoral level student in School of Public Health

PUBH 6370. Social Epidemiology. (2 cr.; Student Option: Spring Every Year) How a society's social interactions, past and present, yield differential exposures and differences in health outcomes between persons who make up populations. New disease-specific risk factors. How well-known exposures emerge and are maintained by social system.

PUBH 6380. Ecology of Infectious Diseases. (3 cr.; A-F; Audit; Every Fall) Ways in which host, agent, and environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/control, evolution of virulence, analytical/molecular tools.

PUBH 6381. Genetics in Public Health. (2 cr.; Student Option; Every Fall) Mechanisms of molecular genetics. Issues related to medical/public health genetics, including basis of human diversity, Human Genome Project, novel genetic mechanisms underlying diseases, ethical/legal issues. prereq: Grad student or professional school student or instr consent

PUBH 6385. Epidemiology and Control of Infectious Diseases. (2 cr.; Student Option; Every Spring) Principles and methods. Strategies for disease control and prevention, including immunization. Relevance of modes of transmission of specific agents for disease spread and prevention. Public health consequences of infectious diseases at local, national, and international levels.

PUBH 6386. Public Health Aspects of Cardiovascular Disease. (2 cr.; Student Option; Every Fall) Well-established risk factors for cardiovascular disease (CVD), prevention of CVD, and national research for treatment of CVD. Prevnetion, Emerging risk factors, current controversies in CVD, prereq: [6330 or 6341], 6450, epidemiology major or instr consent


PUBH 6389. Nutritional Epidemiology. (2 cr.; Student Option; Every Fall) Nutrition/disease relationships through application of epidemiologic methods. Characterization of various exposures to food/nutrient intakes, biological basis for nutrition/disease relationships. Studies of specific chronic diseases and nutritional intake. Design/interpretation of studies using nutritional measures. prereq: [6320 or 6330 or 6341], [Epidemiology MPH or Public Health Nutrition MPH or Epidemiology PhD student]] or instr consent

PUBH 6390. Topics: Epidemiology. (1.5-4 cr. [max 80 cr.]; Student Option; Periodic Fall, Spring & Summer) New course offerings or topics of interest in epidemiology.

PUBH 6400. Topics: Biostatistics. (1.5-4 cr. [max 80 cr.]; Student Option No Audit; Periodic Fall, Spring & Summer) New course offerings or topics of interest in biostatistics.

PUBH 6414. Biostatistical Literacy. (3 cr.; A-F only; Every Fall, Spring & Summer) Develop ability to read/interpret statistical results in primary literature. Minimal calculation. No formal training in any statistical programming software. Biostatistical Literacy will cover the fundamental concepts of study design, descriptive statistics, hypothesis testing, confidence intervals, odds ratios, relative risks, adjusted models in multiple linear, logistic and Poisson regression, and survival analysis. The focus will be when to use a given method and how to interpret the results, not the actual computation or computer programming to obtain results from raw data. prereq: MPH or certificate student or environmental health or instr consent


PUBH 6420. Introduction to SAS Programming. (1 cr.; Student Option; Periodic Fall & Summer) Use of SAS for analysis of biomedical data. Data manipulation/description. Basic statistical analyses (t-tests, chi-square, simple regression).

PUBH 6431. Topics in Hierarchical Bayesian Analysis. (1 cr.; Student Option No Audit; Every Summer) Hierarchical Bayesian methods combine information from various sources and are increasingly used in biomedical and public health settings to accommodate complex data and produce readily interpretable output. This course will introduce students to Bayesian methods, emphasizing the basic methodological framework, real-world applications, and practical computing.

PUBH 6432. Biostatistical Methods in Translational and Clinical Research. (1 cr.; Student Option No Audit; Periodic Summer) This short course on translational and clinical research will focus on the topics of diagnostic medicine and designing clinical research methods, application of regression models and early phase clinical trials. prereq: Students will benefit from having taken one or two semester courses in biostatistics or applied statistics covering up to and including multiple regression and introductory logistic regression.

PUBH 6450. Biostatistics I. (4 cr.; A-F only; Every Fall & Spring) Descriptive statistics. Gaussian probability models, point/interval estimation for means/proportions. Hypothesis testing, including t, chi-square, and nonparametric tests. Simple regression/correlation. ANOVA. Health science applications using output from statistical packages. prereq: [College-level algebra, health sciences grad student] or instr consent

PUBH 6451. Biostatistics II. (4 cr.; Student Option; Every Fall & Spring) Two-way ANOVA, interactions, repeated measures, general linear models. Logistic regression for cohort and case-control studies. Loglinear models, contingency tables, Poisson regression, survival data, Kaplan-Meier methods, proportional hazards models. prereq: [[6420, 6450] with grade of at least B, health sciences grad student] or instr consent

PUBH 6460. Introduction to Biostatistical Thinking. (1 cr.; S-N or Audit; Periodic Fall & Spring) Aspects of Biostatistics as practiced at U of M and as described in research literature. prereq: Biostatistics major or instr consent

PUBH 6470. SAS Procedures and Data Analysis. (3 cr.; Student Option; Every Fall) SAS procedures, how they are used in various health-related datasets to answer specific problems regarding estimation, testing, or prediction. prereq: 6450, 6451 or [7405, 7406] or [Stat 5101, Stat 5102]

PUBH 6527. Healthcare Leadership and Effecting Change. (2 cr.; A-F only; Every Spring) How to become effective change leader in organization. prereq: MHA student

PUBH 6535. Managerial Accounting for Health Services. (3 cr.; A-F or Audit; Every Fall, Spring & Summer) Differential, absorption, activity-based costing. Budgeting, variance analysis. Financial accounting, including transaction data and accrual accounting. Developing financial statements. Ration analysis. prereq: AHC student or instr consent; experience with spreadsheets such as Excel or Lotus recommended

PUBH 6540. Health care Organizational Behavior. (2 cr.; A-F or Audit; Every Fall) Human behavior in organizations. Motivation, leadership, influence of organizational structure, informal group behavior, interpersonal relations, supervision. Emphasizes preventing/solving problems among individuals/groups in organizations. prereq: Health care admin student or instr consent


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administrative decision making. Inductive teaching, lectures, computer/lab exercises. prereq: Health care admin student or instr consent

**PUBH 6542. Management of Health Care Organizations.** (2 cr.; A-F or Audit; Every Fall & Spring)
Role of hospital in health services delivery. Relationships with other systems and the community. Employs governance, medical staff, and role of administrator. Lectures, on-site visits to health services organizations. prereq: Health care admin student

**PUBH 6544. Principles of Problem Solving in Health Services Organizations.** (3 cr.; A-F only; Every Spring)
Problem-solving theory/technique. Solving a management problem within a health services organization. Presenting a report. Lectures, seminars, demonstrations. prereq: 6541, completed 30 hours of MHA coursework, health care administration student

**PUBH 6545. Advanced Problem Solving in Health Services Organizations.** (4 cr.; A-F or Audit; Every Spring)
Defining, analyzing, and solving significant senior management-level operational or health public policy problems. prereq: 6544 or concurrent registration is required (or allowed) in 6544, Healthcare Administration student

**PUBH 6547. Health Care Human Resources Management.** (2 cr.; A-F or Audit; Every Fall & Spring)
Concepts in human resources management as applied to health services organizations. Relationship between human resources management and general management. Work and human resources. Compensation/benefits, personnel planning, recruitment/selection, training/development. Employee appraisal/discipline. Union-management relations. prereq: Health care admin student or public health admin student or instr consent

**PUBH 6548. Medical Group Management.** (2 cr.; A-F or Audit; Every Spring)
Overview of physicians group management in integrated delivery systems. Physician/administrative roles, operational/strategic issues, alternative organizational models, risk-contradiction, processes/government methods, managing change, effective communication. prereq: Health care admin student or instr consent

**PUBH 6551. Contemporary Problems in Health Care.** (1-2 cr.; Student Option; Every Fall & Spring)
Current concepts, problems, principles, and future developments of health and health care, selected by students. Developing models based on current literature and research. Verbal/written presentations from policy/issue perspectives. prereq: Grad student

**PUBH 6553. Health Care Management Ethics.** (1 cr.; [max 2 cr.]; A-F only; Every Fall & Spring)
Ethical issues faced by health care managers as leaders of an organization, members of a profession, and coordinators of clinical processes. Perspectives of managerial, organizational, professional, and clinical ethics. prereq: Public health MPH or MHA or certificate student or instr consent

**PUBH 6554. Healthcare Strategy and Marketing.** (2 cr.; A-F or Audit; Every Spring)
Managing the marketing function, marketing planning, strategy, management concepts. Identifying marketing problems/opportunities. Constructing, evaluating, and managing a marketing plan. prereq: Health care admin student or public health admin student or instr consent

**PUBH 6555. Topics in Health Economics.** (2 cr.; A-F only; Every Fall, Spring & Summer)
General principles of health economics applied to issues in health. Implications for health policy.

**PUBH 6556. Health and Health Systems.** (2 cr.; A-F or Audit; Every Fall, Spring & Summer)
U.S. health care system and health policy process, including current challenges in the areas of health care delivery, financing, and policy.

**PUBH 6557. Health Finance I.** (3 cr.; Student Option; Every Fall & Spring)
Principles of corporate/not-for-profit finance. Net present value, financial analysis, capital budgeting, financing options/decisions, capital structure, capital asset pricing model, financial planning, working capital management. prereq: [Health care admin or public health admin/policy major], familiarity with computerized spreadsheets or instr consent

**PUBH 6558. Health Finance II.** (3 cr.; A-F only; Every Fall & Spring)
Principles of corporate/not-for-profit finance and insurance concepts integrated/applied to health care. Capital/operating budgets. Medicare’s payment systems for hospitals/physicians, risk-adjusted capitation payment systems. Population-based health care finance, managed care. Financing aspects of public health policy and health care reform. prereq: [Health care admin or PubH admin/policy student, familiarity with computerized spreadsheet or instr consent

**PUBH 6560. Operations Research and Quality in Health Care.** (3 cr.; A-F only; Every Fall)
Using a systems perspective to develop models to analyze/improve health care operations. Identifying data needs/sources to model structures, processes, and outcomes of care. Applying quality improvement, management sciences/operations research techniques to real world health care problems. prereq: Grad-level statistics/management coursework

**PUBH 6561. Quantitative Methods Applied to Health Administration Problems.** (2 cr.; A-F or Audit; Every Spring)
Application of Quantitative methods to secondary data, including analysis, data handling, stepwise multiple linear regression and discriminate analysis, pert, queuing, scheduling, inventory and simulation used to solve health administrative problems.

Group research thesis with verbal/written presentations. prereq: Health care admin student or instr consent

**PUBH 6562. Information Technology in Health Care.** (2 cr.; Student Option; Every Fall)
Managing information as a strategic resource within health care organizations. Designing information technology systems to capture, combine, and transform information to measure processes/outcomes of care, support collaborative clinical decision making, support management decisions, empower patients, and improve health care operations.

**PUBH 6563. Integrated Delivery Systems.** (2 cr.; A-F only; Every Fall & Spring)
Integrated models of health care delivery. Emphasizes organizational design, governance, operations, strategy, resource deployment, and the role of the “embedded medical practice.” prereq: Hlth care admin student or instr consent

**PUBH 6564. Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System.** (2 cr.; A-F or Audit; Every Fall)
Development and organization of HMOs and PPOs: risk sharing, provider contracts, utilization management, quality improvement, marketing, and new product development; employer relations; Medicare and Medicaid contracting; budget processing; financial performance; pricing; government regulations. prereq: MHA or MBA or HSRP or PHA student or instr consent

**PUBH 6565. Innovation of Healthcare Services.** (2 cr.; A-F only; Every Fall)
Designing/creating new care delivery services/experiences. Exploiting opportunities for innovation. Overcoming obstacles. Capturing value. prereq: MHA student only

**PUBH 6568. Interprofessional Teamwork in Health Care.** (2 cr.; Student Option; Every Fall & Summer)
Leading/participating in interdisciplinary teams. Team communication, problem solving, conflict management, organizational support. prereq: [Public health MPH or MHA or certificate student] or [health services research, policy/admin] MS student or instr consent

**PUBH 6569. Healthcare Policy.** (1 cr. [max 2 cr.]; A-F only; Every Fall)
Public policy environment surrounding health care and public health systems. Political context of health policy. Approaches to policy formulation/analysis. Tools/strategies for influencing health policy outcomes. prereq: Public health [MPH or MHA or certificate] student or instr consent

**PUBH 6570. Healthcare Administration.** (1-4 cr. [max 8 cr.]; A-F only; Periodic Fall, Spring & Summer)
Selected readings in healthcare administration. Discussion based on readings. prereq: dept consent

**PUBH 6571. Leading Performance Improvement in Health Care.** (2 cr.; A-F only; Every Spring)
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Introduction to concepts of performance improvement in health care institutions. prereq: MHA or MPH or certificate student or instr consent

**PUBH 6572. Management for Clinical Research.** (2 cr.; Student Option; Every Fall) Management for clinical research. prereq: Pursuing clinical research recommended

**PUBH 6573. The Nature of Clinical Care.** (2 cr.; A-F only; Every Spring) Discussing clinical matters with colleagues. Students participate as peers in managing health care performance in hospitals, medical groups, and other health care delivery and public health institutions. prereq: School of Public Health student

**PUBH 6574. Managing Medical Practices as Components of Integrated Health Systems.** (2 cr.; [max 4 cr.]; A-F only; Every Spring) Management of medical practices owned/operated by integrated health systems. Design, strategy, and operation of medical practices integrated with hospitals and other components of comprehensive systems of health care. Embedded medical practice. prereq: MHA student or instr consent

**PUBH 6577. Advanced Problem Solving in Health Services Administration.** (2 cr.; A-F only; Every Spring) Capstone course. Students integrate/synthesize knowledge, attitudes, and skills acquired in curriculum and apply them to resolve management problems. prereq: MHA student

**PUBH 6578. Negotiation Strategies.** (2 cr.; A-F only; Every Spring) The central issues of this course deal with understanding the behavior of individuals, groups, and organizations on the context of competitive situations. prereq: MHA student or instructor permission

**PUBH 6589. Medical Technology Evaluation and Market Research.** (2 cr.; Student Option; Every Spring) Analytical tools for formulating evaluations of innovations in medical technologies. Disseminating results to get a new product to market.

**PUBH 6596. Legal Considerations in Health Services Organizations.** (2 cr.; A-F or Audit; Every Fall, Spring & Summer) Laws affecting administration of hospitals and other healthcare organizations. Administrative law, corporate/business law, labor law, civil liability, tax-related issues. Legal issues relevant to administration, decision making, and planning. prereq: Health care admin student

**PUBH 6600. Topics: Maternal and Child Health.** (0.5-4 cr.; max 20 cr.; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest.

**PUBH 6601. Born a Girl: Global Women's Health.** (1 cr.; Student Option; Every Summer) Women's health conditions, programs, services, and policies in developed/developing countries. Social, economic, environmental, behavioral, and political factors affecting health behaviors, reproductive health, chronic and acute diseases, premature mortality and longevity. prereq: Grad level student

**PUBH 6605. Reproductive and Perinatal Health.** (2 cr.; Student Option; Spring Even Year) Epidemiology, programs, services, and policies. Social, cultural, psychological, physiologic, environmental, economic, and political factors that affect reproductive health, pregnancy, and childbearing. prereq: Public health student or grad student or instr consent

**PUBH 6606. Children's Health: Issues, Programs, and Policies.** (2 cr.; Student Option; Periodic Spring & Summer) Overview of public health issues related to children in the United States. Focus on identifying and planning public health strategies, policies, and programs to improve health of infants and children.

**PUBH 6607. Adolescent Health: Issues, Programs, and Policies.** (2 cr.; Student Option; Spring Even Year) Major public health issues of adolescents in the United States. Emphasizes prevention and health promotion strategies and effectiveness of programs and policies.

**PUBH 6613. Children and Youth With Special Health Care Needs.** (2 cr.; Student Option; Fall Even Year) Principles, programs, policies, and practices for identifying/meeting needs of children/youth with special health care needs in the United States. Epidemiology, historic/current legislation, organization/delivery. Readings, online discussions, written assignments. prereq: Graduate-level student in [AHC programs or education or social work or psychology]

**PUBH 6617. Practical Methods for Secondary Data Analysis.** (3 cr.; Student Option; Every Fall) Introduction to methods for finding, transferring, and processing existing data sources. Focuses on practical approaches to pre-statistical data processing and analysis with STATA using a PC with an MS Windows operating system. Complex survey samples, other survey biases. prereq: Graduate level student or instr consent


**PUBH 6630. Foundations of Maternal and Child Health Leadership.** (3 cr.; Student Option; Every Fall) Historical/current principles, programs, policies, and practices related to women, children, adolescents, and families. Articulating a personal leadership style/plan for development of leadership competencies. Leadership principles, skills, and models applied to improving health of MCH populations. prereq: Public Health MCH major or instr consent

**PUBH 6634. Children and Families: Public Health Policy and Advocacy.** (2 cr.; Student Option; Every Spring) The course will focus on how public policies at the federal, state, and local level influence children's health. Students will develop practical skills to understand, analyze, communicate, and advocate on children's policy issues. The course will include presentations and discussions with Minnesota's current leaders in children's health policy including legislators, advocates, and state commissioners. Instructor information: Lauren Gilchrist is the Senior Policy Advisor to Governor Mark Dayton. In this role, she works with commissioners, legislators, local government and stakeholders to advance health and human services policy issues for the state of Minnesota. She previously served as an advisor to the late Senator Ted Kennedy and Senator Al Franken.

**PUBH 6636. Qualitative Research Methods in Public Health Practice.** (2 cr.; Student Option; Every Fall) Qualitative inquiry, selected data collection, management, analysis methods for qualitative research in public health. Current approaches to assess strength of evidence of qualitative studies in public health. Provision of practical skills that can be applied in public health settings.

**PUBH 6655. Principles and Programs in Maternal and Child Health.** (2 cr.; A-F only; Every Summer) Public health perspective for assessing/meeting health needs of women, children, adolescents, and families. Historical/current principles, programs, policies, and practices related to these populations. prereq: Maternal/child health MPH major enrolled in online program or instr consent

**PUBH 6673. Grant Writing for Public Health.** (1 cr.; Student Option; Every Spring) Hands-on workshop. Identifying successful elements of a grant application. Grant review process. Critiquing a grant. Writing an application.

**PUBH 6675. Women's Health.** (2 cr.; Student Option; Fall Odd Year) Programs, services, and policies that affect women's health in the United States. Methodological issues in research. Emphasizes social, economic, environmental, behavioral, and political factors. Measurement/interpretation of factors, how they translate into interventions, programs, and policies. prereq: Public health student or health sciences grad student or instr consent

**PUBH 6686. Global Reproductive Health.** (2 cr.; Student Option; Fall Even Year) Examine reproductive health issues, programs, services and policies in developed and developing countries. Emphasis on social, economic, environmental, behavioral, and political factors that affect family planning, reproductive health, fertility, and pregnancy outcomes. prereq: [Acad hifh grad level student in...
or grad student in [international studies or child development or other social sciences] or instr consent

PUBH 6700. Foundations of Public Health. (3 cr.; Student Option; Every Fall) Organization of public health, predominately in the United States. Role of public health administration. Problem-solving skills necessary for effective administration.

PUBH 6702. Integrative Leadership Seminar. (3 cr.; Student Option; Every Spring) Explore, investigate, discuss, develop basic concepts/practices for people/organizations associated with "integrative leadership," prereq: University of Minnesota doctoral student or master's student. Integrative Leadership minor

PUBH 6705. Community Health Assessment. (3 cr.; Student Option; Every Spring) Two of the three core functions of public health: health assessment, assurance. Lectures, discussion, group activities, oral presentations. prereq: concurrent registration is required (or allowed) in 6320 or concurrent registration is required (or allowed) in 6341, public hith admin/policy or maternal/child hlit major or instr consent

PUBH 6711. Public Health Law. (2 cr.; Student Option; Every Spring & Summer) Basic concepts of law, legislative process, and legal bases for existence/administration of public health programs. Legal aspects of current public health issues/controversies, regulatory role of government in health services system. prereq: Grad student or professional school student or instr consent

PUBH 6717. Decision Analysis for Health Care. (2 cr.; Student Option; Every Fall) Introduction to methods/range of applications of decision analysis and cost-effectiveness analysis in health care technology assessment, medical decision making, and health resource allocation.

PUBH 6721. Leading Collaborations. (1 cr.; Student Option; Every Spring) How mental health care providers located in individual organizations coordinate their activities so that care of clients is integrated. Coordination of labs and county health departments. Organizations such as rural health networks and community health information networks to achieve community-based goals. prereq: 6752 or instr consent

PUBH 6723. Lean Management in Health Care. (1 cr.; Student Option; Every Spring) Organization to maximize customer value while minimizing waste. Lean management applied in Phillips Neighborhood Clinic. Observing waste. Developing basic value flow diagrams. Using problem-solving techniques to improve quality continuously. prereq: instr consent

PUBH 6724. The Health Care System and Public Health. (3 cr.; Student Option; Periodic Fall & Spring) Overview of health care delivery, finance systems within public health context. Components of health care system: financing, role of employers/public programs, health care delivery system, managed care. Collaborative interventions between managed care, public health. prereq: Public health or grad student or instr consent

PUBH 6726. Medical Device Industry: Business and Public Policy. (3 cr.; Student Option; Every Spring) Business, public policy, regulatory, technology management issues concerning medical device/biotechnology industries. Nature/effects of private-public sector interactions. Involvement by leaders in Minnesota organizations. prereq: MPH or MHA or grad student or instr consent

PUBH 6727. Health Leadership and Effecting Change. (2 cr.; Student Option; Every Fall, Spring & Summer) Analysis of leadership models and competencies, particularly as applied to organizational change. Applications to individual self-development and to health care organizations. prereq: Public hith MPH or MHA or certificate student or [health services research, policy/admin] MS student or instr consent

PUBH 6729. Public Health Leadership. (1 cr.; Student Option No Audit; Every Fall) Designed for MPH students interested in enhancing ability to improve public's health by inspiring/mobilizing others. Core concepts of leadership theory/Key competencies of effective public health leaders. prereq: School of Public Health grad student or instr consent

PUBH 6730. International Comparative Health Systems. (2 cr.; Student Option; Spring Odd Year) History and development of health systems from a socio-political perspective. Overview of relative importance and meaning of health outcomes data. Role of WHO. Students use OECD health database.

PUBH 6732. Topics and Methods in Global Health Assessment. (2 cr.; Student Option; Spring Odd Year) Evaluation of health populations relative to specific topics important to global health, including methodology appropriate to particular issue. Focuses on developing countries. prereq: [6705, concurrent registration is required (or allowed) in PUBH 6705 or concurrent registration is required (or allowed) in PUBH 6320 or concurrent registration is required (or allowed) in PUBH 6341 or concurrent registration is required (or allowed) in grad course in epidemiology], [public health MPH or environmental health [MS or PhD] or health services research/policy/administration [MS or PhD] or epidemiology PhD or clinical research MS] or instr consent

PUBH 6734. International Project Planning and Management. (2 cr.; Student Option No Audit; Every Spring) Practical skills for work as international project manager. Key international public health issues. Students practice management and work with local nonprofit that works internationally or domestically with refugee and immigrant populations in Minnesota. prereq: PHAP grad student or instr consent

PUBH 6735. Principles of Health Policy. (3 cr. [max 6 cr.]; A-F only; Every Fall) The purpose of this course is to introduce students to the policy environment that influences and shapes public health and the provision of health care services, to enhance understanding of the historical and political context of health policy, to develop strategies for analysis of health policy issues, and to communicate effectively in the policy environment. Credit will not be granted if credit has been received for PUBH 6835.

PUBH 6741. Ethics in Public Health: Professional Practice and Policy. (1 cr.; A-F only; Every Fall, Spring & Summer) Introduction to ethical issues in public health practice/policy. Ethical analysis, recognizing/analyzing moral issues. prereq: Public health [MPH or MHA or certificate] student or environmental health [MS or PhD] major or instr consent

PUBH 6742. Ethics in Public Health: Research and Policy. (1 cr.; A-F only; Every Fall, Spring & Summer) Introduction to ethical issues in public health research/policy. Ethical analysis. Recognizing/analyzing moral issues. prereq: Public health [MPH or certificate] student or [clinical research MS or Environmental health [MS or PhD] or epidemiology PhD or [health services research, policy/admin [MS or PhD]] major or instr consent

PUBH 6744. State Health Policy and Politics. (2 cr.; Student Option No Audit; Every Spring) Half semester. Federal health reform debate and debate over reinstating the MN General Assistance Medical Care program. Intergovernmental relationship between the federal and state governments in health policy and finance; role of state and local policy makers and policy advocates. Political context for state health policy development.

PUBH 6751. Principles of Management in Health Services Organizations. (2 cr.; A-F only; Every Fall, Spring & Summer) Understanding of and improvement in the competencies of managers in organizations, particularly as applied to health services and public health organizations. prereq: [Public hith MPH or MHA or certificate] student or [environmental health MS or PhD] student or dentistry MS student or instr consent

PUBH 6755. Planning and Budgeting for Public Health. (2 cr.; Student Option No Audit; Every Fall & Summer) Principles of budgeting, planning, forecasting, and analyzing in nonprofit/government organizations applied to health care administration and public health. prereq: Academic Hith Ctr grad student or instr consent

PUBH 6758. Managing Public Health Systems. (2 cr.; A-F only; Every Fall, Spring & Summer) Problem solving, process management, quality improvement, collaboration/partnership management. Organizing public health core functions and essential services. prereq: [6751 or concurrent registration is required (or allowed) in 6751], [public health [MPH or...
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
This introductory course is intended for junior faculty, post-docs, graduate students and community practitioners interested in adding CBPR to their repertoire of effective approaches to understanding and addressing social and health disparities. Topics will explore the purpose and applications of CBPR; partnership formation and maintenance; issues of power, trust, race, class, and social justice; conflict resolution; ethical issues; CBPR's relationship to cultural knowledge systems, and funding CBPR projects. This is NOT a methodology course. CBPR is an approach to conducting research that is amenable to a variety of research designs and methodologies and will NOT cover topics such as survey design, quantitative methods, qualitative methods, focus groups, community needs assessment procedures, etc.

PUBH 6832. Economics of the Health Care System. (3 cr.; Student Option; Every Fall) Development of traditional issues in health economics. Production of health, demand for health capital and health care, insurance theory and markets, managed care, pricing, physician’s services, production and costs in health care institutions, role of government, cost effectiveness analysis, reform. prereq: [Grad or professional school] student, knowledge of [microeconomic analytical tools, analytical statistics] or instr consent

PUBH 6835. Principles of Health Policy. (2 cr.; Student Option; Every Spring) Social, political, and economic context within which U.S. health-care system developed. Influence of these contextual elements on public policies guiding/regulating organization/delivery of health services. prereq: [Pub hth [MPH or certificate] or pub affairs MPA or healthcare admin MHA or [health serv research, policy/admin [MS or Phd]]] student or instr consent

PUBH 6845. Using Demographic Data for Policy Analysis. (3 cr.; A-F only; Every Spring) How to pose researchable policy questions, locate existing data, turn data into a usable format, understand data documentation, analyze data, communicate findings according to standards of the professional policy community. Quantitative issues, prereq: [Grad level research methods course, basic statistics course] or instr consent

PUBH 6852. Program Evaluation in Health and Mental Health Settings. (2 cr.; A-F only; Every Spring) Understanding an evaluation study. Program evaluation. Applications to health and mental health settings. emphasizes public health.

PUBH 6855. Medical Sociology. (3 cr.; Student Option; Every Spring) Introduction to common theoretical/empirical approaches used by sociologists to study health/illness. How content reflects social inequalities in health/illness. Social processes that shape experience of health/illness. prereq: [Grad or professional school] student, previous experience with statistical software or instr consent

PUBH 6861. Health Insurance. (2 cr.; A-F or Audit; Every Spring) Financing personal health care: theory of insurance, health insurance markets, cost sharing, HMOs, PPOs, public and catastrophic health insurance, and the uninsured. Emphasis on public policy. prereq: Microecon theory course or instr consent

PUBH 6862. Cost-Effectiveness Analysis in Health Care. (3 cr.; Student Option; Every Spring) Government regulations. New technologies. Diagnosis/treatment protocols. Strengths, limitations, appropriateness of different approaches. prereq: instr consent; introductory econ course recommended

PUBH 6863. Understanding Health Care Quality. (2 cr.; A-F only; Every Fall) Introduction to assessing/assuring quality of care. Emphasizes both process and outcomes approaches, paralleling interest in appropriateness/effectiveness of care. Issues around creating needed behavioral changes.

PUBH 6864. Conducting Health Outcomes Research. (3 cr.; Student Option; Every Spring) Major concepts/principles in conducting health outcomes research that evaluates medical care. Developing study designs matched to research questions. Frequently used study designs. Evaluating health outcomes. Analytical approaches. prereq: Introductory course in epidemiology or health services research methods or instr consent

PUBH 6875. Practice of Health Services Research. (2 cr.; Student Option; Every Fall) How practice of health services research is conducted in various organizations. Presentations by guest lecturers from health services research organizations. How the specific organization's research is funded, how it sets an agenda, and how it carries out research. prereq: Public health MPH or grad student or instr consent

PUBH 6876. Public Health Systems Analysis and Design. (2 cr.; Student Option No Audit; Every Fall) Basic knowledge/skills to design, develop, implement public health information systems. Systems development lifecycle, including problem definition, feasibility analysis, logical modeling, system architecture/implementation. Develop communication, analysis, management skills needed to develop information systems that meet user needs. prereq: Grad or professional student or instr consent

PUBH 6877. Public Health Systems Analysis and Design - Practicum. (2 cr.; Student Option No Audit; Every Fall) Hands-on group project to practice skills of design, development, and implementation of public health information systems. Project teams employ site visits, interviews, surveys, and other data collection methods to gather system requirement specifications. Experience full system development lifecycle, including problem definition, feasibility analysis, logical modeling, and system architecture implementation. prereq: Grad or professional student or instr consent, [completion of or concurrent registration is required (or allowed) in 6876]

PUBH 6878. Public Health Systems Analysis and Development Practicum. (2 cr.; S-N only; Every Fall) Individual student or student teams will conduct a full systems analysis for a public health information system for a client.

PUBH 6880. Introduction to Public Health Informatics. (2 cr.; A-F or Audit; Every Spring) Information is key to effective public health administration. Surveillance systems provide information on infectious disease tracking, disease clusters, food-borne outbreaks, and injuries. Environmental monitoring systems provide information on health risks such as toxic chemicals or airborne pollutants. Registries contain information on vital statistics such as birth, death, and immunization. e-Public Health integrates information from electronic health records to use in improving population health. Introduction to Public Health Informatics describes these public health information systems and key issues in managing this information effectively, such as data standards, common functions, decision support, meaningful use, health information exchange, privacy and security. prereq: School of Public Health student or graduate student

PUBH 6881. Advanced Public Health Informatics Applications. (2 cr. [max 4 cr.]; A-F or Audit; Every Fall) Public Health Informatics includes a wide variety of applications that are used to assess, assure, and advocate for population health such as immunization registries, vital statistics systems, birth and death registries, food and environmental health surveillance systems, and infectious disease surveillance. Health information exchange (HIE), such as reports from labs or clinics to public health departments, is a key informatics tool used to support surveillance systems. Advanced Public Health Informatics Applications teaches the key concepts and the skills related to HIE and the concepts and skills necessary to implement it in surveillance systems.

PUBH 6890. Topics: Public Health Informatics. (1-4 cr.; max 80 cr.; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest in Public Health Informatics.

PUBH 6900. Topics: Public Health Nutrition. (0.5-4 cr.; max 80 cr.; Student Option; Periodic Fall, Spring & Summer) New courses or topics of interest in public health nutrition.

PUBH 6901. Foundations of Public Health Nutrition Leadership. (2 cr.; Student Option; Every Fall) Principles of public health nutrition. Roles/functions of public health nutritionists. Programs/delivery mechanisms for promoting nutritional status of populations. Students explore their beliefs/competencies in relation to
principles/philosophy of public health nutrition. prereq: Public health nutrition major or instr consent

PUBH 6902. Maternal, Infant, and Preschool Nutrition. (2 cr.; Student Option; Periodic Fall & Summer)
Nutritional needs of childbearing women/infants. How to meet needs through programs/services. prereq: [xxx nutrition course or equiv]; Public Health Nutr or MCH student or instr consent

PUBH 6903. Child and Adolescent Nutrition. (2 cr.; Student Option; Periodic Fall & Summer)
Current issues/literature. Major nutrition issues of youth. Biological, cultural, and psycho-social factors influencing food behaviors. Strategies for improving nutritional health. prereq: Public health nutrition MPH or maternal/child health MPH degree student or instr consent

PUBH 6904. Nutrition and Aging. (2 cr.; Student Option; Every Summer)
Current literature on nutrition needs/factors affecting nutritional status of adults and the elderly. Relevant community resources. prereq: Grad student or professional school student or instr consent

PUBH 6905. Nutrition for Public Health Promotion and Disease Prevention. (2 cr.; Student Option; Every Fall)
Nutrition topics of current interest. Concepts/facts about science of human nutrition discussed in relation to personal/community nutrition problems/concerns. Applied introductory course with labs. prereq: Grad student or instr consent

PUBH 6906. Global Nutrition. (2 cr.; Student Option; Every Spring)
Nature/scope of chief nutritional issues and problems in the world. Emphasizes developing countries. Nutrient deficiencies, nutrition-related aspects of infectious/chronic disease. prereq: Grad student

PUBH 6910. Critical Review of Research in Public Health Nutrition. (1 cr.; Student Option; Every Spring)
Applying principles of nutrition, epidemiology, and biostatistics to evaluate scientific research on topics of significance in public health nutrition. Interactive seminar format with lecture, discussion, and student presentations.

PUBH 6914. Community Nutrition Intervention. (3 cr.; Student Option; Every Spring)
Tools for developing community nutrition interventions. Using behavioral therapy, conducting needs assessments, writing program objectives, developing intervention strategies, evaluating program implementation and effectiveness, planning a budget, writing grant proposals.

PUBH 6915. Nutrition Assessment. (2 cr.; Student Option; Every Fall)
Common nutritional assessment using dietary, biochemical, and anthropometric approaches. Applications of methods, interpretation of results. Hands-on experience, training in common anthropometric methods. prereq: Public health nutrition major or instr consent

PUBH 6920. Foundations of Interprofessional Professional Communication and Collaboration. (1 cr.; S-N only; Every Fall)
Explore nature of need for interprofessional communication, qualities of successful teams/interprofessional interactions, professional identity, ethics, integrity, values, communication/decision making in interprofessional environment. prereq: MPH student

PUBH 6933. Nutrition and Chronic Diseases. (2 cr.; Student Option; Every Spring)
Issues in nutrition and public health. How nutrition research is translated into dietary recommendations for public health. Relation of nutrition to obesity, cardiovascular disease, diabetes, and cancer.

PUBH 6945. From Kid to Community: Personal, Environmental, and Policy Interventions Targeting Youth Obesity. (1 cr.; S-N only; Every Summer)
Overview of child and adolescent obesity from public health perspective.

PUBH 6950. From Kid to Community: Personal, Social and Environmental Influences on Youth Obesity. (2 cr.; Student Option; Every Fall)
Overview of public health strategies for the prevention of pediatric obesity. Includes overview of epidemiology of child and adolescent obesity with a focus on social-ecological risk factors. Discusses implications for developing intervention programs/prerog: completed one of the following: a) basic intro to nutrition course, b) PUBH 6094, or c) 1 year work experience in the field of obesity and/or public health or instructor consent.

PUBH 6955. Using Policy to Address Child and Adolescent Obesity Prevention. (1 cr.; Student Option; Every Spring)
Overview of federal, state, local policy approaches. National initiatives for prevention of child and adolescent obesity. Specific policies will be discussed at local, state, federal levels. Extensive discussion on evidence of impact of policies on child and adolescent weight.

PUBH 6991. Independent Study: Community Health Promotion. (1-4 cr.; max 20 cr.; Student Option; Every Fall, Spring & Summer) Independent study supervised by community health promotion faculty member. prereq: CHP major, instr consent

PUBH 7094. Culminating Experience: Community Health Promotion. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master's project in community health promotion. prereq: CHP major, instr consent

PUBH 7096. Field Experience: Community Health Promotion. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Supervised community health promotion field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems. prereq: CHP major, instr consent

PUBH 7193. Directed Study: Environmental Health. (1-4 cr.; max 20 cr.; Student Option No Audit; Every Fall, Spring & Summer)
Directed study in a topic agreed upon by student and faculty member. prereq: instr consent

PUBH 7194. Culminating Experience: Environmental Health. (1-5 cr.; max 25 cr.; S-N only; Every Fall, Spring & Summer)
Directed research towards completion of culminating experience in environmental health. prereq: Environmental health major, instr consent

PUBH 7196. Field Experience: Environmental Health. (1-5 cr.; S-N or Audit; Every Fall, Spring & Summer)
Supervised environmental health field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems. prereq: Environmental health major, instr consent

PUBH 7200. Global Health in a Local Context: Soc Determinants, Community Engagement, & Social Action in MN. (0.5-4 cr.; Student Option No Audit; Every Fall) This course will immerse students in the study of health equity, the social determinants of health, global health in a local setting, and community-based health care. The course curriculum will be modeled on the dynamic SocMed curriculum currently utilized annually in Uganda and Haiti (www.socmedglobal.org), which offers a highly experiential, interdisciplinary, and interprofessional study of these topics. prereq: Grad stud & TC community members with interest. Everyone must submit an application to receive a permission number to register. Go to http://globalhealthcenter.umn.edu/education/global-local

PUBH 7210. Topics: Global Food Systems. (0.5 cr.; max 3 cr.; S-N only; Every Summer)
Food systems related to specific food products, including inputs, processes, and outputs from production sites to consumers. Context for food safety policy. Concept of food system biosecurity as prerequisites for a safe,
infectious disease agents. Application of molecular subtyping techniques to surveillance and outbreak investigations. Implications for public health practice.

**PUBH 7218. Culturally Based Community Health Immersion.** (0.5 cr.; S-N only; Every Summer)
Students view public health practice in action and reflect on ways that urban environments impact health services for members of underserved/ emerging communities. One-day field trip to a culturally specific community health setting in the Twin Cities.

**PUBH 7220. Personal Protective Equipment and Respiratory Protection.** (1 cr.; Student Option No Audit; Every Summer)

**PUBH 7211. Food System Biosecurity: Threats.** (.5 cr.; Student Option; Periodic Fall)
Public health threats to food system biosecurity. Principles of biosecurity, vulnerabilities of the food system from pre-harvest through post-processing, potential threats by class of agent, strategies to minimize threats and protect public’s health. prereq: Grad student or professional school student or instr consent

**PUBH 7213. Applications of Microbiology to Food Systems Monitoring.** (.5 cr.; Student Option; Periodic Fall)
Microbiological testing to determine prevalence of pathogens in specific foods. Identification of causes of foodborne disease outbreaks. Monitoring critical control points. Traditional/rapid lab methods are used to detect indicator organisms, pathogens, and other contaminants of public health concern. prereq: Grad student or professional school student or instr consent

**PUBH 7214. Principles of Risk Communication.** (1 cr.; Student Option No Audit; Every Summer)
Key concepts of risk communication theory and their practical application to collection/sharing of information in support of individual and community decision-making about public health issues. Application of risk communication principles to routine, ongoing public health issues and those that arise out of emergency/crisis.

**PUBH 7215. Food Safety: Risk Assessment and Risk Management.** (1 cr.; Student Option No Audit; Summer Even Year)
Risk assessment methods/strategies for managing risk for specific foods and across the food system. Students work in groups to identify a specific risk management question to be addressed by risk assessment and develop a specific risk management strategy.

**PUBH 7216. Food Safety Risk Management.** (.5 cr.; Student Option No Audit; Summer Even Year)
Strategies for managing risk of food-borne diseases for specific foods and across food system.

**PUBH 7217. Advances in Molecular Epidemiological Analysis.** (.5 cr.; Student Option No Audit; Summer Even Year)
Overview of molecular laboratory techniques used to detect, identify, and characterize infectious disease agents. Application of molecular subtyping techniques to surveillance and outbreak investigations. Implications for public health practice.

**PUBH 7218. Culturally Based Community Health Immersion.** (0.5 cr.; S-N only; Every Summer)
Students view public health practice in action and reflect on ways that urban environments impact health services for members of underserved/ emerging communities. One-day field trip to a culturally specific community health setting in the Twin Cities.

**PUBH 7220. Personal Protective Equipment and Respiratory Protection.** (1 cr.; Student Option No Audit; Every Summer)

**PUBH 7221. Planning for Urgent Threats.** (1 cr.; Student Option No Audit; Every Summer)
Role of public health in disaster preparedness, response, and recovery. How public health agencies plan for managing the crisis. Providing surge capacity to maintain public health and health care functions. Assisting a community’s recovery from a disaster.

**PUBH 7221. Planning for Urgent Threats.** (1 cr.; Student Option No Audit; Every Summer)
Role of public health in disaster preparedness, response, and recovery. How public health agencies plan for managing the crisis. Providing surge capacity to maintain public health and health care functions. Assisting a community’s recovery from a disaster.

**PUBH 7222. Best Practices in Emergency Response.** (1 cr.; S-N only; Periodic Summer)
Best practices in PH preparedness & response are evolving & continually tested with new experiences & expertise. This course for PH professionals and professionals responsible for preparedness planning, response & recovery is designed to provide participants with practical applications & tools to apply learning from real incidents.

**PUBH 7223. Concepts of Disaster Behavioral Health.** (1 cr.; S-N only; Every Summer)
Impact of disaster on the behavioral health of victims, survivors, and communities. Real scenarios for predictable phases of disaster recovery and concepts of behavioral health services after disaster. Steps for disaster behavioral health response planning/preparation. Presentations, discussion, individual/small group exercises.

**PUBH 7224. Business Continuity Planning for Disasters and Emergencies.** (1 cr.; Student Option No Audit; Every Summer)
Field-based learning experience. Student help develop business plan for natural or man-made disasters or emergencies, assess current business needs and existing continuity plans, and work in teams to develop, implement, and maintain programs to prevent, mitigate, prepare for, respond to, and recover from disasters/emergencies.

**PUBH 7225. Communication and Information Technology Tools for Public Health Emergency Response.** (1 cr.; Student Option No Audit; Summer Odd Year)
Uses Incident Command System as framework. Application of information/communication technology to emergency response. Communication exercise design, IT project management, backup communication methods. prereq: [FEMA IS-100a, FEMA IS-546a] with certificate of completion

**PUBH 7226. Media Relations Practicum.** (1 cr.; Student Option No Audit; Summer Every Summer)

**PUBH 7227. Incident Management Systems: The Public Health Role.** (1 cr.; S-N only; Periodic Summer)
Managing personnel/resources in an emergency incident. Formalized/common management practices applicable in virtually any setting.

**PUBH 7230. Topics in Infectious Disease.** (0.5-4 cr. [max 20 cr.]; Student Option No Audit; Every Summer)

**PUBH 7231. Surveillance of Foodborne Diseases in Humans.** (1 cr.; Student Option No Audit; Every Spring & Summer)

**PUBH 7232. Surveillance of Foodborne Diseases in Animals and Plants.** (1 cr.; Student Option No Audit; Every Spring & Summer)

**PUBH 7233. Food System Defense: Vulnerabilities in the Food System.** (1.5 cr.; Student Option No Audit; Periodic Summer)
Holistic view of food system. Tools to assess vulnerability of specific food systems/facilities. Legal, regulatory, supply chain, public health system, and technology strategies. Instructors are from public/private sectors related to food system.

**PUBH 7234. Global Food Systems Leadership.** (1 cr.; S-N only; Periodic Summer)
Critical competencies for leadership in industry, government, and academia necessary for ensuring an abundant, affordable, and safe global food supply.

**PUBH 7235. Surveillance of Zoonotic Pathogens in Animals.** (1 cr.; Student Option No Audit; Periodic Summer)
Case-study approach/field trips. Surveillance issues related to zoonotic pathogens in animals.

PUBH 7236. Farm to Table Program: Minnesota. (2 cr.; Student Option No Audit; Every Summer)
Explore the food system from farm to table in Minnesota while considering aspects of food sustainability, environmental health, public health, animal welfare and health, food safety, and food security. Activities & highlights will highlight the farm, processing, retail, government and academic sectors of the food production chain.

PUBH 7237. Using Risk Analysis Tools: Estimating Food Safety on the Farm to Table Continuum. (1 cr.; Student Option No Audit; Periodic Summer)
This applications-based course will provide the necessary risk- and science-based tools to evaluate and mitigate the microbial and chemical risks in a food production chain from the farm until consumption. Participants will be divided into small interdisciplinary groups to mimic a real risk analysis team and develop real-case outbreak scenarios. The attendants will follow the risk analysis process as an integral part of a science-based decision-making (risk prioritization, risk assessment, risk management and risk communication) to estimate and manage the food safety risks. The attendants will apply different qualitative (hazard analysis, decision matrices) and quantitative (risk prioritization, modeling, and web-based software) tools by using a computer. The participants will present the main outcomes from the analyses and will evaluate possible mitigation options to reduce the risk in a cost-effective way.

PUBH 7240. Topics: Health Care Issues in Underserved Populations. (1-0.5-4 cr.; max 20 cr.; Student Option No Audit; Every Summer)
Overview of disparities compared with other U.S. population groups. Health/clinical issues affecting underserved populations. Cultural/historical aspects. Health care systems response.

PUBH 7241. Culturally Responsive Communication. (1 cr.; Student Option No Audit; Periodic Summer)

PUBH 7242. War and Public Health. (1 cr.; Student Option No Audit; Every Summer)
Public health problems associated with armed conflict; interdisciplinary perspective with emphasis on analyzing the complexities. Consequences of mass displacement, effects on community and family, women’s roles and experiences, trauma and healing. Health intervention strategies. Seminar discussion format.

PUBH 7250. Designing and Conducting Focus Group Interviews. (1 cr.; Student Option No Audit; Every Spring & Summer)
Interactive, intensive overview of focus group procedures for public/non-profit environments. Practical approaches to determining appropriate use of focus groups. Design options, developing questions, recruiting participants, moderating. Analyzing/reporting results.

PUBH 7251. Data Analysis From Focus Groups. (1 cr.; Student Option No Audit; Every Summer)
Alternatives for capturing data in focus groups. Making sense out of data. Alternative analytic strategies. Emphasizes analysis that is systematic/verifiable.

PUBH 7252. Qualitative Research Methods: Discovering the Value of Words, Stories and Photographs. (1 cr.; Student Option No Audit; Every Summer)
Utility of qualitative research methods in public health research and policy initiatives. Key methods, including focus groups, grounded theory, ethnography, phenomenology, and photovoice. Using methods when resources are scarce. Ethical/human subjects considerations. Data analysis/dissemination, software selection. Writing small grant proposals. Mixed methodology approaches.

PUBH 7253. Introduction to GIS. (1-1.4 cr.; S-N only; Every Summer)

PUBH 7254. Introductory Biostatistics for Health Care Professionals. (1 cr.; S-N only; Every Summer)

PUBH 7255. Application of EpiInfo Software in Epidemiology Investigation and Data Management. (1 cr.; Student Option No Audit; Every Summer)
Introduction to use of EpiInfo software for epidemiological investigations. Data management/analysis. Exercises in outbreak investigations and presentation of analysis and results. Prereq: Grad-level epidemiology course participation.

PUBH 7256. Navigating an MPH Project. (0.5 cr.; S-N only; Every Summer)
Types of MPH projects. Tools to facilitate completion. Literature review techniques, type of research, Institutional Review Board/Institutional Animal Care/Use Committee approval, analytic tools, writing/presencing/defending projects. Prereq: Public health practice MPH student or [other MPH student, instr consent]

PUBH 7257. Qualitative Data Analysis. (1 cr.; Student Option No Audit; Every Summer)
Analyze/work with qualitative data from variety of data collection methods/multiple analysis approaches. Discussion of analyzing photographs/video data will provide insights on how best to analyze these types of data.

PUBH 7260. Ergonomics and the Prevention of Workplace Injuries. (1 cr.; Student Option No Audit; Summer Odd Year)

PUBH 7261. Ecosystem Health. (1 cr.; Student Option No Audit; Periodic Summer)
Impact of global environmental change on human health/welfare. How major changes in the environment such as wild land degradation, increasing contaminant loads, and climate change are altering human, wildlife, and domestic animal fitness/survival. Depletion of wild resources of nutritional, social, or economic importance. Loss of biodiversity. Alterations in disease prevalence, including emerging infectious diseases. Strategies to mediate/prevent changes and their impacts on human well-being.

PUBH 7262. Globalization and Health. (1 cr.; Student Option No Audit; Periodic Summer)
Global health concerns cross the borders of developed and developing nations. Effect of globalization on public and scientific consequences in public health. Interplay between global stressors such as population, war, economics, urbanization, and environment; effects on the health of women/children, spread of infectious/chronic diseases, nutrition and environmental health.

PUBH 7263. Global One Health Leadership Workshop and Practicum. (2 cr.; Student Option No Audit; Every Summer)
Leadership skills for addressing challenges/opportunities at convergence of public health, animal health, environmental/ecosystem health, economic development. Enhance critical leadership competencies in context of complex, multifactorial problems.

PUBH 7280. Public Health Advocacy Through Professional Organizations. (0.5-2 cr.; S-N or Audit; Every Fall, Spring & Summer)
Development of public health agendas/advocacy in non-governmental organizations. Students research a selected organization, attend one of its national/international meetings. Prereq: Public health practice MPH major or instr consent.

PUBH 7291. Independent Study: Public Health Practice. (0.5-2 cr.; S-N only; Every Fall, Spring & Summer)
Independent study supervised by a public health practice faculty member. Prereq: Public health practice MPH major, instr consent.
PUBH 7294. Master’s Project: Public Health Practice. (0.5-4 cr. [max 12 cr.]; S-N only; Every Fall, Spring & Summer)
Directed field research. Original or secondary analysis of data sets related to public health practice. prereq: Public health practice MPH major, instr consent

PUBH 7296. Field Experience: Public Health Practice. (0.5-8 cr. [max 32 cr.]; S-N only; Every Fall, Spring & Summer)
Directed field experience or clinical rotation/practicum in selected community or public health agencies/institutions. Integration of knowledge and skills in population science for public health. prereq: Public health practice MPH major, instr consent

PUBH 7391. Independent Study: Epidemiology. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Independent study supervised by epidemiology faculty member. prereq: [EPI major or grad student], instr consent

PUBH 7392. Readings in Epidemiology. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Current readings in epidemiology. prereq: Epidemiology major, instr consent

PUBH 7394. Culminating Experience: Epidemiology. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master's project in epidemiology. prereq: Epidemiology MPH student, instr consent

PUBH 7396. Field Experience: Epidemiology. (1-5 cr.; S-N only; Every Fall, Spring & Summer)
Supervised epidemiologic field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems. prereq: Epidemiology major, instr consent

PUBH 7400. Topics: Biostatistics. (0.5-4 cr. [max 20 cr.]; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest in biostatistics.

PUBH 7401. Fundamentals of Biostatistical Inference. (4 cr.; Student Option; Every Fall)
Part of two-course sequence intended for PhD students in School of Public Health who need rigorous approach to probability/statistics/statistical inference with applications to research in public health. prereq: Background in calculus; intended for PhD students in public hth and other hth sci who need rigorous approach to probability/statistics and statistical inference with applications to research in public hth

PUBH 7402. Biostatistics Modeling and Methods. (4 cr.; Student Option; Every Spring)
Second of two-course sequence. Rigorous approach to probability/statistics, statistical inference. Applications to research in public health. prereq: 7401; intended for PhD students in health sciences

PUBH 7405. Biostatistics: Regression. (4 cr.; Student Option; Every Fall)
T-tests, confidence intervals, power, type I/II errors. Exploratory data analysis. Simple linear regression, regression in matrix notation, multiple regression, diagnostics. Ordinary least squares, violations, generalized least squares, nonlinear least squares regression. Introduction to General linear Model. SAS and S-Plus used. prereq: [Stat 5101 or concurrent registration is required (or allowed) in Stat 5101], biostatistics major or instr consent

PUBH 7406. Advanced Regression and Design. (4 cr.; Student Option; Every Spring)
Topics include maximum likelihood estimation, single and multifactor analysis of variance, logistic regression, log-linear models, multinominal log models, proportional odds models for ordinal data, gamma and inverse-Gaussian models, over-dispersion, analysis of deviance, model fits, choice of covariates, model diagnostics, and an introduction to non-parametric regression methods. R is used. prereq: [Stat 5105 or concurrent registration is required (or allowed) in Stat 5102], biostatistics major or instr consent

PUBH 7407. Analysis of Categorical Data. (3 cr.; Student Option; Every Spring)
Contingency tables, odds ratio, relative risk, chi-square tests, log-linear models, logistic regression, conditional logistic regression, Poisson regression, matching, generalized linear models for independent data. SAS/S-Plus used throughout. prereq: 7405, [Stat 5102 or concurrent registration is required (or allowed) in Stat 5102], biostatistics major or instr consent

PUBH 7415. Introduction to Clinical Trials. (3 cr.; Student Option; Every Fall & Summer)
Hypotheses/endpoint comparison intervention control, ethical considerations, blinding/randomization, data collection/monitoring, sample size, analysis, writing. Protocol development, group discussions. prereq: 6414 or 6450 or one semester graduate-level introductory biostatistics or statistics or instr consent

PUBH 7420. Clinical Trials: Design, Implementation, and Analysis. (3 cr.; Student Option; Every Spring)
Introduction to and methodology of randomized clinical trials. Design issues, sample size, operational details, interim monitoring, data analysis issues, overview, analysis, writing, Protocol development, group discussions. prereq: 6414 or 6450 or concurrent registration is required (or allowed) in 6450 or 6451 or concurrent registration is required (or allowed) in Stat 5102 or Stat 8102

PUBH 7430. Statistical Methods for Correlated Data. (3 cr.; Student Option; Every Fall)
Correlated data arise in many situations, particularly when observations are made over time and space or on individuals who share certain underlying characteristics. This course covers techniques for exploring and describing correlated data, along with statistical methods for estimating population parameters (mostly means) from these data. The focus will be primarily on generalized linear models (both with and without random effects) for normally and non-normally distributed data. Wherever possible, techniques will be illustrated using real-world examples. Computing will be done using R and SAS.

PUBH 7435. Latent Variable Measurement Models and Path Analysis. (3 cr.; Student Option; Every Fall)
Introduction to use of latent variable models. Exploratory/confirmatory factor analysis, path analysis, structural equation modeling, latent trait models, latent class models. Uses SAS/AMOS software. prereq: [6414, 6415] or [6450, 6451] or biostatistics major or instr consent

PUBH 7440. Introduction to Bayesian Analysis. (3 cr.; Student Option; Every Spring)
Introduction to Bayesian methods. Comparison with traditional frequentist methods.

PUBH 7445. Statistics for Human Genetics and Molecular Biology. (3 cr.; Student Option; Every Spring)
Introduction to statistical problems arising in molecular biology. Problems in physical mapping (radiation hybrid mapping, DDP), genetic mapping (pedigree analysis, lod scores, TDT), biopolymer sequence analysis (alignment, motif recognition), and marker array analysis. prereq: [6450, 6451] or instr consent; background in molecular biology recommended

PUBH 7450. Survival Analysis. (3 cr.; Student Option; Every Fall)
Statistical methodologies in analysis of survival data. Kaplan-Meier estimator, Cox’s proportional hazards multiple regression model, time-dependent covariates, analysis of residuals, multiple failure outcomes. Typical biomedical applications, including clinical trials and person-years data. prereq: 7406, [Stat 5102 or Stat 8102]

PUBH 7460. Advanced Statistical Computing. (3 cr.; Student Option; Every Fall)
Statistical computing using SAS, Splus, and FORTRAN or C. Use of pseudo-random number generators, distribution functions. Matrix manipulations with applications to regression and estimation of variance. Simulation studies, minimization of functions, nonlinear regression, macro programming, numerical methods of integration. prereq: [7405, biostatistics major, [C or FORTRAN]] or instr consent

PUBH 7465. Biostatistics Consulting. (3 cr.; Student Option; Periodic Spring)
Professional roles/responsibilities of practicing biostatistician as consultant/collaborator in health science research. Discussion, written assignments, student presentations, meeting notes, interviews, guests. prereq: [7405, 7406, 7407] or [Stat 8051, Stat 8052], [Stat 8102]

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
PUBH 7470. Statistics for Translational and Clinical Research. (3 cr.; Student Option; Every Spring)
Diagnosis of medicine, including methods for ROC curve. Biostatistics. Early-phase clinical trials, methods including dose escalation, toxicity, and monitoring. Quality of life. prereq: [6450, 6451] or equiv. [grad student in biostatistics or statistics or clinical research], familiarity with SAS

PUBH 7475. Statistical Learning and Data Mining. (3 cr.; Student Option; Periodic Spring)
Various statistical techniques for extracting useful information (i.e., learning) from data. Linear discriminant analysis, tree-structured classifiers, feed-forward neural networks, support vector machines, other nonparametric methods, classifier ensembles, unsupervised learning. prereq: [[6450, 6452] or equiv], programming background in [FORTRAN or C/C+ + or JAVA or Splus/R] or instr consent; 2nd yr MS recommended

PUBH 7494. Culminating Experience: Biostatistics. (1-3 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master's or Plan B project in biostatistics. prereq: Biostatistics major, instr consent

PUBH 7496. Biostatistics: Field Experience. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Supervised biostatistical field study in health or public health setting under academic/ professional supervision. Emphasis on application of acquired knowledge/skills to relevant issues/problems. prereq: Biostatistics MPH student

PUBH 7534. Marketing for Health Care Professionals. (1 cr. [max 2 cr.]; A-F only; Every Summer)
Application of principles of marketing to managing professional practice.

PUBH 7535. Managerial Accounting for Health Services. (3 cr.; A-F or Audit; Every Spring)
Differential, absorption, activity-based costing, Budgeting, variance analysis. Financial accounting, including transaction data/accrual accounting. Developing financial statements. Ration analysis. prereq: [AHC student or instr consent], experience with spreadsheets such as Excel or Lotus recommended

PUBH 7536. Health Finance I. (3 cr.; Student Option No Audit; Every Summer)
Principles of corporate/not-for-profit finance. Net present value, financial analysis, capital budgeting, financing options/decisions, capital structure, capital asset pricing model, financial planning, working capital management.

PUBH 7537. Health Finance II. (3 cr.; A-F only; Every Fall)
Principles of corporate/not-for-profit finance/insurance concepts integrated/applied to health care. Capital/operating budgets.

PUBH 7470. Statistics for Translational and Clinical Research. (3 cr.; Student Option; Every Spring)
Diagnosis of medicine, including methods for ROC curve. Biostatistics. Early-phase clinical trials, methods including dose escalation, toxicity, and monitoring. Quality of life. prereq: [6450, 6451] or equiv. [grad student in biostatistics or statistics or clinical research], familiarity with SAS

PUBH 7475. Statistical Learning and Data Mining. (3 cr.; Student Option; Periodic Spring)
Various statistical techniques for extracting useful information (i.e., learning) from data. Linear discriminant analysis, tree-structured classifiers, feed-forward neural networks, support vector machines, other nonparametric methods, classifier ensembles, unsupervised learning. prereq: [[6450, 6452] or equiv], programming background in [FORTRAN or C/C+ + or JAVA or Splus/R] or instr consent; 2nd yr MS recommended

PUBH 7494. Culminating Experience: Biostatistics. (1-3 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master's or Plan B project in biostatistics. prereq: Biostatistics major, instr consent

PUBH 7496. Biostatistics: Field Experience. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Supervised biostatistical field study in health or public health setting under academic/ professional supervision. Emphasis on application of acquired knowledge/skills to relevant issues/problems. prereq: Biostatistics MPH student

PUBH 7534. Marketing for Health Care Professionals. (1 cr. [max 2 cr.]; A-F only; Every Summer)
Application of principles of marketing to managing professional practice.

PUBH 7535. Managerial Accounting for Health Services. (3 cr.; A-F or Audit; Every Spring)
Differential, absorption, activity-based costing, Budgeting, variance analysis. Financial accounting, including transaction data/accrual accounting. Developing financial statements. Ration analysis. prereq: [AHC student or instr consent], experience with spreadsheets such as Excel or Lotus recommended

PUBH 7536. Health Finance I. (3 cr.; Student Option No Audit; Every Summer)
Principles of corporate/not-for-profit finance. Net present value, financial analysis, capital budgeting, financing options/decisions, capital structure, capital asset pricing model, financial planning, working capital management.

PUBH 7537. Health Finance II. (3 cr.; A-F only; Every Fall)
Principles of corporate/not-for-profit finance/insurance concepts integrated/applied to health care. Capital/operating budgets.


PUBH 7541. Statistics for Health Management Decision Making. (3 cr.; Student Option No Audit; Every Spring)

PUBH 7547. Health Care Human Resource Management. (2 cr.; A-F only; Every Fall)

PUBH 7551. Principles of Management in Health Services Organizations. (2 cr.; A-F only; Every Spring)
Understanding of/improvement in competencies of managers in organizations, particularly as applied to health services/public health organizations.

PUBH 7553. Health Care Management Ethics. (1 cr. [max 2 cr.]; A-F only; Every Fall)
Ethical issues faced by health care managers as leaders of organization, members of profession, coordinators of clinical processes. Perspectives of managerial, organizational, professional, clinical ethics.

PUBH 7554. Health Care Strategy and Marketing. (1 cr.; A-F only; Every Spring & Summer)

PUBH 7555. Topics in Health Economics. (2 cr.; A-F only; Every Summer)
General principles of health economics applied to issues in health. Implications for health policy.

PUBH 7556. Health and Health Systems. (2 cr.; A-F only; Every Spring)

PUBH 7560. Operations Research and Quality in Health Care. (3 cr.; A-F only; Every Spring)
Using systems perspective to develop models to analyze/improve health care operations. Identifying data needs/sources to model structures, processes, outcomes of care.

PUBH 7562. Information Technology in Health Care. (2 cr.; A-F only; Every Summer)
Managing information as strategic resource within health care organizations. Designing information technology systems to capture, combine, transform information to measure processes/outcomes of care, support collaborative clinical decision making, support management decisions.

PUBH 7564. Private Purchasers of Health Care. (2 cr.; A-F only; Every Spring)

PUBH 7565. Health Care Delivery, Design & Innovation. (2 cr.; A-F only; Every Spring)

PUBH 7566. The Henry Capstone: Core Concepts in Managing Health Care Organizations. (2 cr.; S-N only; Every Fall) Seminar course supporting students as they complete capstone project.

PUBH 7568. Interdisciplinary Teamwork in Health Care. (2 cr.; A-F only; Every Summer)
Develop skills to function in inter-professional teams by using knowledge of various health care professions, principles of teamwork, knowledge of teams as they function in health care. Team formation, leading teams, decision making in teams, managing conflict in teams.

PUBH 7569. Health Care Policy. (1 cr.; A-F only; Every Summer)

PUBH 7571. Organizational Integration in Health Care Delivery. (2 cr.; A-F only; Every Fall)
Introduction to integrated healthcare and integrated health systems. Design, governance, operations, strategy, and the models for effectively integrating and aligning physicians and other medical professionals in interprofessional teams.

PUBH 7572. Health Care Strategies in Competitive Markets. (2 cr.; A-F only; Every Spring)
Application/understanding of competitive strategy. Prominent theories/models for health care markets.

PUBH 7573. Managing the Embedded Medical Practice. (2 cr.; A-F only; Every Fall)
Build competencies in areas of design, strategy, operations, finance for embedded medical practice.

PUBH 7576. Legal Considerations in Health Services Organizations. (2 cr.; A-F only; Every Summer)
Laws affecting administration of hospitals/other healthcare organizations. Administrative law,
corporate/business law, labor law, civil liability, tax-related issues. Legal issues relevant to administration, decision making, planning.

PUBH 7580. Organizational Management in Long Term Care. (1 cr. [max 2 cr.]; A-F only; Every Fall)
Overview of organizational management and human resource management in long-term care setting from senior manager’s perspective. Combines three days of on-campus seminars with independent study.

PUBH 7581. Gerontology and Services for Long Term Care Residents. (2-4 cr. [max 8 cr.]; A-F or Audit; Every Spring)
Needs of and programs for institutionalized elderly. Various aspects of human aging. Five days of on-campus seminars combined with independent study.

PUBH 7582. Practicum in Long-Term Care Administration. (4 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students apply acquired knowledge to practice of long-term care administration, under guidance of a preceptor. prereq: [7580, 7581, 7583] or [7587, 7588]

PUBH 7583. Managerial Accounting in Long-Term Care Administration. (4 cr.; A-F or Audit; Every Spring)
Advanced managerial accounting. Financial statement analysis, strategic planning, costing, control. Planning for capital needs in long-term care administration. Specific applications made to Minnesota State Medicaid reimbursement, Rule 50 cost reporting, nursing home industry standards, and budgeting process. Five days of on-campus seminars are combined with independent study. prereq: Introductory accounting

PUBH 7584. Health Care and Medical Needs. (1 cr. [max 2 cr.]; A-F only; Every Fall)
Differentiation between aging process and disease process. Common conditions/diseases associated with aging.

PUBH 7585. Community Health Care Leadership Development I. (5-10 cr.; A-F or Audit; Periodic Summer)
Nine-month program including on-campus (two weeks) plus off-campus study including seminars and monthly dialogues with mentors. Community development of health. Cultural meaning of community. Analyzing economic/political foundations of health. prereq: Member of a community health care group

PUBH 7586. Community Healthcare Leadership Development II. (5-10 cr.; A-F or Audit; Periodic Summer)
Nine-month program including on-campus (two weeks) plus off-campus study including seminars and monthly dialogues with mentors. Innovative community health development. Leading implementation of change. Networking with national/international health communities. prereq: Member of a community healthcare group

PUBH 7587. Regulatory Management in Long-Term Care. (1 cr. [max 2 cr.]; A-F or Audit; Every Summer)
Funding mechanisms, regulatory compliance mechanisms, and legal provisions currently in force for long-term care industry.

PUBH 7588. Information Uses in Long-Term Care. (2 cr.; A-F or Audit; Every Fall)
Accumulation/analysis of data to inform management decision-making in long-term care. One day on-campus seminar, independent study. prereq: Some knowledge of computers

PUBH 7589. Human Resource Management in Long Term Care. (0.5 cr. [max 1 cr.]; A-F only; Every Fall)
Covers workplace culture, accountability and fairness, and just and learning culture concepts.

PUBH 7591. Independent Study: Health Care Administration. (1-4 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Independent study supervised by a health care administration faculty member. prereq: instr consent

PUBH 7592. Healthcare Law. (0.5 cr. [max 1 cr.]; A-F only; Every Summer)
Covers legal and regulatory issues related to the operation of long-term care service delivery organizations.

PUBH 7596. Clerkship in Health Care Administration. (2 cr.; A-F or Audit; Periodic Spring & Summer)
Survey/solution of management problems within a local health services organization. Preparation of formal management report. prereq: 6544, health care admin student

PUBH 7691. Independent Study: Maternal and Child Health. (1-4 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Independent study supervised by a maternal and child health faculty member. prereq: Maternal/child health major, instr consent

PUBH 7694. Culminating Experience: Maternal and Child Health. (1-4 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master’s project in maternal/child health. prereq: Maternal/child health major, instr consent

PUBH 7696. Field Experience: Maternal and Child Health. (1-4 cr.; S-N only; Every Fall, Spring & Summer)
Supervised maternal/child health field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems. prereq: Public health nutrition major, dept consent

PUBH 7991. Independent Study: Public Health Nutrition. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master’s project in public health nutrition. prereq: PubH Nutr MPH student or Nutr grad student, instr consent

PUBH 7994. Culminating Experience: Public Health Nutrition. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of master’s project in public health nutrition. prereq: PubH Nutr major, instr consent

PUBH 7996. Field Experience: Public Health Nutrition. (1-6 cr.; S-N only; Every Fall, Spring & Summer)
Supervised public health nutrition field study in health or public health setting under academic/professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems. prereq: Public health nutrition major, dept consent

PUBH 8100. Topics: Applied Analyses of Occupational Health Data. (1-4 cr. [max 80 cr.]; Student Option; Every Fall, Spring & Summer)
New course offerings or topics of interest in environmental health. prereq: Doctoral student in occupational health studies. Prior coursework in epidemiology, statistics

PUBH 8120. Occupational Health and Safety Research Seminar. (1 cr. [max 12 cr.]; S-N or Audit; Every Fall, Spring & Summer)
Facilitates student research training in occupational injury prevention. Roundtable discussions, interdisciplinary involvement.
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Explanatory/confirmatory factor analysis, path analysis, structural equation modeling, latent trait models, latent class models. SAS/AMOS software are used. prereq: Biostatistics PhD student or instr consent

**PUBH 8442. Bayesian Decision Theory and Data Analysis.** (3 cr.; Student Option; Every Spring)
Theory/application of Bayesian methods. Bayesian methods compared with traditional, frequentist methods. prereq: [7460 or experience with FORTRAN or with [C, S+]]. Stat 5101, Stat 5102, Stat 8311, graduate student in [biostatistics or statistics] or instr consent

**PUBH 8443. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

**PUBH 8445. Statistics for Human Genetics and Molecular Biology.** (3 cr.; Student Option; Every Spring)
Introduction to statistical problems arising in molecular biology. Problems in physical mapping (radiation hybrid mapping, DDP), genetic mapping (pedigree analysis, lod scores, TDT), biopolymer sequence analysis (alignment, motif recognition), and micro array analysis. prereq: [[Stat 8101, Stat 8102] or equiv], PhD student or instr consent; some background with molecular biology desirable

**PUBH 8446. Advanced Statistical Genetics and Genomics.** (3 cr.; Student Option; Every Spring)
Genetic mapping of complex traits in humans, modern population genetics with an emphasis on inference based observed molecular genetics data, association studies; statistical methods for low/high level analysis of genomic/proteomic data. Multiple comparison and gene network modeling. prereq: [7445, statistical theory at level of STAT 5101-2; college-level molecular genetics course is recommended] or instr consent

**PUBH 8452. Advanced Longitudinal Data Analysis.** (3 cr.; Student Option; Every Spring)
Methods of inference for outcome variables measured repeatedly in time or space. Linear/ nonlinear models with either normal or non-normal error structures. Random effects. Transitional/marginal models with biomedical applications. prereq: Stat 5102, Stat 8311, experience with [SAS or S+], advanced [biostats or stats] student or instr consent

**PUBH 8462. Advanced Survival Analysis.** (3 cr.; Student Option; Periodic Fall & Spring)

**PUBH 8472. Spatial Biostatistics.** (3 cr.; Student Option; Periodic Fall & Spring)
Spatial data, spatial statistical models, and spatial inference on unknown parameters or unobserved spatial data. Nature of spatial data. Special analysis tools that help to analyze such data. Theory/applications, prereq: [STAT 5101, STAT 5102] or [STAT 8101, STAT 8102], some experience with S-plus; STAT 8311 recommended

**PUBH 8475. Statistical Learning and Data Mining.** (3 cr.; Student Option; Periodic Spring)
Statistical techniques for extracting useful information from data. Linear discriminant analysis, tree-structured classifiers, feed-forward neural networks, support vector machines, other nonparametric methods, classifier ensembles (such as bagging/boosting), unsupervised learning. prereq: [[6450, 6451, 6452] or STAT 5303] or equiv, [biostatistics or statistics PhD student] or instr consent

**PUBH 8482. Sequential and Adaptive Methods for Clinical Trials.** (3 cr.; Student Option; Every Fall & Spring)
Statistical methods for design/analysis of sequential experiments. Wald theorems, stopping times, martingales, Brownian motion, dynamic programming. Compares Bayesian/frequentist approaches. Applications to interim monitoring of clinical trials, medical surveillance. prereq: Stat 8101-8102 or equivalent, [students should be comfortable with the multivariate normal distribution or instr consent]

**PUBH 8492. Theories of Hierarchical and Other Richly Parameterized Linear Models.** (3 cr.; A-F only; Spring Odd Year)
Linear richly-parameterized models. Hierarchical/dynamic/linear/linear mixed models. Random regressions. Smoothers, longitudinal models. Schemes for specifying/fitting models. Theory/computing for mixed-linear-models. Richly parameterized models and the odd/surprising/undesirable results in applying them to data sets. Lectures, class project. prereq: [[8401 or STAT 8311], [[STAT 8101, STAT 8102] or equiv], [biostatistics or statistics] PhD student] or instr consent

**PUBH 8494. Directed Research: Biostatistics.** (1-4 cr.; S-N only; Every Fall, Spring & Summer)
Research, with direction from a faculty member, in biostatistics. prereq: instr consent

**PUBH 8666. Doctoral Pre-Thesis Credits.** (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**PUBH 8777. Thesis Credits: Master’s.** (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**PUBH 8800. Topics in Health Services Research and Policy.** (1-4 cr.; max 20 cr.; Student Option; Periodic Fall, Spring & Summer)
Topics and credit vary by instructor.

**PUBH 8801. Health Services Policy Analysis: Theory.** (3 cr.; Student Option; Every Fall)
Integrated overview of U.S. health services policy. Related theoretical/empirical literature. Analysis of alternative policy-making models, political/philosophical underpinnings of those models, prereq: [Grad or professional school] student or instr consent

**PUBH 8802. Health Services Policy Analysis: Applications.** (2 cr.; A-F or Audit; Every Spring)
Emphasizes relationships between health services research/policy. Uses case studies to examine how research influences policy/vice versa. prereq: [6835, 8801] or instr consent

**PUBH 8803. Long-Term Care: Principles, Programs, and Policies.** (2 cr.; Student Option; Periodic Spring)
Long-term care policy for functionally impaired persons, particularly the elderly. Team taught from healthcare and social services perspective; grounded in research literature on evidence of program effects. Innovative programs addressing current fragmentation of services. prereq; Grad-level health-care policy course or instr consent

**PUBH 8804. Advanced Quantitative Methods Seminar.** (3 cr. [max 6 cr.]; A-F or Audit; Every Spring)
Understand/competently use advanced quantitative methods in applied social science, policy, demographic research. Methods considered largely within or related to framework of regression analysis. Effort will be made to reflect interests of class. prereq: This is an advanced, doctoral-level course. Students are expected to have completed a full year of doctoral-level introductory statistical and/or econometric classes in their respective field prior to enrolling in this course (e.g., Pubh 7401-2, ApEc8211-2, SOC 8801-8811). Exceptions may be granted with instr consent.

**PUBH 8805. Sociological Theory in Health Services Research.** (3 cr.; Student Option; Every Fall)
Overview of sociological theories in medical sociology, occupations/professions. Emphasizes teaching students how to apply theories to health/social phenomena of their own interest/choice.

**PUBH 8806. Sociology of Health Occupations and Organizations.** (3 cr.; Student Option; Every Fall & Spring)
Sociological theories of occupations/organizations as applied to health care. Functional, conflict, evolutionary theories applied to health care reorganization such as managed care, technology on organization of work/occupations. Emphasizes application of theories to develop hypotheses. prereq: Hrspreconcurrent registration is required (or allowed) in a grad major or instr consent
PUBH 8810. Research Studies in Health Care. (3 cr.; Max 6 cr.; Student Option; Every Fall) Introduction to philosophy of science, conceptual modeling, experimental design, survey/sample design, issues relevant to health services research, prereq: Grad or professional school student or instr consent

PUBH 8811. Research Methods in Health Care. (3 cr.; Student Option; Every Fall & Spring) Research methods commonly used in analysis of health services research and health policy problems, prereq: [8810, grad or professional school student] or instr consent

PUBH 8813. Measurement of Health-Related Social Factors. (3 cr.; A-F or Audit; Every Fall & Spring) How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data, intro stat course, understanding of simple correlations or instr consent

PUBH 8820. Health Economics I. (3 cr.; A-F or Audit; Every Spring) Application of microeconomic theory to healthcare decisions of consumers and producers under different assumptions about market structure and behavior, prereq: One course each in intermediate microeconomics, calculus, intro to linear algebra

PUBH 8821. Health Economics II. (3 cr.; A-F or Audit; Every Fall & Spring) Examines application of microeconomic theory to health services research through selected reading from published and unpublished health economics literature, prereq: 8820 or instr consent

PUBH 8830. Writing for Research. (2 cr.; Student Option No Audit; Every Fall) Two-course sequence. Writing research grants/papers. Writing skills appropriate to research proposals and scholarly papers. How to review, synthesize, and critique research proposals and published articles, prereq: HSRPA PhD student or instr consent

PUBH 8831. Writing for Research. (2 cr.; Student Option No Audit; Every Spring) Second of two course sequence. Writing research proposals and scholarly papers. How to review, synthesize, and critique papers and research proposals, prereq: 8830

PUBH 8836. Integration of Public Health Research Methods in Health Services Research and Policy. (2 cr.; Student Option: Periodic Fall) Integration of concepts/designs of public health research methods, how they can be integrated into health services research and policy analysis. Experiential learning opportunities in clinical settings that illustrate need for integration, prereq: Professional school or grad student or instr consent

PUBH 8888. Thesis Credit: Doctoral. (1-24 cr. [Max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Max 18 cr per semester or summer; 24 cr required; For Environmental Health Students ONLY: Contact Director of Graduate Studies and the Graduate Student Coordinator.

PUBH 8893. Directed Study: Health Services Research, Policy, and Administration. (1-3 cr.; Student Option; Every Fall, Spring & Summer) H-N or Audit, student or instr consent

PUBH 8894. Directed Research: Health Services Research, Policy, and Administration. (1-8 cr.; Student Option; Every Fall, Spring & Summer) H-N or Audit, student or instr consent

**Radiology (RAD)**

RAD 7101. Externship in Diagnostic Radiology at Fairview-University Medical Center. (3 cr.; H-N or Audit; Every Fall, Spring & Summer) There are four basic elements of the course: 1.rotation through different areas of the radiology department, observing multiple radiographic procedures (GU, GI, nuclear medicine, pediatric radiology, neuroradiology, general reading room, chest/CT body, ultrasound, cardiovascular radiology, mammography); 2.didactic lectures by members of the radiology staff in their own specialty area, both individually with the medical student and while the medical student attends departmental conferences every morning; 3. the text, Diagnostic Imaging by Armstrong and Wastie; and 4. the ACR teaching film library in various subspecialties of radiology which student may study individually or in small groups.

RAD 7102. Externship in Diagnostic Radiology at VA Medical Center. (3 cr.; H-N or Audit; Every Fall, Spring & Summer) This course presents an overview of the various imaging modalities and image interpretation. Lectures cover fundamentals of image interpretation, nuclear medicine, computerized tomography, ultrasound, and magnetic resonance imaging. Individual rotations provide an opportunity to observe the procedures and read films with staff and residents. Emphasis is on normal anatomy and basic pathologic patterns. Recommended reading is available in the department for loan during the rotation.

RAD 7103. Externship in Medical Imaging at Hennepin County Medical Center. (2-3 cr.; H-N or Audit; Every Fall, Spring & Summer) COURSE STRUCTURE: There are tutorials and interdepartmental and intra-departmental conferences. The student is assigned to watch and, if possible, participate in various routine and special radiological examinations. Independent study includes assigned reading material, i.e., Dr. L. Squire’s series of Exercises in Diagnostic Radiology, Dr. L. Squire’s audiovisual series (24 tapes), and Dr. L. Squire’s radiology teaching film series.

RAD 7104. Externship: Diagnostic Radiology--Regions Medical Center. (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer) Ill prereq: enrolled med

RAD 7105. Externship in Radiology - Duluth. (3 cr.; H-N or Audit; Every Fall, Spring & Summer) The student gains an appreciation for the radiologic examination, its capabilities, limitations, and hazards, and will be offered a review of fundamental physical and basic science aspects of the subject. The student learns how to work with technical and other auxiliary personnel. Emphasis is on how to approach radiologic diagnosis and work with the clinician in a radiologic consultation service. There is observation and participation in daily interpretation of films, fluoroscopy, and special procedures. Self-instruction is encouraged, with reading assignments and use of an extensive x-ray film teaching file. prereq: One med and one surg cikshp

RAD 7110. Research Problems in Radiology. (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer) After consultation with staff, the student performs well-defined, radiologic-related research projects adjusted to the student’s level of experience and interest.

RAD 7140. Special Problems: Roentgenology. (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer) N/A prereq: enrolled med

RAD 7172. Radiation Biology. (2 cr.; H-N or Audit; Every Fall, Spring & Summer) Dedicated elective for prospective students to become familiar with interventional radiology and understand the clinical scope and research possibilities available in Interventional Radiology.

RAD 7511. Roentgen Technique. (1 cr.; H-N or Audit; Every Fall) Provides the student with a better understanding of the various uses of radioactive materials in the practice of medicine. Physicians need to understand how these special diagnostic tests compare to the more usual radiologic (x-ray) procedures in the diagnosis of disease and to appreciate the therapeutic capabilities of radio-nuclides. The student becomes familiar with nuclear medicine using one of several books: Diagnostic Nuclear Medicine by Sandler, et. al., Williams and Wilkins; An Atlas of Clinical Nuclear Medicine by Fogelman and Maisey, Mosby; Principles of Nuclear Medicine, by Wagner, et.al, Saunders.

RAD 7540. Special Problems: Radiological Physics. (1-15 cr.; H-N or Audit; Periodic Fall)
Consent Social research/evaluation methodology.
[3 cr. ; A-F only; Every Fall, Spring & Summer]

RE 520. Nuclear Medicine. (4 cr. max [6 cr.]; No Grade Associated; Every Fall, Spring & Summer)

Rec, Park, and Leisure Studies (REC)

REC 1501. Orientation to Leisure and Recreation. (3 cr. ; A-F only; Every Fall & Spring)
Opportunities to explore field of recreation/role it plays in society/human development. Visit recreation facilities representing public, quasi-public, for-profit agencies. Overview of recreation field/foundation for continuing on to more advanced recreation courses.

REC 1901. Freshman Seminar: Environmental Issues. (ENV; 3 cr.; Student Option No Audit; Periodic Fall & Spring)
Reading, discussion, critical analysis, and writing about environmental issues. Intensive, small-group setting. prereq: Fr

REC 1905. Freshman Seminar. (3-6 cr.; Student Option No Audit; Periodic Fall & Spring)
Interdisciplinary seminar. Topics specified in Class Schedule.

REC 2151. Outdoor and Camp Leadership. (3 cr.; A-F only; Every Spring)
Practical/theoretical study of leading/educating diverse groups in outdoor settings. Outdoor leadership skills, styles/methods, how these translate to general leadership methods in other settings/careers. How leadership styles impacts learning processes.

REC 3281. Research and Evaluation in Recreation, Park, and Leisure Studies. (4 cr.; A-F only; Every Fall)
Social research/evaluation methodology. Survey of present status of recreation/park research, evaluation. prereq: Rec major or instr consent

REC 3321. Outdoor Recreation 3-Season Skills. (3 cr.; A-F only; Every Fall)
Introduction to essential outdoor technical skills as they relate to outdoor leadership and programming. Focus on teaching students to lead/instruct in outdoor classroom. prereq: Student will not receive credit if they have previously taken REC 4900/5900 - Special Topics with this topic title

REC 3322. Outdoor Recreation Winter Skills. (3 cr.; A-F only; Every Spring)
Introduction to essential winter technical skills as they relate to outdoor leadership/programming. Focus on teaching students to lead/instruct in outdoor classroom. prereq: Student will not receive credit if they have previously taken REC 4900/5900 - Special Topics with this topic title

REC 3541W. Recreation Programming. (WI; 3 cr.; A-F only; Every Fall)
Principles/practices of designing/managing leisure service agencies in public/private sector. prereq: [3541W or instr consent], rec major

REC 3551. Administration and Finance of Leisure Services. (4 cr.; A-F only; Every Spring)
Principles/practices of financing/managing leisure service agencies in public/private sector. prereq: REC major or instr consent

REC 3601W. Leisure and Human Development. (WI; 3 cr.; A-F only; Every Spring)
Explore issues associated with roles of leisure throughout life span. Principles/procedures for designing programs, services, facilities relative to individual values, attitudes, identity, culture, age, gender. prereq: REC major or instr consent

REC 3796. Senior Internship in Recreation, Park, and Leisure Studies. (3-9 cr.; S-N only; Every Fall, Spring & Summer)
On-the-job supervised practical experience under specialist in a field directly related to student's academic program. prereq: Rec major, completion of most core courses, sr, instr consent

REC 3993. Directed Study in Recreation, Park, and Leisure Studies. (1-9 cr.; A-F only; Every Fall, Spring & Summer)
Independent study of leisure service programs, systems, facilities, or policies. Focuses on conduct of recreation programs. Scholarly projects (e.g., library or field research) or demonstration projects. prereq: [REC MEd or grad student], instr consent

Rehabilitation Science (RSC)

RSC 5058. Anatomy for Rehabilitation Science. (6 cr.; A-F or Audit; Every Summer)
Study of gross human anatomy through lecture/laboratory experiences that include cadaver dissection of extremities, head, neck, back, abdomen, thoracic, pelvic regions with correlation to clinical conditions. prereq: Student enrolled in Rehabilitation Science Program, instr consent, dept consent

RSC 5101. Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences. (1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Quantitative research approaches in health, rehabilitation, human movement sciences. Application examples/practice problems focus of the course. Basic algebra/geometry, solving equations for unknowns, logarithmic transforms, derivatives/integrals, matrix methods, use of macros in research applications. prereq: Basic algebra, trigonometry, and geometry. Pre-calculus or calculus is helpful but not required.

RSC 5102. Hot Topics in the Biology of Aging. (1 cr.; A-F only; Spring Odd Year)
This course is intended to provide a platform of understanding about the major issues
surrounding biological research in aging. This course will include a combination of student- and faculty-led discussions on select research topics that are highly relevant to the field of biogerontology research, along with seminars on scientific integrity. Student participants will lead discussions focused on their area of research expertise, utilizing a combination of review articles and research articles and case studies of scientific misconduct. Faculty will provide students with a tour of their laboratory, followed by discussion of literature published by their laboratory dealing with aging and/or proteomics. This course is directed to graduate students and post-doctoral fellows currently engaged in conducting research in the area of biological aging.

RSC 5103. Seminal Milestones in the Biology of Aging. (0-1 cr.; A-F only; Fall Even Year) This course is intended to provide a platform of understanding about the major issues surrounding biological research in aging. The course will utilize original literature, including both seminal, historical background papers and the most recent progress in the field of biogerontology research as a starting point for in-depth discussions. This course is directed to graduate students and post-doctoral fellows currently engaged in conducting research in the area of biological aging.

RSC 5106. Rehab Science: Past, Present, and Future. (1 cr.; A-F or Audit; Periodic Fall) This is one of a series of seminar courses that prepares students to think critically in reading and discussing the literature in rehabilitation science and to speak and write persuasively on scientific topics. This semester, the seminar will focus on the past, present, and future of rehabilitation science. This course will include lecture presentations from rehabilitation science faculty for the first 50 minutes of the weekly class time, as well as discussion/interaction sessions planned jointly by assigned students and faculty for the second 50 minute session each week.

RSC 5135. Advanced Biomechanics I: Kinematics. (3 cr.; A-F or Audit; Fall Odd Year) How to describe/measure movement. Basic/ applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion. Meets with RSC 8135. prereq: instr consent

RSC 5200. Introduction to Transcranial Magnetic Stimulation. (3 cr.; A-F or Audit; Fall Even Year) Theory/application of transcranial magnetic stimulation (TMS) to measure corticospinal excitability. Must sign consent form. Resting/active motor thresholds, single hemisphere paired-pulse testing, bilateral interhemispheric inhibition paired-pulse testing, input-output recruitment curves, cortical silent periods, H reflex testing.

RSC 5206. Academic Ethos. (1 cr.; A-F or Audit; Periodic Spring) Explicit/implicit culture unique to academia. Early understanding within/beyond rehabilitation science. Role of higher education in society, academic freedom, tenure, corporatization of education, accreditation, globalization of education, regulatory monitoring of research, faculty scholarship/governance.

RSC 5231. Clinical Biomechanics. (2-5 cr.; A-F only; Every Fall) Biomechanics. Internal/external forces/structures responsible for normal/abnormal human movement. Joint and tissue mechanics, muscle function, task analysis, and gait mechanics. Lecture and lab practice. prereq: concurrent registration is required (or allowed) in PT 6231, general physics, [intro or short] calculus, anatomy; intensive anatomy course in human cadaver dissection recommended

RSC 5233. Advanced Biomechanics II: Kinetics. (3 cr.; A-F or Audit; Spring Even Year) Forces that create human motion and are produced within body as a result. Measuring human motion. Clinical movement assessment, Exercise, sport, and activities of daily living. Two-dimensional rigid body dynamics models, forward/inverse dynamics solutions, hypotheses to describe whole body/joint kinetics. Lectures, lab, discussion, prereq: 5135 or equiv or instr consent

RSC 5281. Scientific Foundations: Exercise Theory. (3 cr.; A-F only; Every Fall) In-depth presentation of fundamental concepts in exercise physiology/exercise biochemistry related primarily to skeletal muscle, secondarily to cardiovascular system/connective tissue. Exercise/performance-enhancing ergogenic aids. prereq: Rehabilitation Science grad student

RSC 5294. Independent Study in Rehabilitation Science. (1-3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer) Independent exploration into topics related to rehabilitation science. prereq: Rehabilitation science student or program approval

RSC 5306. Scientific and Professional Presentation. (1 cr.; A-F or Audit; Periodic Spring) This course will focus on the process and practice of oral presentation of scientific inquiry and discoveries. These skills are essential for scientists in all disciplines, yet often guidelines for optimal scientific presentation are not taught or practiced in an educational setting. Specific areas to be covered in this course include delivery presentation intent, audience analysis, timing, content, keys to effective communication, vocal behavior, and important things to avoid. Context will include conference-style platform or podium presentations, poster presentations, and seminar presentation. The course will involve opportunities to prepare and practice presentation skills and receive constructive feedback in a safe, supportive environment. It is appropriate for students from all disciplines and levels of PhD study.

RSC 5310. Physiology for Physical Rehabilitation. (1-5 cr.; A-F or Audit; Every Spring) This course is designed to convey foundational information regarding human basic physiology and more advanced integrative physiology to provide the student a broad range of knowledge on how the human body works at rest, exercise, and as we age. Basic cell physiology, which serves the human body's infrastructure for function in different cell types for various organ systems, will be discussed with the major emphasis of this course being on the human body as a system. Along these lines, most of the content will relate to integrative physiology, as our systems are often redundant in regulating homeostasis. The objective of this course is to prepare the student for the study of pathophysiological changes within the human body.

RSC 5814. Age, Exercise, and Rehabilitation. (2 cr.; Student Option; Every Fall) Overview of normal physiological responses to exercise in the elderly. Comparison of exercise-induced responses of physiological systems throughout aging process. Focuses on importance of exercise from rehabilitation perspective. Offered Fall semesters of even-numbered years. prereq: Rehabilitation science student or program permission

RSC 5841. Applied Data Acquisition and Processing. (4 cr.; A-F or Audit; Fall Even Year) This course will introduce students to collecting and processing biomedical time series data. Students will gain experience using data acquisition hardware common in many laboratories, as well as related software for acquisition of the data and digital signal processing. Data sources will include electroencephalography (EEG), electromyography (EMG), wearable sensors, and data from other systems based on the background and interests of students in the class. The overall goal of this course is to provide students with the necessary, fundamental skills to run a successful experiment, troubleshoot errors, and produce high quality data sets. prereq: prefer students to have completed general physics, introductory of short calculus

RSC 5901. Scholarly Inquiry in Health Sciences. (4 cr.; A-F or Audit; Every Spring) How research evidence is developed, disseminated, utilized in health sciences. Qualitative/quantitative scholarly project proposal. Critique studies/peer proposals. Explore conduct of research. prereq: Three credits of undergraduate statistics. instr consent, dept consent

RSC 8021. Application of Proteomics to Aging. (0-1 cr.; A-F only; Fall Odd Year) This course is intended to provide a platform of understanding about the use of proteomic technology in aging research. This course will include a combination of faculty- and student-led discussions on select topics that are highly relevant to the field of mass spectrometry and proteomic research. This course also includes an introduction to the NIH/NRSA fellowship applications. Student participants will lead discussions focused on research articles
highlighting current proteomic techniques. This course is directed to graduate students and post-doctoral fellows currently engaged in conducting research in the area of biological aging.

RSC 8022. Fostering a Career in Aging Research. (1 cr.; S-N only; Spring Even Year) Platform for preparing pre-doctoral students/post-doctoral fellows for next step in academic career. Combination of student/faculty led discussions. prereq: instr consent

RSC 8106. Critical Analysis of Scientific Literature. (1-2 cr.; A-F or Audit; Periodic Fall) This course will focus on the process of critical review, appraisal, and synthesis of scientific literature. Overview of organizing and writing literature reviews for a traditional dissertation, systematic reviews, and peer review for scientific manuscripts will be included. The course will involve substantive review of the literature and writing in your anticipated area of dissertation work.

RSC 8130. Current Literature Seminar. (1-3 cr. [max 9 cr.]; A-F or Audit; Every Fall, Spring & Summer) Critical review of literature to evaluate efficacy of selected physical therapy interventions. prereq: Grad student in PT or rehabilitation science major or instr consent

RSC 8135. Advanced Kinesiology. (3 cr.; A-F or Audit; Fall Odd Year) How to describe/messure movement. Basic/ applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion. Meets in conjunction with RSC 5135. prereq: [Rehabilitation science student or program permission], instr consent

RSC 8170. Special Topics in Rehabilitation Science. (; 1-3 cr. [max 9 cr.]; A-F or Audit; Every Fall, Spring & Summer) Topics vary by semester. Papers required.

RSC 8185. Problems in Rehabilitation Science. (1-3 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer) Research practicum on selected topic. Use of systematic literature search. Critical analysis of scientific literature. Specific measurement systems. Data collection/reduction methods of on-going or new research projects. Preparing/defending research reports.

RSC 8188. Teaching Practicum. (; 1-5 cr.; A-F or Audit; Every Fall, Spring & Summer) Supervised experience in teaching/evaluation. Effective use of instructional materials in lecture/lab courses. Students create learning objectives for teaching unit(s), conduct a review of current literature on topic, prepare/deliver presentations, compose test questions. Offered by individual arrangement with faculty. prereq: [Rehabilitation science student or program permission], instr consent

RSC 8192. Research Design in Rehabilitation Science. (; 4 cr.; A-F or Audit; Every Fall) The goals of this course are to develop abilities to critically evaluate peer-reviewed literature. It will also enable students to identify and apply appropriate statistical procedures, and interpret the meaning of statistical analyses. Finally, it will give students an opportunity to present the aims, methods, intended analyses, and preliminary results of their own research. Additionally, students will meet individually for 2 hours every month with the lecturer to work on the method section of a paper related to their PhD project. This paper will be critically reviewed and graded as end-evaluation for this class. prereq: instr consent

RSC 8206. Grant Writing. (2 cr.; A-F or Audit; Periodic Fall) Process of applying for individual National Institutes of Health (NIH) pre-doctoral research training fellowship. Overview of NIH Program Announcement PA-11-111/NIH SF424 individual fellowship application guide required for application will be included. Substantive writing of components of NIH fellowship.

RSC 8235. Human Kinetics. (3 cr.; A-F or Audit; Spring Even Year) Forces that create human motion or are produced within body as a result of motion. Measuring kinematics of motion. Clinical movement assessment. Measuring/analyzing exercise, sport, and activities for transfer of forces within body. Two-dimensional rigid body dynamics. Forward/inverse dynamics. Hypotheses for whole body/joint kinetics. Lectures, lab experiments, discussion. Meets with RSC 5235. prereq: [RSC 5135 or equiv] or instr consent

RSC 8282. Problems in Human Movement. (4 cr.; A-F or Audit; Every Spring) Fundamental principles of neurophysiology, neurology, motor control, and motor learning as a basis for therapeutic intervention in motor dysfunction. prereq: [Rehabilitation science student or program permission], instr consent

RSC 8306. Peer Review and Publication. (2 cr.; A-F or Audit; Periodic Spring) This course will focus on the process of publication in the scientific literature, with emphasis on publication of original research. Overview of organizing and writing for publication, and the peer review process for scientific manuscripts will be included. The course will involve substantive writing practice in your anticipated area of scientific inquiry.

RSC 8333. FTE: Master’s. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

RSC 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

RSC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

RSC 8777. Thesis Credits: Master’s. (; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

RSC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) Who is the student? Doctoral prereq: Max 18 cr per semester or summer, 24 cr required; RSC doctoral student who has successfully passed the prelim written exam, dept consent

Religious Studies (RELS)

RELS 1001. Introduction to the Religions of the World. (GP; 3 cr.; Student Option; Every Fall & Spring) Introduction to major religions of world/academic study of religion. Judaism, Buddhism, Christianity, Islam, some pre-Christian religions of Antiquity.

RELS 1002. Introduction to the Study of Religions in America. (AH; 3 cr.; Student Option; Every Fall) Pluralistic character of religion in United States. Methods, problems, materials, views of sacred/religious practices. Religion's role in gender, race, science.


RELS 1011. Religions and American Identity in the United States from World War II to the Present. (CIV; 3 cr.; Student Option; Every Fall) Political/cultural watersheds of last 60 years. Debates within/between religious traditions/communities. How gender, race, class, sexuality have shaped relationships between religion/politics. Tensions between secularism/religiosity, liberalism/fundamentalism.

RELS 1034. Introduction to Jewish History and Cultures. (HIS; 3 cr.; Student Option; Every Fall) Jewish history, society, culture from Second Temple period (5th century BCE) to modern era as illuminated by literature, philosophy, art, film, music, religious law/custom, artifacts of daily life. Emphasizes political, social, cultural contexts that shaped development of Jewish ideas, practices, and institutions.

RELS 1082. Jesus in History. (HIS; 3 cr.; Student Option; Every Spring) Who was Jesus? How can we recover what he said and did? Why was he killed and who did it? Was there agreement about the life and words of Jesus in the earliest stages of Christianity, or were there major disagreements even then? How were the early writers about Jesus influenced by their social, political, and religious contexts? And why was it reported in...
the news recently that Jesus was married? In this course we examine the earliest attempts to describe Jesus and his significance in the gospel literature of the first and second centuries and beyond. We ask how historians may claim to “know” the “facts” of Jesus’s life and meaning in light of these various portraits. We seek to understand how the different literary presentations of Jesus reflect their authors’ social, religious, and political situations. We aim to understand in more detail the diversity of perspectives about Jesus from the earliest stage of the development of Christianity. Intended as a course of interest to all undergraduates on the Twin Cities campus. Students of any, all, or no religious background are welcome.

**RELS 1082H. Honors Course: Jesus in History.** (HIS; 3 cr. ; Student Option; Every Spring)
Who was Jesus? How can we recover what he said and did? Why was he killed and who did it? Was there agreement about the life and words of Jesus in the earliest stages of Christianity, or were there major disagreements even then? How were the early writers about Jesus influenced by their social, political, and religious contexts? And why was it reported in the news recently that Jesus was married? In this course we examine the earliest attempts to describe Jesus and his significance in the gospel literature of the first and second centuries and beyond. We ask how historians may claim to “know” the “facts” of Jesus’s life and meaning in light of these various portraits. We seek to understand how the different literary presentations of Jesus reflect their authors’ social, religious, and political situations. We aim to understand in more detail the diversity of perspectives about Jesus from the earliest stage of the development of Christianity. Intended as a course of interest to all undergraduates on the Twin Cities campus. Students of any, all, or no religious background are welcome. prereq: honors

**RELS 1201. The Bible: Context and Interpretation.** (LITR; 3 cr. ; Student Option; Periodic Fall & Spring)

**RELS 3001W. Theory and Method in Religion: Critical Approaches to the Study of Religion.** (WI; 3 cr. ; Student Option; Every Spring)
Theoretical/methodological issues in academic study of religion. Theories of origin, character, and function of religion as a human phenomenon. Psychological, sociological, anthropological, and phenomenological perspectives.

**RELS 3034. Introduction to Jewish History and Cultures.** (HIS; 3 cr. ; Student Option; Every Fall)
Jewish history, society, culture from Second Temple period (5th century BCE) to modern era as illuminated by literature, philosophy, art, film, music, religious law/custom, artifacts of daily life. Emphasizes political, social, cultural contexts that shaped development of Jewish ideas, practices, and institutions.

**RELS 3070. Topics in Religious Studies.** (: 4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule and Course Guide.

**RELS 3071. Greek and Hellenistic Religions.** (HIS; 3 cr. ; Student Option; Fall Even Year)

**RELS 3072. The New Testament.** (: 3 cr.; Student Option; Periodic Fall & Spring)

**RELS 3073. Roman Religion and Early Christianity.** (: 3 cr.; Student Option; Periodic Spring)

**RELS 3074. Age of Constantine the Great.** (: 3 cr.; Student Option; Periodic Fall)
Change/continuity in Roman Empire from 2nd-century zenith through 3rd-century crisis, first Christian emperor (306 to 337 A.D.), and beyond. Replacement of classical paganism by Christianity. Beginnings of monasticism. Superpower relations between Roman, Persian empires.

**RELS 3076. The Apostle Paul: Life, Letters, and Legacy.** (: 3 cr.; Student Option; Fall Odd, Spring Even Year)
How/what can we know about Paul. What his message was. What he was fighting. How he was later understood by friends/foes.

**RELS 3078. Jews of the Islamic Mediterranean and Christian Europe, 7th-17th Centuries.** (: 3 cr.; Student Option; Periodic Fall & Spring)

**RELS 3079. Muslims and Jews: Conflict and Coexistence in the Middle East and North Africa since 1700.** (GPHIS; 3 cr.; Student Option; Fall Odd Year)
Diversity of social/cultural interactions between Muslims and Jews, and between Islam and Judaism, since 1700. What enabled the two religious communities to peacefully coexist. Causes of conflict. Why history of Muslim-Jewish relations is so contentious.

**RELS 3113. History of Modern Israel/Palestine: Society, Culture, and Politics.** (GP; 3 cr.; Student Option; Fall Odd Year)

**RELS 3201. The Bible: Context and Interpretation.** (LITR; 3 cr.; Student Option; Every Fall & Spring)

**RELS 3202. Prophecy in Ancient Israel.** (3 cr.; Student Option; Fall Even, Spring Odd Year)

**RELS 3203. The Bible: Wisdom, Poetry, and Apocalyptic.** (: 3 cr.; Student Option; Periodic Fall)

**RELS 3204. Dead Sea Scrolls.** (: 3 cr.; Student Option; Spring Odd Year)
Introduction to Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for development of Bible. Background of Judaism and Christianity. Archaeological site of Qumran.

**RELS 3205. Women, Gender, and the Hebrew Bible.** (AH; 3 cr.; Student Option; Spring Odd Year)
How men, women, gender, sexuality is portrayed in Hebrew Bible. Social/religious roles/status of women in ancient Israel. Read biblical texts from academic point of view.

**RELS 3321. American Indian Philosophies.** (AH,DSJ; 4 cr.; Student Option; Every Fall, Spring & Summer)
World views of indigenous people of Americas. Topics include native medicines/healing practices, ceremonies/ritual, governance, ecology, humor, tribal histories, status of contemporary native people.

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
RELS 3322. Art of Central and South America Before Columbus. (AH; 3 cr.; Student Option; Fall Even Year)
Art/architecture of native peoples of Americas from twelfth century B.C. until arrival of Europeans. Ways that people living in South America/Mesoamerica prior to Spanish conquest produced, shaped, used art/architecture.

RELS 3371. Buddhism. (GP; 3 cr.; Student Option; Summer Even Year)
Historical and contemporary account of the Buddhist religion in Asia/world in terms of its rise, development, various schools, practices, philosophical concepts, and ethics. Current trends in the modern faith and the rise of "socially engaged" Buddhism.

RELS 3372. Reading Asian Cultures. (3 cr.; A-F or Audit; Spring Odd Year)

RELS 3373. Religion and Society in Imperial China. (3 cr.; Student Option; Periodic Fall & Spring)

RELS 3377. A Thousand Years of Buddhism in China: Beliefs, Practices, and Culture. (3 cr.; Student Option; Fall Even Year)
Buddhism in China, 4th-15th centuries. Introduction of Buddhism to China, Relevance of Buddhist teaching to indigenous thought (e.g., Taoism, Confucianism). Major "schools": Tiantai, Huayan, Chan/Zen, etc., Cultural activities of monks, nuns, and lay believers.

RELS 3415W. Art of India. (AH, WI, GP; 4 cr.; Student Option; Every Fall, Spring & Summer)
Indian sculpture, architecture, and painting, from prehistoric Indus Valley civilization to present.

RELS 3502. Ancient Israel: From Conquest to Exile. (3 cr.; Student Option; Periodic Spring)
Israelite history in context of what is known from Egyptian, Canaanite, Mesopotamian sources. Focuses on issues raised by archaeological data related to Israelite conquest of Canaan. prereq: Hebrew not required; 3501 recommended

RELS 3504. Ancient Jewish Culture and Identity. (3 cr.; Student Option; Periodic Fall)
Ancient Judaism from the Persian restoration (520 BCE) to Roman times (second century CE). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, and Roman.

RELS 3520. History of the Holocaust. (3 cr.; Student Option; Periodic Fall & Spring)

RELS 3521W. History of the Holocaust. (WI; 3 cr.; Student Option; Periodic Fall & Spring)

RELS 3535. Death and the Afterlife in the Ancient World. (AH; 3 cr.; Student Option; Fall Odd Year)
Beliefs, attitudes, and behaviors related to death and afterlife found in cultures of ancient Mediterranean and Near East. Literature, funerary art/epitaphs. Archaeological evidence for burial practices and care of dead.

RELS 3541. Age of St. Augustine of Hippo. (3 cr.; Student Option; Periodic Fall & Spring)
Cultural diversity (A.D. 363 to circa 500 A.D.). Replacement of Roman Empire in Western Europe by barbarian kingdoms, consolidation of Constantinople. Literature, art, thought resulting from Christianity and Augustine of Hippo. Meets with CNES 3108.

RELS 3542. The Age of Justinian and Muhammad (c.500-c.700 A.D.). (3 cr.; Student Option; Periodic Spring)
Uses sources written between 500 and 700 A.D. to consider history, art, religion, and architecture of Golden Age of Byzantium, its superpower relations with Persian Empire. Way that Arab invasions from mid-7th century altered configuration of Mediterranean world and Near East.

RELS 3543. Pagans, Christians, Barbarians: The World of Late Antiquity. (3 cr.; A-F or Audit; Fall Odd Year)
Between classical and medieval, pagan and Christian, Roman and barbarian, the late antique world was a dynamic age. This course focuses on the Mediterranean region from the 2nd to the mid-7th century exploring such topics as the conversion of Constantine, the fall of Rome, barbarian invasions, the spread of Christianity, and the rise of Islam.

RELS 3544. History of Christianity I: Martyrs, Monks, Crusaders. (3 cr.; Student Option; Fall Odd, Spring Even Year)
This course surveys the history of Christianity from its status as a persecuted minority religion of the Roman Empire to its dominant role in medieval Europe and Byzantium. We study Christian traditions in Asia and Africa as well as Europe with special attention to the relationship between Christianity and culture in the ancient and medieval world.

RELS 3545. History of Christianity II: Reformation, Enlightenment. (3 cr.; Student Option; Periodic Fall & Spring)

RELS 3612. Baroque Rome: Art and Politics in the Papal Capital. (HIS; 3 cr.; Student Option; Fall Even Year)
Center of baroque culture--Rome--as city of spectacular and pageantry. Urban development. Major works in painting, sculpture, and architecture. Ecclesiastical/private patrons who transformed Rome into one of the world's great capitals.

RELS 3621W. The Christian Right and Left in America: Protestant Liberals, Evangelicals, and Fundamentalists. (WI; 3 cr.; Student Option; Spring Even Year)
Religious, historical, social, and scientific thought/practice across three main U.S. Protestant groups since 1820. Historical processes that brought about diverse understandings of Christianity, theologies, and worship. Theological left/right views of views of society, history, and science, that influence public debates.

RELS 3622. "Sinners, Saints, and Savages": Religion in Early America. (3 cr.; Student Option; Spring Odd Year)

RELS 3623. Religion and the American Culture Wars. (HIS; 3 cr.; Student Option; Every Fall)

RELS 3624. Atheists & Others: Religious Outsiders in the United States. (DSJ; 3 cr.; Student Option; Periodic Spring)
What does it mean to be an atheist in the United States today? Atheists comprise a small percentage of the American population, but one with an increasingly visible presence in popular culture, political discourse, and everyday life. How do atheists organize into groups oriented toward identity-formation, social connection, and political action? prereq: SOC 1001 recommended

RELS 3625. Magic and Medicine. (3 cr.; Student Option; Spring Odd Year)
Course examines how the line between magic and medicine has changed over time. From accusations of witchcraft to proclamations of scientific breakthrough, we will examine the relationship between the supernatural and the natural from the early modern period to today. Specific topics include the practice of exorcism, the concept of the "four humors," the persecution of witches, the development
of "voodoo,"? the effectiveness of placebos, and the professionalization of medicine. Throughout, we will ask how gender, class, and race have affected the construction of "magic" and "medicine."

RELS 3671. Hinduism. (3 cr.; Student Option; Periodic Fall & Spring) Development of Hinduism focusing on sectarian trends, modern religious practices, myths/rituales, pilgrimage patterns/religious festivals. Interrelationship between Indian social structure/Hinduism.

RELS 3707W. Anthropology of the Middle East. (GP, WI, SOCS; 3 cr.; Student Option; Fall Even Year) Anthropological field methods of analyzing/interpreting Middle Eastern cultures/societies.

RELS 3708. The Cultures of the Silk Road. (3 cr.; Student Option; Every Fall & Spring) Past/present state of cultures that flourished in Central Asia (present-day CA republics, Iran, Afghanistan) after Alexander the Great. Decline with opening of sea routes.

RELS 3709. Ancient Iran. (3 cr.; Student Option; Periodic Fall & Spring) Development of ancient Iranian culture under Achaemenians and Sassanians. Impact of Zoroastrian religion on Iranians, on Hellenism, and on domains such as Bactria. Iran's contribution to cultures of Silk Road.


RELS 3712. Islam: Religion and Culture. (3 cr.; Student Option; Every Fall) Religion of Islam. Faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, status in world societies. Asia, Europe, Americas.

RELS 3713. Modern Iran: Nationalism, Religion, and the Struggle to Create Modern Iran. (3 cr.; Student Option; Spring Odd Year) Iranian history from the fall of the Sassanids (7th C. CE) to the present. Sh'ite Islam in a world context. Iranian dynasties. Iran's entrance into modern world politics.

RELS 3714. Islam and the West. (3 cr.; Student Option; Periodic Fall & Spring) Cultural/intellectual trends that have defined differences between Islam and the West. Development of historical, philosophical, and intellectual mindset of both spheres. Factors in tension, anxiety, and hatred between Muslim world and Europe and the United States.

RELS 3715. History of the Crusades. (GP, HIS; 3 cr.; Student Option; Every Fall, Spring & Summer) Crusading spirit in Europe. Results of classic medieval crusades ca 1095-1285. States established by crusaders in Near East.

RELS 3716. Gender and the Family in the Islamic World. (3 cr.; A-F only; Periodic Spring) Experiences of Muslim women/families from a historical/comparative perspective. Gender/family power relations in colonial representations, sexual politics, family, education/health, paid work, human rights, and Islamic feminism. prereq: At least soph

RELS 3717. Christians, Muslims, and Jews in the Middle Ages. (GP, HIS; 3 cr.; Student Option; Fall Even, Spring Odd Year) Muslim/Christian expansion, jihad/crusade, anti-Jewish violence/persecution. Trade, intellectual exchange, religious dialogue.

RELS 3718W. Christ in Islamic Thought. (WI; 3 cr.; Student Option; Periodic Spring) Course examines the history of the figure of Christ in Islamic thought, from the beginnings of Islam in the Qur'an and the Hadith to the recent 2013 book by Reza Aslan, Zealot. The course is based on close reading of primary sources from regions extending from Spain to Iran, and in various languages (in translation): Arabic, Greek, French, Farsi, and Italian. Course demonstrates how much the interpretation of the figure of Christ in Islamic thought belonged to specific historical contexts.


RELS 3721. North Africa since 1500: Islam, Colonialism, and Independence. (3 cr.; Student Option; Spring Odd Year) History of Maghrib (Morocco, Algeria, Tunisia, Libya, disputed territories of Western Sahara) from time of Ottoman expansion/Shari'ahfian dynasties (Sa'dian/'Alawid) in 16th/17th Centuries to end of 20th century. Focus on encounter of Islamic cultures/societies of Maghrib with Africa/Europe.

RELS 3970. Supplemental Discussion in Religious Studies. (1 cr. [max 3 cr.]; Student Option; Periodic Fall & Spring) Extra discussion section attached to a religious studies course/event.

RELS 3993. Directed Studies. (1-4 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Student works with faculty on a subject decided upon by both.

RELS 4049. Religion and Culture. (3 cr.; Student Option; Every Fall & Spring) Religious beliefs and world views cross-culturally. Theories of origins, functions, and forms (e.g. myth, ritual, symbolism) of religion. prereq: 1005 or ANTH 1003 or instr consent


RELS 4952. Final Project. (1-4 cr.; A-F or Audit; Every Fall & Spring) Independent research/ writing under supervision of faculty sponsor. In-depth research paper/comparable project to be completed in conjunction with RELS course. prereq: Limited to RELS majors. Please see director of Undergraduate Studies for permission.

RELS 5001. Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion. (3 cr.; Student Option; Every Spring) Theoretical/methodological issues in academic study of religion. Theories of origin, character, and function of religion as a human phenomenon. Psychological, sociological, anthropological, and phenomenological perspectives. prereq: Sr or grad student or instr consent


RELS 5907. Topics in Religious Studies. (3 cr. [max 18 cr.]; Student Option; Periodic Fall, Spring & Summer) Topics specified in Class Schedule and Course Guide.


RELS 5204. Dead Sea Scrolls. (3 cr.; Student Option; Spring Odd Year) Introduction to Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for development of Bible. Background of

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**RELS 5252. Art and Archaeology of Early Christianity and the Late Roman Empire.** (3 cr.; Student Option; Periodic Fall & Spring) Emergence of Christian visual culture in Rome. Age of Tetrarchs/Constantine. Age of Justinian. Development of liturgical environments such as Jewish synagogue/Christian church. Molding of imperial/Christian art, architecture, ritual. Constantinople, from its founding through sixth century. Church architecture. Early icon/ manuscript painting.

**RELS 5326. Art of the Inka and its Ancestors.** (3 cr.; Student Option; Every Spring) Art/architecture of people of Andes from first appearance in archaeological record until Spanish invasion in 16th century. Problems, theoretical/methodological approaches. Analysis of scholarly writing, focusing on evidence. prereq: Jr. or Sr. or grad student

**RELS 5504. Development of Israelite Religion II.** (3 cr.; Student Option; Periodic Fall) Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, Roman.

**RELS 5513W. Scripture and Interpretation in Israelite Religion and Judaism.** (WI; 3 cr.; A-F or Audit; Spring Odd Year) Idea of divine revelation. Impact on religion/literature. How history of Bible's creation, transmission, interpretation helps us think critically about role of idea of revelation in history of religious traditions. prereq: At least one upper level course (3xxx or higher) in academic biblical or religious studies.


**RELS 5621W. The Christian Right and Left in America: Protestant Liberals, Evangelicals, and Fundamentalists.** (WI; 3 cr.; Student Option; Spring Even Year) Religious, historical, social, and scientific thought/practice across three main U.S. Protestant groups since 1820. Historical processes that brought about diverse understandings of Christianity, theologies, and worship. Theological left/right views of views of society, history, and science that influence public debates.

**RELS 5671. Hinduism.** (3 cr.; Student Option; Periodic Fall & Spring) Development of Hinduism focusing on sectarian trends, modern religious practices, myths/rituals, pilgrimage patterns/religious festivals. Interrelationship between Indian social structure/Hinduism.

**RELS 5707W. Anthropology of the Middle East.** (GP, WI, SOCS; 3 cr.; Student Option; Fall Even Year) Anthropological field methods of analyzing/interpreting Middle Eastern cultures/societies.

**RELS 5721. North Africa since 1500: Islam, Colonialism, and Independence.** (3 cr.; Student Option; Spring Odd Year) History of Maghrib (Morocco, Algeria, Tunisia, Libya, disputed territories of Western Sahara) from time of Ottoman expansion/Shafii dynasties (Sa'dian/Alawid) in 16th/17th Centuries to end of 20th century. Focus on encounter of Islamic cultures/societies of Maghrib with Africa/Europe.

**RELS 5993. Directed Studies.** (1-4 cr. [max 24 cr.]; Student Option; Every Fall & Spring) TBD prereq: instr consent

**RELS 8190. Comparative Seminar in Religions in Antiquity.** (3 cr. [max 6 cr.]; A-F or Audit; Spring Odd Year) Topics vary, see Class Schedule. Major cultural movements as it developed over several centuries. Draws on evidence in literature, archival records, inscriptions, documentary papyri, and archaeological remains. Artistic media such as wall painting, architectural ornament, funerary sculpture, or manuscript illumination.

**Retail Merchandising (RM)**

**RM 1201. Fashion, Ethics, and Consumption.** (CIV; 3 cr.; Student Option; Every Fall & Spring) Apparel business. Multiple steps in the process of creating/merchandising apparel, and the ethical positions reflected in decision making at each step.

**RM 2196. Work Experience in Retail Merchandising.** (1-4 cr. [max 8 cr.]; S-N only; Every Fall, Spring & Summer) Supervised work experience in business, industry, or government, related to student's area of study. Integrative paper or project. prereq: Plan submitted/approved by [adviser, internship supervisor], written approval of supervisor, instr consent

**RM 2215. Introduction to Retail Merchandising.** (3 cr.; A-F or Audit; Every Spring) Overview of retailing management. Aspects of retailing management in global, multi-channel retail environment. Strategies/tactics to make decisions to operate retail business. Retail management principles covered.

**RM 2234. Retailing in a Digital Age.** (TS; 3 cr.; A-F only; Every Spring) Students will explore and evaluate the impact of emergence of retail technology on the retail industry and consumers as well as on the society at large. Changes in the retail business and consumer behaviors will be examined in relation to emerging technologies. Both benefits and concerns related to digital retailing will be discussed.

**RM 3124. Consumers of Design.** (3 cr.; A-F only; Every Fall & Spring) Contemporary approaches to consumer behavior. prereq: retail merchandising major or minor

**RM 3196. Field Study: National or International.** (1-4 cr. [max 10 cr.]; A-F or Audit; Every Fall, Spring & Summer) Faculty-directed field study in national or international setting. prereq: instr consent

**RM 3201. Career and Internship Preparation for Retail Merchandising.** (1 cr.; A-F only; Every Fall & Spring) Research career opportunities related to retail industry, set career objectives based on an assessment of individual skills/interests, and identify job search skills to implement a transition from college to employment. prereq: Retail merchandising major

**RM 3242. Retail Buying.** (3 cr.; A-F or Audit; Every Fall) Principles/methods of merchandise inventory control, merchandise selection. prereq: [2215 or DHA 2215], [MATH 1031 or MATH 1051 or MATH 1142 or MATH 1151 or MATH 1155 or MATH 1271], [jr or sr], retail merchandising [major or minor]] or instr consent

**RM 3243. Visual Merchandising.** (3 cr.; A-F or Audit; Every Spring) Retail store environment. Physical/psychological effects that initiate/motivate consumer behavior. Merchandise display: creativity, department layout, fixtureing, lighting, cross merchandising, visual resources, signing, maintenance. prereq: 2215, [DHA major or minor or instr consent]

**RM 4117W. Retail Environments and Human Behavior.** (WI; 3 cr.; A-F only; Every Spring) Theory/research related to designed environments across retail channels. prereq: 2215 or DHA 2215, [jr or sr or grad student], [design major or minor or instr consent]

**RM 4123. Living in a Consumer Society.** (3 cr.; A-F only; Fall Odd Year) Consumerism within U.S. society. Commodification of health care, education, and production of news. Commercialization of public space/culture. What drives consumer society. How meaning is manufactured. What the lived experiences are of consumers today. Postmodern market. Alternatives to consumer society. prereq: Sr, retail merchandising major or minor

**RM 4160H. Honors Capstone Project.** (2 cr. [max 4 cr.]; A-F only; Every Fall & Spring) Individualizes honors experience by connecting aspects of major program with special academic interests. prereq: Retail merchandising honors

**RM 4193. Directed Study in Retail Merchandising.** (1-4 cr. [max 8 cr.]; A-F or Audit; Every Fall, Spring & Summer) Independent study in retail merchandising under tutorial guidance. prereq: Undergrad, instr consent

**RM 4196. Internship in Retail Merchandising.** (1-2 cr.; S-N or Audit; Every Fall, Spring & Summer) Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu. 517
Supervised work experience relating activity in business, industry, or government to student’s area of study. Integrative paper or project may be required. prereq: Completion of at least one-half of professional sequence, plan submitted/approved in advance by [adviser, internship supervisor], written consent of faculty supervisor, instr consent

**RM 4212W. Dress, Society, and Culture.** (WI; 3 cr.; A-F or Audit; Every Spring) Contemporary dress from diverse cultures within/outside USA analyzed using social science concepts. Dress as nonverbal communication system. prereq: [Dr or sr grad student], [design major or minor or instr consent]

**RM 4216. Retail Promotions.** (3 cr. [max 4 cr.]; A-F or Audit; Every Fall) Role of integrated marketing communications in retail businesses. Promotion techniques/media characteristics. Application of theories behind consumer decision making. prereq: 2215, 3124, [Dr or sr grad student], [DHA major or minor or instr consent]

**RM 4217. International Retail Markets.** (GP; 3 cr.: A-F or Audit; Every Spring) Operating a retail business in foreign countries. How international markets differ from U.S. market. Effects of sociocultural systems within foreign countries. Theories of international trade. Interface between countries and firms. Strategic alternatives. prereq: 2215 or DHA 2215, [Dr or sr grad student], [DHA major or minor or instr consent]

**RM 4247. Advanced Buying and Sourcing.** (; 3 cr.; A-F or Audit; Every Spring) Technology application for buying/sourcing. Six-month dollar merchandise plan, assortment planning, market purchase and sales promotions planning, inventory management, costing, markdowns, timing, and sourcing. prereq: 2215, 3242 or DHA 2215, [DHA major or minor or instr consent]

**RM 4248. Creative Leadership in Retailing.** (3 cr.; A-F only; Every Fall) Theory/research on creative leadership. Opportunities to apply knowledge to contemporary issues facing practicing retail leaders.

### Russian (RUSS)

**RUSS 1101. Beginning Russian I.** (; 5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing.

**RUSS 1102. Beginning Russian II.** (; 5 cr.; Student Option; Every Spring) Listening, speaking, reading, writing. prereq: 1101 or equiv

**RUSS 3001. Intermediate Russian I.** (; 5 cr.; Student Option; Every Fall) Conversation, composition, grammar review, translation, readings in literature. prereq: 1102 or instr consent

**RUSS 3002. Intermediate Russian II.** (; 5 cr.; Student Option; Every Spring) Expansion of experience in speaking, reading, and understanding Russian. Reading contemporary texts. prereq: 3001 or instr consent

**RUSS 3101. Advanced Russian I.** (4 cr.; Student Option; Every Fall) Advanced grammar, conversation, composition, reading. prereq: 3002 or 4104 or instr consent

**RUSS 3102. Advanced Russian II.** (4 cr.; Student Option; Every Spring) Advanced grammar, conversation, composition, reading. prereq: 3101 or 4111 or instr consent

**RUSS 3105. Russian Poetry and Prose.** (; 3 cr.; Student Option; Periodic Fall) Appreciation of literary values through stylistic analysis and literary interpretation; analysis of humanistic elements. Readings in Russian. prereq: Russ 3102 or concurrent enrollment in Russ 3102 or permission

**RUSS 3311V. Honors Major Project in Russian.** (WI; 3-4 cr.; A-F only; Every Fall & Spring) Directed research/writing in student's chosen field. prereq: Advanced Russian major

**RUSS 3311W. Russian Major Project.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Directed research and writing in student's chosen field. prereq: Advanced Russian major

**RUSS 3404. Tolstoy in Translation.** (GP,LITR; 3 cr.; Student Option; Spring Odd Year) Novels, stories, and philosophical writings of Leo Tolstoy.

**RUSS 3407. Stories and Plays of Anton Chekhov in Translation.** (; 3 cr.; Student Option; Every Spring) Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

**RUSS 3411. Dostoevsky in Translation.** (GP,LITR; 3 cr.; Student Option; Spring Even Year) Novels, stories, and miscellaneous writings of Fyodor Dostoevsky.

**RUSS 3421. Literature: Middle Ages to Dostoevsky in Translation.** (LITR; 3 cr.; Student Option; Every Fall) Russian literature from about 1000 A.D. to mid-19th century; emphasizing writers of the first half of the 19th century.

**RUSS 3422. Literature: Tolstoy to the Present in Translation.** (LITR; 3 cr.; Student Option; Every Spring) Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

**RUSS 3512. Russian Art and Culture.** (AH,GP; 3 cr.; Student Option; Fall Odd Year) Major trends in Russian visual arts in context of social, political, and ideological questions.

**RUSS 3900. Topics in Russian Language, Literature, and Culture.** (; 1-4 cr. [max 16 cr.]; Student Option; Periodic Fall & Spring) Variable topics in Russian language, literature, and culture. Consult department for details.

**RUSS 3993. Directed Studies.** (1-4 cr. [max 16 cr.]; Student Option; Every Fall & Spring) Guided individual study. Prereq: instr consent, dept consent, college consent.

**RUSS 4101. Beginning Russian for Graduate Research I.** (; 5 cr.; Student Option; Every Fall) Listening, speaking, reading, writing.

**RUSS 4102. Beginning Russian for Graduate Research II.** (; 5 cr.; Student Option; Every Spring) Listening, speaking, reading, writing. prereq: 4101

**RUSS 4103. Intermediate Russian for Graduate Research I.** (; 5 cr.; Student Option; Every Fall) Conversation, composition, grammar review, translation, readings in literature. prereq: 4102

**RUSS 4104. Intermediate Russian II.** (; 5 cr.; Student Option; Every Spring) Speaking, reading, and understanding Russian. Reading contemporary texts. prereq: 4103

**RUSS 4111. Advanced Russian for Graduate Research I.** (4 cr.; Student Option; Every Fall) Advanced grammar, conversation, composition, reading. prereq: 3002 or 4104 or instr consent

**RUSS 4112. Advanced Russian for Graduate Research II.** (4 cr.; Student Option; Every Spring) Advanced grammar, conversation, composition, reading. prereq: 3101 or 4111 or instr consent

**RUSS 5404. Tolstoy in Translation.** (GP,LITR; 3 cr.; Student Option; Spring Even Year) Novels, stories, and philosophical writings of Leo Tolstoy.

**RUSS 5407. Stories and Plays of Anton Chekhov in Translation.** (; 3 cr.; Student Option; Every Spring) Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

**RUSS 5411. Dostoevsky in Translation.** (; 3 cr.; Student Option; Spring Even Year) Novels, stories, and other writings of Fyodor Dostoevsky.

**RUSS 5421. Literature: Middle Ages to Dostoevsky in Translation.** (LITR; 3 cr.; Student Option; Every Fall) Russian literature from about 1000 A.D. to mid-19th century; emphasizing writers of the first half of the 19th century.

**RUSS 5422. Literature: Tolstoy to the Present in Translation.** (LITR; 3 cr.; Student Option; Every Spring) Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

**RUSS 5900. Topics in Russian Language, Literature, and Culture.** (; 1-4 cr. [max 3 cr.]; Student Option; Periodic Fall) Variable topics in Russian language, literature, and culture. prereq: 1102 for language topics
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**S W (S W)**

**S W 32C. Abuse of Children.** (2 cr. ; S-N only.)

**Scandinavian (SCAN)**

**SCAN 3011W. Readings in Scandinavian Languages.** (WI; 4 cr. ; Student Option; Every Fall)
Reading/composition in Danish, Norwegian, and Swedish for advanced proficiency. Introduction to differences between the three languages. Prereq: [Dan or Nor or Swed][1004 or 4004] or instr consent

**SCAN 3501W. Scandinavian Culture Past and Present.** (GP,WI; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Cultural, social, and political developments: principal views and core values; major cultural figures; Scandinavian mentality. Readings in translation for nonmajors. Invited lectures on central topics within selected areas of study.

**SCAN 3502. Scandinavian Myths.** (GP,LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
Literary and cultural investigation of the popular beliefs, myths, and religion of the medieval Scandinavians; the interaction of paganism and Christianity; the reflection of myths in Old Scandinavian literature and art. All readings in English.

**SCAN 3503. Scandinavian Folklore.** (GP,LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
Literary and folkloristic investigation of Scandinavian folktales and legends. Readings in translation for nonmajors.

**SCAN 3504. Emigration, Immigration, Integration: The Nordic Experience.** (GP,HIS; 3 cr. ; Student Option; Every Fall & Spring)
Issues of origin/language, immigration/settlement, traditions/values, culture/politics, and transgressions of boundaries from the old to the new studied through photos, diaries, letters, stories, and novels by Moberg, Rolvaag, Ager, and other pioneers. All readings in translation.

**SCAN 3505. Scandinavian Fiction From 1890 to Present.** (LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
Modernity’s search for new forms to represent changing historical situations. Ibsen, Strindberg, Hamsun, Selma Lagerlof, Hjalmar Bergman, Paar Lagerkvist, Karen Blixen, Moa Martinson, Tarjei Vesaas, Edith Sodergran, Ingrid Bergman, Lars Gustafsson. All readings in translation.

**SCAN 3601. Great Literary Works of Scandinavia.** (LITR; 3 cr. ; Student Option; Fall Odd Year)
Major literary works from the Middle Ages to the present. Readings in translation.

**SCAN 3602. The Literary Fairy Tale in Scandinavia.** (LITR; 3 cr. ; Student Option; Fall Even, Spr & Summer Odd Yr)
Literary fairy tales from Scandinavia, especially Hans Christian Andersen. Readings in translation for non-majors.

**SCAN 3605. The Scandinavian Short Story.** (LITR; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Short stories by important 19th/20th-century authors from five Scandinavian countries. Genre theory/practical criticism. Readings in English for non-majors.

**SCAN 3613. Children’s Literature in Scandinavia.** (LITR; 3 cr. ; Student Option; Fall Even Year)
Analysis and discussion of representative works in Scandinavian children's literature from picture books to young adult books using a variety of critical methods of interpretation. Taught in English.

**SCAN 3614. Blood on Snow: Scandinavian Thrillers in Fiction and Film.** (GP,LITR; 3 cr. ; Student Option; Periodic Fall & Spring)
Scandinavian crime novels/films against background of peaceful welfare states. Readings in translation for non-majors. Scandinavian majors/minors read excerpts in specific languages.

**SCAN 3634. Scandinavian Women Writers.** (GP,LITR; 3 cr. ; Student Option; Spring Odd Year)
Investigation of issues important to women as articulated by Scandinavian women writers. Historical overview of women’s writing in Scandinavia and in-depth investigation of texts by contemporary women writers. All readings in translation.

**SCAN 3670. Topics in Scandinavian Studies.** (; 3 cr. ; max 9 cr.; ; Student Option; Periodic Fall & Spring)
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule. Readings in English for nonmajors. May meet with 5670.

**SCAN 3993. Directed Studies.** (1-4 cr. ; max 12 cr.; ; Student Option; Every Fall, Spring & Summer)
Guided individual reading and study. Prereq instr consent, dept consent, college consent.

**SCAN 4011. Readings in Scandinavian Languages.** (; 2 cr.; ; Student Option; Every Fall)
Meets with 3011W. See 3011W for description. Prereq; Grad student

**SCAN 4614. Introduction to Kierkegaard.** (; 3 cr. ; Student Option; Periodic Fall & Spring)

**SCAN 5502. The Icelandic Saga.** (; 3 cr.; ; Student Option; )
Study of the sagas written in 13th-century Iceland. Discussion includes cultural and historical information about medieval Iceland and analysis of a selection of saga texts using contemporary critical approaches. All readings in translation.

**SCAN 5605. The Scandinavian Short Story.** (LITR; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Short stories by 19th-20th century authors from all five Scandinavian countries. Genre theory/practical criticism. Readings in English for non-majors.

**SCAN 5613. Contemporary Scandinavian Literature.** (; 3 cr.; ; Student Option; )
An investigation of issues which emerged as extremely important after 1945 in Scandinavia, as articulated by writers and analyzed by researchers in social sciences. All readings in translation.

**SCAN 5614. Blood on Snow: Scandinavian Thrillers in Fiction and Film.** (3 cr. ; Student Option; Periodic Fall & Spring)
Scandinavian crime novels/films against background of peaceful welfare states. Readings in translation for non-majors. Scandinavian majors/minors read excerpts in specific languages.

**SCAN 5634. Scandinavian Women Writers.** (GP,LITR; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Issues important to women as articulated by Scandinavian women writers. Historical overview of women's writing in Scandinavia. In-depth investigation of texts by contemporary women writers. All readings in translation.

**SCAN 5670. Topics in Scandinavian Studies.** (; 3 cr.; max 9 cr.; ; Student Option; Periodic Fall & Spring)
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule. Readings in English for nonmajors. May meet with 3670.

**SCAN 5701. Old Norse Language and Literature.** (; 3 cr.; ; Student Option; Every Fall)
Acquisition of a reading knowledge of Old Norse; linguistic, philological and literary study of Old Norse language and literature.

**SCAN 5703. Old Norse Poetry.** (3 cr. ; Student Option; Periodic Fall) Reading and analysis of either eddic poetry from the Poetic Edda or skaldic poetry. Texts read in Old Norse.

**SCAN 5710. Topics in Old Norse Literature.** (; 3 cr.; max 9 cr.; ; Student Option; Every Spring)
Topic may focus on Old Norse prose or poetry. Primary texts read in Old Norse. Critical literature about texts, medieval Icelandic culture in English. Topics specified in Class Schedule. Prereq: 5701 or equiv

**SCAN 5993. Directed Studies.** (1-4 cr. ; max 12 cr.; ; Student Option; Every Fall, Spring & Summer)
Guided individual reading and study. Prereq instr consent, dept consent, college consent.
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SCIC 8021. Advanced Numerical Methods. (3 cr.; Student Option; Every Spring)
Interdisciplinary overview of advanced numerical methods of scientific computation, emphasizing computational aspects. Approximation methods for partial differential equations, numerical linear algebra, sparse matrix techniques, iterative methods, solution of eigenvalue problems, and case studies. prereq: Undergraduate degree in field using sci comp or instr consent

SCIC 8031. Modeling, Optimization, and Statistics. (3 cr.; Student Option; Periodic Fall)
Interdisciplinary overview of mathematical modeling, optimization, and statistics techniques for scientific computation. Nonlinear equations and nonlinear optimization, statistics, control theory, modeling, and simulation. prereq: Undergraduate degree in field using sci comp or instr consent

SCIC 8041. Computational Aspects of Finite Element Methods. (3 cr.; Student Option; Periodic Fall)
Fundamental concepts and techniques of finite element analysis. Variational equations and Galerkin's method; weak formulations for problems with nonsymmetric differential operators; Petrov-Galerkin methods; examples from solid and fluid mechanics; properties of standard finite element families, implementation, prerequisite. Undergraduate degree in field using sci comp or IT grad student or instr consent

SCIC 8095. Problems in Scientific Computation. (1-3 cr.; [max 9 cr.]; Student Option; Periodic Fall)
Selected topics in interdisciplinary aspects of scientific computing, prerequisite. Undergraduate degree in field using sci comp or instr consent

SCIC 8190. Supercomputer Research Seminar. (1 cr.; [max 3 cr.]; Student Option; Periodic Fall & Spring)
Series of seminars by distinguished lecturers. prerequisite. Undergraduate degree in field using sci comp or instr consent

SCIC 8253. Computational Nanomechanics. (3 cr.; Student Option; Every Spring)
Fundamentals of mechanical properties in nanometer scale. Role of discrete structure and underlying atomic, molecular, and interfacial forces are illustrated with modern examples. Overview of computational atomistic methods. Lectures, hands-on computing using publicly available or personally developed scientific software packages. prerequisite: CSE graduate student

SCIC 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Master's student, adviser and DGS consent

SCIC 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Doctoral student, adviser and DGS consent

SCIC 8551. Multiscale Methods for Bridging Length and Time Scales. (3 cr.; A-F or Audit; Periodic Spring)
Classical/emerging techniques for bridging length/time scales. Nonlinear thermoelasticity, viscous fluids, and micromagnetics from macro/atomic viewpoints. Statistical mechanics, kinetic theory of gases, weak convergence methods, quasicontinuum, effective Hamiltonians, MD, new methods for bridging time scales. prerequisite: Basic knowledge of quantum mechanics, atomic forces, familiarity with partial differential equations, grad student in engineering or mathematics or physics or scientific computation

SCIC 8594. Scientific Computation Directed Research. (1-4 cr.; [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
tbd prerequisite: Undergraduate degree in field using sci comp or instr consent

SCIC 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; No Grade Associated; Every Fall, Spring & Summer)
tbd prerequisite: Doctoral student who has not passed prelim oral: no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SCIC 8777. Thesis Credits: Master's. (1-18 cr.; No Grade Associated; Every Fall, Spring & Summer)
No description prerequisite: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SCIC 8888. Thesis Credit: Doctoral. (1-24 cr.; Max 100 cr.)
No description prerequisite: Max 18 cr per semester or summer; 24 cr required

Security Technologies (ST)

ST 8109. Cybersecurity Foundations - Technology, Risk & Communication. (2 cr.; A-F only; Every Fall)
Explore cyber security risks through evaluation of consumer driven technology concepts and their applicability to enterprise. Core technology concepts that face both consumers and businesses. How technology works, how to understand and communicate risks to business management, deliver actionable risk mitigation approaches. Security standards and benchmarks that guide industry. This course is also open to non-ST graduate students and non-degree graduate students who may register with permission/consent from the ST program (DGS, DGSA or teaching faculty.)

ST 8200. Special Topics in Security Technologies. (0.5 cr.; A-F only; Every Fall & Spring)
Leaders in the field related to security technologies. Special speakers.

ST 8220. Vulnerability, Risk and Threat Assessment and Management. (3 cr.; A-F only; Spring Even Year)

ST 8221. Communications of Risk and Security. (1 cr.; A-F only; Every Fall)
Analyze public speaking. How to be an effective listener, how to prepare for effective public speaking, how to be an effective writer, communicate by email, write for emphasis,
ST 8330. Critical Infrastructure Protections. (3 cr.; A-F only; Every Summer)
Systems risk analysis, engineering, economics, and public policy. Investigate infrastructure security/support design and management of complex civil infrastructure systems. Systems' vulnerability assessment, asset and risk management, investigation of infrastructure interdependencies and couplings, along with judicious analyses of policies. Contribution of science and technology to strategically enhance security/quality of life. prereq: MSST grad student

ST 8331. Dynamic Systems Modeling and Simulation Tools. (2 cr.; A-F only; Every Fall)
Techniques for modeling complex systems and predicting and evaluating consequences, risks and the potential utility of interventions and countermeasures in the context of intentional disruption or use of the system as an attack vehicle. Importance of inter/intra system modeling. Variety of modeling approaches. How systems can be characterized focusing on the parameters that are important for consequence assessment, risk assessment, capability benchmarking, and decision support. Develop a systems and simulation-based approach to risk assessment, preparedness, intervention assessment, and problem solving.

ST 8440. Security Practicum. (0.5-2 cr.; A-F only; Every Summer)
Seminars and focused workshops on selected areas of security science and technology. prereq: Admitted to MSST grad program

ST 8441. Internship (optional). (0.5 cr. [max 1 cr.]; A-F only; Every Fall & Spring)
Summer internship opportunities at the university centers, companies, state, and federal agencies.

ST 8510. Psychology/Behavior Intelligence for Homeland Security. (2 cr.; A-F only; Every Summer)
Political, psychological, sociological, and economic foundations and dynamics of both terrorism and homeland security. Contemporary debates over terrorism, counterterrorism, and homeland security. Students develop their own (informed) perspectives.

ST 8511. Public Policy. (1 cr.; A-F only; Every Fall)
Key policies in the U.S. addressing safety and security of citizens, institutions, and systems. Complex network of actors/organizations involved in S&T and security-related areas and their multiple objectives and values. Legislative, policy, and organizational issues facing U.S. intelligence, business, academic, and S&T communities. Students reflect on how these issues relate to their own professional roles/experiences, as well as stakeholder communities with which they work. Consider a specific piece of security-related legislation/analyze associated policy problems and how they relate to security risks. Historical and contemporary examples used to illustrate related public policy questions.

ST 8512. Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics. (2 cr.; A-F only; Every Spring)
An exploration of challenges to American civil liberties and national security in times of terrorism. prereq: MSST grad student

ST 8513. Cyber Threat Intelligence. (2 cr.; A-F only; Every Spring)
The educational objective of this course is to provide students the foundational theory and applied skill in cyber threat intelligence analysis. This includes all phases of the intelligence life cycle: requirements development, collection, analysis methods, and reports and briefings for organizational leaders to influence risk-based cyber security decisions. The class counts as an elective for the MSST major and is also open to other graduate students after consultation with the director of graduate studies and a background check.

ST 8620. Capstone. (0.5-2 cr.; A-F only; Every Spring & Summer)
The Capstone project is an independent, original, and applied investigation on a relevant subject, problem, or issue in the area of security technologies and homeland security. prereq: MSST grad program student

ST 8660. Independent Study. (1-4 cr.; A-F only; Every Fall, Spring & Summer)
Focused study in security science, technology, business, policy or law, with a deliverable project report/presentation.

ST 8661. Securing Cyberspace (Fundamentals). (3 cr.; A-F only; Every Fall)
The course is a two-course sequence which provides a comprehensive technical and logical foundation for defending an organization against cyber security threats. ST 8661 will be offered every fall and ST 8662 every spring.

ST 8662. Securing Cyberspace - Advanced. (0-3 cr.; A-F only; Every Spring)
The course is a two-course sequence which provides a comprehensive technical and logical foundation for defending an organization against cyber security threats. The class is open to other grad students & upper undergrads after an interview with the director of graduate studies.

Social Work (SW)

SW 20. Community Engagement. (0 cr.; No Grade Associated; Every Fall, Spring & Summer)
Students volunteer in clinic/agency predetermined by the School of Social Work. Registration for course is officially documented on transcript. prereq: MSW student, academic faculty adviser consent

SW 1001. Introduction to the World of Social Work: A Global Perspective. (3 cr.; Student Option; Every Spring)

SW 1501. Introduction to Peace Studies. (3 cr.; A-F only; Every Fall & Spring)
Interdisciplinary field that considers questions such as how human conflicts can be resolved in ways that promote justice/peace. Definitions, conditions, and causes of violence, nonviolence, war, and peace between nations, groups, or individuals.

SW 1905. Freshman Seminar. (1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)
Interdisciplinary seminar. Topics specified in Class Schedule.

SW 2501W. Introduction to Social Justice. (WI,DSJ; 4 cr.; A-F only; Every Fall & Spring)
Meanings of social justice. Ways in which social justice advocates work for social change. Criminal justice, globalization, and social welfare. Students do service learning in a social justice organization.

SW 3501. Theories and Practices of Social Change Organizing. (4 cr.; A-F only; Every Fall & Spring)

SW 3702. Introduction to Adult Intimate Partner Violence: Intervention and Prevention. (3 cr.; Student Option; Every Fall & Spring) Theories, research, intervention, and prevention strategies regarding violence against women and the abuse of vulnerable adults in the United States. Issues of gender, race, culture, age, physical ability, SES, and sexual orientation. Includes service learning.

SW 3703. Gender Violence in Global Perspective. (3 cr.; Student Option; Every Fall & Spring) Theories/research on violence in intimate domestic relationships examined through multiple lenses. Overview of interventions in Minnesota, United States, and other societies.

SW 4501. Senior Seminar in Social Justice. (4 cr.; A-F only; Every Spring) Capstone course. Students complete a social justice portfolio, do service learning in a social justice organization. prereq: 2501, 3501

SW 4693. Directed Studies. (1-10 cr.; Student Option; Every Fall, Spring & Summer) Guided individual reading or study related to social issues, social work methods, or social work history. prereq: instr consent

SW 4694. Directed Research. (1-10 cr.; Student Option; Every Fall, Spring & Summer) Guided research related to social issues, social work methods, or social work history. prereq: instr consent

SW 5051. Human Behavior and the Social Environment. (2-3 cr.; A-F or Audit; Every Fall & Spring) Social, psychological, biological, and cultural factors of individual and group development as applied to social work practice. Behavior and life-cycle development focusing on diversity and each stage of life. Discuss development in terms of the individual, and in terms of overlapping social systems such as the multigenerational family, culture, community, and society. prereq: Grad student or 8 cr social sciences or instr consent

SW 5101. Historical Origins and Contemporary Policies and Programs in Social Welfare. (3-4 cr.; A-F or Audit; Every Fall & Spring) Contemporary policies and programs in social welfare are examined in light of their historical origins and evolution. A framework is then developed for analysis of concepts and principles in contemporary social policy for social welfare programs and services. The emergence of the profession of social work also examined. prereq: Grad or 8 sem cr of social sciences

SW 5562. Global Social Work and Social Development. (3 cr.; Student Option; Every Fall) Theories/strategies of social work and social development in industrial/developing countries. Applying international perspective and comparative framework to analyze basic human needs, social problems, and social work and social development strategies in different countries.

SW 5810. Seminar: Special Topics. (1-4 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Topics specified in Class Schedule.

SW 5903. Substance Abuse and Social Work. (2 cr.; Student Option; Every Spring) Students gain skills in eliminating the detrimental impact of substance use disorders at multiple levels (families, groups, organizations, and communities) through an ability to identify, assess, intervene, and evaluate those struggling with substance abuse and dependency throughout the life span. prereq: Grad student or dept consent

SW 5904. Facilitation & Conflict Mgmt: Humanistic Approach. (2 cr.; Student Option; Every Fall, Spring & Summer) Humanistic approach to facilitating meetings in small human service organizations and units within large bureaucratic structures. Managing conflict among individuals, groups, and communities in multiple settings.

SW 5905. Permanency in Child Welfare. (2 cr.; Student Option; Every Spring) Depth/breadth in knowledge/skill acquisition in achieving permanency for children receiving services within public, tribal, and private child welfare systems. Out-of-home/permanency placements, specific permanency interventions, and child/family responses to different permanency options. prereq: Grad student or dept consent

SW 5906. Advanced Ethical Decision Making. (1 cr.; Student Option; Every Spring) Identify ethical issues, resolve ethical dilemmas, make ethical decisions when confronted with conflicting duties/choices that occur within the context of professional social work at all levels of practice. prereq: Grad student or dept consent

SW 5907. School Social Work. (1 cr.; Student Option; Every Fall, Spring & Summer) Apply social work knowledge/skills in school settings through prevention, assessment, intervention, and evaluation from an ecological multilevel approach focused on students, families, and the school community. prereq: Grad student or dept consent

SW 5908. Technology and Communication in Social Work. (1 cr.; Student Option; Every Spring) Online course explores the influence of technology in social work practice/society.

SW 5909. Social Work With Involuntary Clients. (2 cr.; Student Option; Every Fall, Spring & Summer) Includes theory, ethics, effectiveness, and intervention methods for work with client systems that experience involuntary contact with a social worker. Interventions at micro, mezzo, and macro levels are included. Practice in varied settings such as child welfare, mental health, corrections, and public schools as well as practice related to organizational responses to change. prereq: Grad or non-degree seeking student or instr consent

SW 5912. Grief & Loss in Social Work Practice. (1 cr.; Student Option; Every Fall, Spring & Summer) Review current concepts of grief/loss. Historical/modern views, symptoms of grief, implications of diverse losses, including expected, sudden, or traumtic losses, ambiguous grief.


SW 5911. Independent Study in Social Work. (1-4 cr.; Student Option; Every Fall, Spring & Summer) Independent study in areas of special interest to students and faculty.

SW 8010. Seminar: Field Practicum I. (1-8 cr.; S-N or Audit; Every Fall, Spring & Summer) Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups focus on student-and facilitator-identified issues. Students discuss professional/personal biases, ethical dilemmas, and supervisory issues. Cross-cultural understanding, implications of cross-cultural practice. prereq: 8201

SW 8020. Field Practicum II. (1-6 cr.; S-N or Audit; Every Fall, Spring & Summer) Integrates classroom learning within a concentration with the direct experience of an internship. Students expand competency in cross-cultural practice. prereq: 8010

SW 8030. Advanced Standing Social Work Practicum. (1-8 cr.; S-N or Audit; Every Fall, Spring & Summer) Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups discuss issues raised in field placement. Groups focus on professional/personal biases, ethical dilemmas, supervisory issues, cross-cultural sharing, and implications of students' privilege/power in relation to client systems. prereq: Adv standing
SW 8041. Specialized Field Placement. (1-4 cr.; S-N only; Every Fall, Spring & Summer)
Field placement added to required foundation/concentration field placements (or to concentration placement for advanced standing students). prereq: [8020 or 8030], instr consent

SW 8051. Psychopathology and Social Work Practice. (3 cr.; A-F only; Every Fall & Summer)
Psychopathology from an eco-systemic perspective. Biopsychosocial influences on incidence, course, treatment of common mental disorders diagnosed from infancy through adulthood. Differential effects on populations at risk. Diagnostic skills, alternative intervention strategies, social work roles. prereq: All foundation courses for full program or advanced standing or instr consent

SW 8052. Resilience and Risk. (3 cr.; A-F only; Every Fall)
Applying theories of human development to issues confronting children, families, and social workers. Identifying strengths-based resources within ecologies of families. Mobilizing resources to empower clients to cope with, adapt to, and overcome adversities. prereq: [Foundation coursework, adv standing] or instr consent

SW 8105. Economic Security of Disadvantaged Populations. (3 cr.; A-F only; Every Spring)
Impact of social policy and macro economic trends on economic security of disadvantaged populations. Focuses on antipoverty/welfare programs in the United States, although international perspective is used as well. prereq: [8211, advanced standing] or instr consent

SW 8150. Special Topics in Social Policy. (1-9 cr.; Student Option)

SW 8151. Social Work Methods: Practice With Individuals and Systems. (2 cr.; A-F or Audit; Every Fall)
Develops foundation knowledge and skills for social workers to work with individuals and systems. prereq: MSW student or instr consent

SW 8152. Social Work Practice Methods: Families and Groups. (2 cr.; A-F or Audit; Every Fall)
Develops foundation knowledge and skills in relationship building, engagement, interviewing, and assessment with families and groups using the ecological-systems theoretical framework and resiliency-based approach. prereq: MSW student or instr consent

SW 8153. Models of Community Intervention. (1 cr.; A-F or Audit; Every Fall & Spring)
Models of community intervention as integral to social work professional's role in community/practice. Multi-modes of community intervention. How they are practiced at neighborhood, community, and legislative levels. prereq: MSW student or instr consent

SW 8154. Organizations and Policy Advocacy. (1 cr.; A-F or Audit; Every Spring)
Community practice as it relates to human service agencies and organizations. Builds upon theoretical approaches to human service organizations/agencies and their distinct attributes. Key practice knowledge, skills, and values that promote, develop, and maintain human service organizations that effectively meet community/client needs. prereq: MSW student or instr consent

SW 8211. Macro Social Work Practice and Policy Advocacy. (3 cr.; A-F or Audit; Every Spring)
Policy analysis, development, implementation, community development, social action, social planning. Ecological, problem-solving, empowerment perspectives, policy/methods. Theories of organizational/community development/change. prereq: 5101 or instr consent

SW 8251. Social Work Practice in Health, Disabilities, and Aging. (3 cr.; A-F or Audit; Every Fall)
Social work practice in health/disabilities/ageing. History in social work, practice contexts/settings, service delivery systems. Practice/population overlaps, distinctions, co-operations. prereq: [5051, 5101, 8151, 8152, 8153, 8154] or MSW Adv Standing or instr consent

SW 8252. Advanced Interventions and Issues in Health, Disabilities, and Aging (HDA). (3 cr.; A-F or Audit; Every Fall)
Advanced assessment/intervention. Critical issues/current developments related to health, disabilities, aging. Individual, family, organizational, community social work. prereq: [8251 or concurrent registration is required (or allowed) in 8251], [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8261. Advanced Social Work Practice in Health Care. (3 cr.; A-F only; Every Fall, Spring & Summer)
Advanced social work practice in health care. Theoretical models/evidence-based interventions. Psychosocial assessment, treatment interventions, interdisciplinary teamwork, ethics, leadership. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8262. Empowerment Practice With Persons With Disabilities. (3 cr.; A-F or Audit; Every Fall)
Models of disability, types of disability, common social work practices. Knowledge/skills for use across lifespan/cultures/various settings. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8263. Advanced Direct Practice and Community-Based Interventions in Gerontology. (3 cr.; A-F or Audit; Every Spring)
Direct/community-based social work intervention with older adults in individual, family, group, residential, community settings. Geriatric assessment/therapy modalities. Evidence-based interventions/approaches. prereq: [SW 8251 or concurrent registration is required (or allowed) in 8251], [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8312. Advanced Social Work Practice With Groups. (3 cr.; Student Option; Periodic Fall)
Advanced clinical social work practice with groups. How to differentiate among available models of group work and select an appropriate model based on needs of client population and on context in which they are served. prereq: [8201, 8202, adv standing] or instr consent

SW 8313. Professional Practice in Interdisciplinary Teams and Collaboratives. (3 cr.; Student Option; Every Fall & Spring)
Principles of interdisciplinary/interorganizational collaboration in human services, health, and educational settings. Team building, decision-making models, engaging value differences, managing conflict on team, role/status disparities, relational communications. Emerging approaches to interorganizational collaboration. prereq: [Foundation curriculum, [advanced standing or grad student in health and human service or in educational professional program]] or instr consent

SW 8315. Mood Disorders: New Directions in Clinical Care. (2 cr.; Student Option; Periodic Spring)
Depression. Current research from biochemical, genetic, familial, and sociocultural perspectives. Gender, racial, ethnic, class, and sexual preference issues concerning prevalence, assessment and treatment. prereq: [Foundation coursework, advanced standing] or instr consent

SW 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SW 8351. Advanced Practice I: Families and Children. (3 cr.; A-F or Audit; Every Fall & Spring)
Utilizing evidence-informed, culturally respectful assessments/engagement models with families/children. Factors internal/external to families. Work with families/children around broad scope of stressors. Resiliency. prereq: [5051, 5101, 8151, 8152, 8153, 8514] or MSW Adv Standing or instr consent

SW 8352. Advanced Practice with Families. (3 cr.; A-F or Audit; Every Fall & Spring)
Work with families/children in family-centered, community, preventive practice. Engagement, assessment, intervention, evaluation. prereq: [8351 or concurrent registration is required (or allowed) in 8351], [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8361. Identification and Assessment of Family Violence. (3 cr.; A-F or Audit; Periodic Fall)
Identification/assessment of family violence. Contextual knowledge of behaviors of perpetrators, victims, survivors. Gender, race, culture, age, ability, SES, sexual orientation. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
SW 8362. Social Work Interventions With Families. (3 cr.; A-F or Audit; Every Fall) Theory/models of social work intervention with families. Theoretical constructs of traditional/emerging models of social work practice with families. Develop assessment/ intervention skills. prereq: [8451 or concurrent registration is required (or allowed) in 8451], [8351 or concurrent registration is required (or allowed) in 8351], [5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8363. Social Work in Child Welfare. (3 cr.; A-F or Audit; Every Spring) Public, private, tribal child welfare related to assessment of strengths/risks. Develop appropriate plans that secure child safety/well-being. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

SW 8451. Assessment and Engagement in Clinical Social Work Practice. (3 cr.; A-F or Audit; Every Fall & Summer) Mental health diagnostic codes/classifications. Interviewing skills, assessment writing skills/techniques. Biopsychosocial perspective/engagement strategies. prereq: [5051, 5101, 8151, 8152, 8153, 8154] or MSW Adv Standing or instr consent

SW 8452. Core Concepts in Clinical Social Work Practice. (3 cr.; A-F or Audit; Every Fall & Spring) Interpersonal process skills. Developing/maintaining effective therapeutic alliances/positive intervention outcomes with diverse populations. prereq: [8451 or concurrent registration is required (or allowed) in 8451], [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8461. Advanced Clinical Social Work Practice with Adults. (3 cr.; A-F or Audit; Every Fall) Research-informed clinical interventions for adults with mental health distress. Application of cognitive behavioral/psychoanalytic psychotherapies through brief/long-term models across diverse populations. prereq: [8451 or concurrent registration is required (or allowed) in 8451], [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8462. Advanced Clinical Practice With Children and Adolescents. (3 cr.; A-F or Audit; Every Fall) Social work interventions using normative developmental supports/mental health case planning. Develop advanced clinical social work practice knowledge/skills for working with children/adolescents with mental health risks. Provide knowledge for community social workers serving children exposed to stress. prereq: [8351 or concurrent registration is required (or allowed) in 8351] or [8451 or concurrent registration is required (or allowed) in 8451], [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8463. Social Work Practice With Severe and Persistent Mental Illness and Severe Emotional Disturbance. (3 cr.; A-F or Audit; Every Spring) Integrated social work approach to assessing/working with individuals with SPMI. SED. Trends/modalities/evidence-supported approaches. Recovery/wellness approaches. Macro systems that impact lives of individuals/families. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8501. Planning, Marketing, and Program Development. (3 cr.; A-F only; Every Fall) Principles, applied practice of management concepts in human service settings. Management theories, organizational planning, program development, marketing/communications. Management practice that is client/community-focused, results-oriented, and seeks to achieve positive social change. prereq: [Foundation curriculum, advanced standing] or instr consent

SW 8502. Resource Development and Management. (3 cr.; Student Option; Periodic Fall) Procuring/managing financial resources in social work settings. Principles of philanthropy. Fund raising, grant writing, preparing/monitoring budgets, interpreting basic financial reports. Management information systems, accountability requirements. prereq: [Foundation curriculum, advanced standing] or instr consent

SW 8503. Personnel Leadership and Management. (3 cr.; Student Option; Periodic Fall & Spring) Skills/principles in effective leadership. Legal/strategic considerations in personnel management. Workplace diversity. Selection, hiring, and development of paid/unpaid staff. Evaluation, compensation, and benefits. Promotions and staff termination. Management of work groups and collaboratives. prereq: [Foundation curriculum, advanced standing] or instr consent

SW 8505. Advanced Community Organization and Advocacy. (3 cr.; A-F only; Every Fall & Spring) Methods for stimulating/supporting joint action for constructive change to fulfill community needs. Principles of working with local organizations. Social action to accomplish specific changes. prereq: [Foundation curriculum, advanced standing] or instr consent

SW 8507. Community Practice Seminar. (1 cr.; Student Option; Every Spring) Links content from human services management and from community organization and advocacy. Integrating framework that draws upon knowledge/skills used in agency/organizational management and in community organization/change. prereq: [Foundation curriculum, advanced standing] or instr consent

SW 8519. Mediation and Conflict Resolution for Social Workers. (3 cr.; Student Option; Periodic Spring) Advanced mediator skills for social workers; appropriateness of mediation for conflicts that frequently confront social work practitioners, such as divorce, neighborhood disputes, and conflicts between parents and adolescents, between spouses, and between crime victims and offenders. prereq: Credit will not be granted if credit has been received for: : 5519; MSW student or grad conflict mgmt minor or instr consent

SW 8525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr.; A-F only; Periodic Spring) Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and strategies of social welfare in different economic/political systems. Emphasizes Third World nations. Skills for social workers and other professionals in the helping professions. prereq: [8211, advanced standing] or instr consent

SW 8551. Advanced Community Practice: Assessment, Organizing, and Advocacy. (3 cr.; A-F or Audit; Every Fall) Community practice, including community organizing, policy advocacy, social service/change leadership. prereq: [5051, 5101, 8151, 8152, 8153, 8154] or MSW Adv Standing or instr consent

SW 8552. Advanced Community Practice: Leadership, Planning, and Program Development. (3 cr.; A-F or Audit; Every Fall) Advanced community practice knowledge/skills. Strategic planning, program design, organizational leadership/management, work groups. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8561. Human Resources Management in Human Services Agencies. (3 cr.; A-F or Audit; Every Fall) Processes/components of strategic human resources management in social services. Environmental scanning, job analysis, recruitment/selection, training/development, motivation, performance evaluation, compensation/benefits, termination. Human resources law. Promotion of inclusive workplace. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8562. Human Services Finances. (2 cr.; Student Option; Every Spring) Contexts, purposes, principles, strategies associated with human services financing. Acquiring, allocating, managing, reporting public/private funding. Financial policy, mission. Short/long term agency sustainability. prereq: [5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8563. Advanced Policy Advocacy. (3 cr.; A-F or Audit; Every Fall) Students paired with social service, social policy, social justice agencies, coalitions. Agenda setting, legislative research, legislative advocacy in relation to specific legislation proposed in Minnesota state legislature. Tie policy theory to real-world practice. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent
SW 8602. Direct Practice Evaluation. (2 cr; A-F only; Every Fall & Spring) Students design evaluations that incorporate current evaluation methods and principles derived from research, theory, practice wisdom, their own experience. Evaluation methods include single-system designs, client-focused evaluations, practitioner-focused evaluations, and use of event analyses, standardized instruments, self-constructed instruments. prereq: 8601 or equiv or instr consent

SW 8603. Program Evaluation. (2 cr; A-F only; Every Fall) Conceptual, methodological, political, psychological, and administrative factors related to conduct and consequences of social work program evaluation. Social programs as cause and effect; models, types, and strategies of evaluation; appraisal of selected research literature. prereq: 8601 or equiv or instr consent

SW 8666. Doctoral Pre-Thesis Credits. (1-6 cr; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations; up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SW 8693. Directed Study. (1-6 cr; Student Option; Every Fall, Spring & Summer) Independent study under tutorial guidance. prereq: instr consent

SW 8694. Directed Research. (1-6 cr; Student Option; Every Fall, Spring & Summer) Individual or small group research inquiry translating introductory course content into research design and study. Projects may be conducted in conjunction with field learning experiences or other coursework. prereq: instr consent

SW 8801. Social Work Ethics and Legal Issues. (3 cr; Student Option; Periodic Fall & Spring) Develops knowledge base and skills required to identify and understand legal and ethical issues, resolve ethical dilemmas, and make ethical decisions within social work. Values base, ethical standards, ethical decision-making models, and laws and legal procedures related to social work. Legal aspects of child welfare practice. prereq: Credit will not be granted if credit has been received for: 5811; foundation courses or adv standing or instr consent

SW 8804. Child Welfare Policy. (3 cr; A-F or Audit; Every Spring) Develops advanced policy knowledge/skills for social workers practicing in or collaborating with public or private child welfare services. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8805. Aging and Disability Policy. (3 cr; A-F or Audit; Every Spring) Social policy related to disability/aging. Major policy areas of income support, health, education, caregiving, employment, housing, retirement. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8806. Health and Mental Health Policy. (3 cr; A-F or Audit; Every Spring) Critically engage in health/mental health policy debate, analysis, development, implementation. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8807. International and Comparative Social Welfare Policy. (3 cr; A-F or Audit; Every Spring) Cross-national comparisons of social welfare policies, major international conventions, treaties. Social welfare, social development theories/policies. In-depth analyses of selected countries’ policies, international agreements, social development strategies. prereq: [5051, 5101, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8821. Social Work and Difference, Diversity and Privilege. (2 cr; A-F only; Every Fall & Summer) Essential knowledge/awareness/skills to support culturally competent social work practice. prereq: [5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8841. Social Work Research Methods. (2 cr; A-F or Audit; Every Fall & Spring) Develops foundational research methods knowledge/skills fundamental to evidence-based social work practice. prereq: MSW student or instr consent

SW 8842. Advanced Social Work Evaluation. (1-3 cr; max 6 cr; A-F or Audit; Every Fall, Spring & Summer) Students design/carry out evaluation of program or own direct practice. Purposes/types of evaluations. Instrument design, data analysis, ethical issues. Organizational, political, social, cultural factors affecting evaluation in diverse human contexts. prereq: concurrent registration is required (or allowed) in 8200 or 8030, [5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or instr consent

SW 8851. Social Welfare History and Historical Research Methods. (3 cr; A-F only; Periodic Spring) Methods of historical research in, and survey of, history/evolution of social welfare/work, using primary/secondary source materials. prereq: Completed research courses for soc work PhD student or [equiv research methods courses, grad student]

SW 8855. Social Policy Formulation and Analysis. (3 cr; A-F only; Periodic Fall) Application of theoretical perspectives, conceptual frameworks, and research methodologies to analysis of social issues and analysis/formulation of social welfare policy. prereq: Soc wk PhD student or instr consent

SW 8861. Theory and Model Development in Social Work. (3 cr; A-F only; Periodic Fall) Intervention research methods, contemporary social work practice models. Direct intervention in systems, from individual to community. Theoretical, value, empirical foundations of practice models for intervention research. prereq: Soc wk PhD student or instr consent

SW 8863. Social Work Teaching Methods and Educational Issues. (3 cr; A-F only; Periodic Fall) Teaching methods, skills, strategies, and issues related to Teaching, scholarship, and service roles in social work education. Issues, including curriculum development. Teaching experience in a social work class. prereq: Soc wk PhD student or 2nd-yr MSW student or instr consent

SW 8871. Social Work Research Seminar I. (3 cr; A-F only; Every Fall) Concepts/methods of social research. Issues in social science, social work research, and knowledge development. Development of research questions. Sampling, measurement, data collection in qualitative/quantitative research. prereq: Soc wk PhD student or instr consent

SW 8872. Social Work Research Seminar II. (3 cr; A-F only; Every Spring) Methods/design of quasi-experiments, surveys, descriptive research. Grounded theory. Analysis of quantitative/qualitative data. prereq: 8871 or instr consent

SW 8875. Research Practicum. (2 cr; max 6 cr; S-N or Audit; Every Fall & Spring) Experience in conduct of research, following completion of 8871 and 8872. Students work under faculty direction. prereq: Soc wk PhD student or instr consent

SW 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

SW 8901. Assessment and Treatment of Trauma. (2 cr; Student Option; Every Spring) Sociopolitical context of trauma. Impact on diverse populations of individuals, families, communities. Evidence-based approaches for addressing trauma on multiple system levels. Applications to case conceptualization, treatment planning. prereq: Advanced Standing or students who have completed entire foundation curriculum including SW 8010 or instr consent

SW 8902. Social Work Supervision, Consultation, and Leadership. (2 cr; Student Option; Periodic Fall & Spring) Sociopolitical context of trauma/its impact on diverse populations of individuals, families, communities. Evidence-based approaches for addressing trauma on multiple system levels. Through applications to case conceptualization/treatment planning. prereq: Advanced Standing or students who have completed the entire foundation curriculum including SW 8010 or instr consent

Social, Adm, and Clinical Phar (SACP)
SAP 8333. FTE: Master’s. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Master’s student, [adviser, DGS] consent

SAP 8444. FTE: Doctoral. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student, [adviser, DGS] consent

SAP 8666. Doctoral Pre-Thesis Credits. (1-6 cr. ; max 12 cr.) ; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SAP 8777. Thesis Credits: Master’s. (1-18 cr. ; max 50 cr.) ; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Plan A

SAP 8888. Thesis Credits: Doctoral. (1-24 cr. ; max 100 cr.) ; No Grade Associated; Every Fall, Spring & Summer) tbd

Social/Administrative Pharmacy (SAPH)

SAP 5100. Pro-Seminar. (1 cr. ; A-F or Audit; Every Fall) History, foundational frameworks, and key research domains for social and administrative pharmacy through examining landmark literature. Students think critically, reflect on important works, and create a cognitive map of the discipline and their own focus for study.

SAP 5610. Pharmacoepidemiology. (3 cr.; A-F only; Fall Odd Year) Application of epidemiologic principles to study/ use. Beneficial/adverse outcomes of drugs in human populations.

SAP 8054. Advanced Studies in Pharmaceutical Care Practice. (3 cr. ; A-F or Audit; Every Fall & Spring) Analyzing practice/implementation of pharmaceutical care. Students confront their assumptions about pharmacy profession, pharmacy practice, and pharmaceutical care. Discussions, guest speakers, intensive literature searches/evaluation.

SAP 8100. Seminar. (1 cr. ; max 8 cr.) ; A-F only; Every Fall & Spring) Contemporary issues and research problems in sociobehavioral pharmacy, pharmacoconomics and policy, and clinical research, prereq: Grad SAPH major or instr consent

SAP 8173. Principles and Methods of Implementing Research. (3 cr.; Student Option; Every Fall) Integrates scientific, statistical, and practical aspects of research. Interrelationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences. prereq: Two grad stat courses

SAP 8200. Research Problems. (1-8 cr. ; max 16 cr.) ; Student Option; Every Fall, Spring & Summer) Individually designed research experience directed at contemporary problems related to drug use process. prereq: Grad SAPh major or instr consent

SAP 8235. Pharmaceutical Economics and Policy. (3 cr. ; A-F or Audit; Every Fall) Economic analysis of pharmaceutical sector of health care systems. Problems of pricing production and distribution of pharmaceuticals. Domestic or international policy issues relevant to price and access of pharmaceuticals. prereq: Grad SAPh major or instr consent

SAP 8255. Pharmaceutical Marketing. (3 cr.; A-F or Audit; Periodic Fall & Spring) Historical development of distributive systems, marketing channels, institutions, policies, and practices as they relate to pharmaceutical industry. Contemporary issues/theory related to pharmaceutical marketing. Pharmaceutical proportion, especially directed to consumer advertising. prereq: Grad SAPC major or instr consent

SAP 8270. Clinical Conferences. (2 cr.; Student Option; Every Fall) N/A prereq: Grad SAPh major or instr consent

SAP 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) No description prereq: Master’s student, adviser and DGS consent

SAP 8420. Social and Behavioral Aspects of Pharmacy Practice. (3 cr.; A-F or Audit; Every Spring) Historical development of the profession, its growth and development, emphasizing forces of education, professionalization, attitude modification, and changes occurring as a product of legal and organizational forces in society. prereq: Grad SAPC major or instr consent

SAP 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) No description prereq: Doctoral student, adviser and DGS consent

SAP 8500. Pharmacy and Its Environment. (3 cr.; A-F or Audit; Every Spring) Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to other health practitioners. Identification of factors (health policy, regulation, economics, research and development, promotion) that affect individual responses to drug therapy. prereq: Grad SAPh major or instr consent

SAP 8666. Doctoral Pre-Thesis Credits. (1-6 cr. ; max 12 cr.) ; No Grade Associated; Every Fall, Spring & Summer) Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SAP 8700. Hospital Pharmacy Administration. (3 cr.; A-F or Audit; Periodic Fall) History, classification, organization, and functions of hospital departments in relation to the pharmacy service. prereq: Grad SAPh major or instr consent

SAP 8702. Hospital Pharmacy Survey. (1 cr.; max 3 cr.) ; Student Option; Periodic Fall) Readings for self-directed students to explore contemporary issues in hospital pharmacy practices. prereq: Grad SAPh major or instr consent

SAP 8777. Thesis Credits: Master’s. (1-18 cr. ; max 50 cr.) ; No Grade Associated; Every Fall, Spring & Summer) No description prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SAP 8810. Social Psychology of Health Care. (3 cr.; Student Option; Periodic Spring) Behavioral and social aspects of recovery responses to drugs and other therapies, patients’ compliance with prescribed therapies, relationships between healthcare professional and patient. prereq: Grad SAPh major or instr consent

SAP 8840. Social Measurement. (3 cr.; A-F or Audit; Periodic Fall & Spring) How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data. prereq: Intro stat course, understanding of simple correlations or instr consent

SAP 8888. Thesis Credit: Doctoral. (1-24 cr. ; max 100 cr.) ; No Grade Associated; Every Fall, Spring & Summer) No description prereq: Max 18 cr per semester or summer; 24 cr required

Sociology (SOC)

SOC 1001. Introduction to Sociology. (DSJ.SOCs; 4 cr.; Student Option; Every Fall, Spring & Summer) This course is designed to introduce you to the study of society and what sociologists call the “sociological imagination:” a way of viewing the events, relationships and social phenomena that shape our individual lives and much of our collective experience. Through the course we will examine some of the central concepts and problems that have preoccupied both classical and contemporary sociologists and gain a sense of how the sociological imagination can illuminate the social forces that have a concrete impact on our everyday lives. Throughout the course you will be asked to consider the ways in which society affects your life, and how you,
in turn, affect society. prereq: Soc Majors/
Minors must register A-F

SOC 1011V. Honors: Introduction to Sociology. (DSJ,WI,SOCS; 4 cr.; A-F only; Every Fall & Spring)
This course is designed to introduce you to the study of society and what sociologists call the "sociological imagination:" a way of viewing the events, relationships, and social phenomena that shape our individual lives and much of our collective experience. Through the course we will examine some of the central concepts and problems that have preoccupied both classical and contemporary sociologists and gain a sense of how the sociological imagination can illuminate the social forces that have a concrete impact on our everyday lives. Throughout the course you will be asked to consider the ways in which society affects your life and how you, in turn, affect society.

SOC 1101. Law, Crime, & Punishment. (3 cr.; A-F or Audit; Every Spring)
Introductory course designed to provide students with a general understanding of the main theoretical perspectives and empirical findings that dominate socio-legal studies and contemporary criminology. We examine the connections and relationships between law, crime, and punishment using an interdisciplinary social science approach.

SOC 1905. Freshman Seminar. (3 cr.; A-F only; Periodic Fall)
Topics specified in Class Schedule.

SOC 3003. Social Problems. (3 cr.; A-F or Audit; Periodic Fall)
Analysis of major social problems, including inequality, crime, drug abuse, pollution, and racism. Proposed solutions, evaluation of policy consequences. prereq: 1001 recommended; soc majors/minors must register A-F

SOC 3090. Topics in Sociology. (3 cr. [max 6 cr.]; Student Option; Periodic Spring)
Topics specified in class schedule. prereq: 1001 recommended; soc majors/minors must register A-F; cr will not be granted if cr has been received for the same topics title

SOC 3093. Directed Study. (1-4 cr.; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study at sophomore level. Prereq 1001, instr consent, dept consent, college consent; soc majors/minors must register A-F.

SOC 3094. Directed Research. (1-4 cr.; Student Option; Every Fall & Spring)
Guided research experience at sophomore level. prereq: 1001, instr consent; soc majors/minors must register A-F.

SOC 3101. Sociological Perspectives on the Criminal Justice System. (CIV; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
This course introduces students to a sociological account of the U.S. criminal justice system. We will critically examine the components, dynamics, and effects of policing, criminal courts, community supervision, jails, and prisons. Throughout the course, we focus on sociological understandings of these processes, with particular attention to ethnic, racial, class, and gender inequalities as well as long-term problems associated with the high rate of criminal justice supervision in the U.S.

SOC 3101H. Honors: Sociological Perspectives on the Criminal Justice System. (CIV; 3 cr.; A-F only; Every Fall, Spring & Summer)
This course introduces students to a sociological account of the U.S criminal justice system. We will critically examine the components, dynamics, and effects of policing, criminal courts, community supervision, jails, and prisons. Throughout the course, we focus on sociological understandings of these processes, with particular attention to ethnic, racial, class, and gender inequalities as well as long-term problems associated with the high rate of criminal justice supervision in the U.S. Honors students are expected to demonstrate greater depth of discussion, depth and to a degree length of writing assignments, presentations, and leadership of the students.

SOC 3102. Criminal Behavior and Social Control. (3 cr.; Student Option; Every Fall & Spring)
This course will address the social and legal origins of crime and crime control with a focus on general theories of deviance/crime and present an overview of forms of social control. We will critically examine criminological, sociological and legal theories that explain the causes of crime and other misdeeds. prereq: Soc majors/minors must register A-F

SOC 3201. Inequality: Introduction to Stratification. (3 cr.; Student Option; Periodic Fall)
Why does inequality exist? How does it work? These are the essential questions examined in this class. Topics range from welfare and poverty to the role of race and gender in getting ahead. We will pay particular attention to social inequalities ? why some people live longer and happier lives while others are burdened by worry, poverty, and ill health. prereq: soc majors/minors must register A-F

SOC 3211W. American Race Relations. (DSJ,WI; 3 cr.; A-F or Audit; Every Fall & Spring)
This course is designed to provide students with an understanding of the contours of race in the post-civil rights era United States. This course will focus on race relations in today's society with a historical overview of the experiences of various racial and ethnic groups in order to help explain their present-day social status. The class will also consider the future of race relations in the U.S. and evaluate remedies to racial inequality.

SOC 3221. Sociology of Gender. (3 cr.; A-F or Audit; Every Fall)
Organization, culture, and dynamics of gender relations as major features of social life. Gender/racial inequalities in workplace. Relationships between gender/race. Gender and culture. Sexuality, gendered politics, and women's movement. prereq: 1001 recommended; soc majors/minors must register A-F

SOC 3251W. Sociological Perspectives on Race, Class, and Gender. (DSJ,WI,SOCS; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Race, class, and gender as aspects of social identity and as features of social organization. Experiences of women of color in the United States. Family life, work, violence, sexuality/ reproduction. Possibilities for social change. prereq: Soc majors/minors must register A-F

SOC 3301W. Politics and Society. (WI; 3 cr.; A-F or Audit; Periodic Spring)
Political sociology is concerned with the social bases of power and the social consequences of the organization of power, especially how power operates in relationship to various forms of inequality and different institutions. We will explore political socialization, electoral politics and voting, social movements, the media and framing, and politics of inequality, poverty, and welfare. prereq: 1001 recommended; soc majors/minors must register A-F

SOC 3309. Atheists & Others: Religious Outsiders in the United States. (DSJ; 3 cr.; A-F only; Periodic Spring)
What does it mean to be an atheist in the United States today? Atheists comprise a small percentage of the American population, but one with an increasingly visible presence in popular culture, political discourse, and everyday life. How do atheists organize into groups oriented toward identity-formation, social connection, and political action? prereq: 1001 recommended

SOC 3311W. Hard Times & Bad Behavior: Homelessness & Marginality in the United States. (WI; 3 cr.; Student Option; Spring Even Year)
Themes of marginality in U.S. Rootlessness produced by labor market, love-hate relationship between elites/marginal populations, complex mixture of freedom/deprivation of people on edge.

SOC 3322W. Social Movements, Protests, and Change. (CIV,WI; 3 cr.; Student Option; Spring Odd Year)
Origins, dynamics, and consequences of social movements. Challenges facing movement organizations. Relationship between movements and political institutions. Role of movements in bringing about social change. Theoretical issues, case studies. prereq: 1001 or instr consent; soc majors/minors must register A-F

SOC 3411W. Organizations and Society. (WI; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Formal organizations as major social influences in work lives, personality development, social change, and conflict. Life-course analysis of enterprises, bureaucracies, and voluntary organizations. Organizational control, conflict, coordination, and inter-organizational sets/ relationships. prereq: 1001 recommended; soc majors/minors must register A-F

SOC 3412. Social Networking: Theories and Methods. (TS; 3 cr.; A-F only; Spring Even Year)
Network analysis spans a diverse range of phenomena from ego-centric ties, to small work-team sociograms, to organizational
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

SOC 3412H. Honors: Social Networking: Theories and Methods. (TS; 3 cr.; A-F only; Spring Even Year)
Network analysis spans a diverse range of phenomena from ego-centric ties, to small work-team sociograms, to organizational relations, to trade and military alliances among nation states. This course introduces undergraduate students to theories and methods for studying social networks, the ties connecting people, groups, and organizations. Topics include friendship, communication, small group, health, sexual and romantic, corporate, social movement, public policy, innovation diffusion, criminal and terrorist, and Internet networks. Honors students are expected to demonstrate greater depth of discussion, depth and to a degree length of writing assignments, presentations, and leadership of the students.

SOC 3415. Consume This! The Sociology and Politics of Consumption. (3 cr.; A-F or Audit; Periodic Fall)
How symbols are created, acquired, diffused, and used for organizing personal identity and maintaining group boundaries. Fashion. Socialization. Structure of retail trade. Role of mass media, advertising, marketing/production strategies. Implications of worldwide markets. Prereq: 1001 recommended; soc majors/minors must register A-F

SOC 3417W. Global Institutions of Power: World Bank, International Monetary Fund, and World Trade Organization. (GP, WI; 3 cr.; A-F only; Every Fall)

SOC 3421W. Sociology of Work: Good Jobs, Bad Jobs, No Jobs?. (WI; 3 cr.; A-F or Audit; Periodic Spring)
Work is central to individuals, economy, and society. This course introduces students to sociological perspectives and analyses of work. We will look at what makes a good job good, a bad job bad, and impacts of joblessness on society. Prereq: 1001 recommended, Soc majors/minors must register A-F

SOC 3451V. Honors: Cities & Social Change. (WI; 3 cr.; Student Option; Every Fall)

SOC 3451W. Cities & Social Change. (WI; 3 cr.; Student Option; Every Fall)

SOC 3452. Education and Society. (3 cr.; Student Option; Periodic Fall & Spring)
Everyone thinks they know what "education" is. We've all been in schools, and we think we know how they work. We all have opinions about why some people go farther in school than others and why some people learn more than others. We all think we know what role education plays in shaping who gets good jobs, who has a good life, and who has more knowledge. This course is designed to challenge and expand what we think we know about all of these things. Students (and instructor) will critically engage scientific research in sociology, education, economics, public policy, and elsewhere. The goal will be to educate everyone about the current state of knowledge about how "education" works: what shapes educational achievement; where sex and racial/ethnic and socioeconomic inequalities in educational achievements come from; what role education plays in economic development; how educational accomplishments result in better social and economic outcomes; and how educational institutions might be improved. Prereq: Soc majors/minors must register A-F

SOC 3501. Sociology of Families. (DSJ, SOCS; 3 cr.; Student Option; Fall Even, Spring Odd Year)
Families in contemporary American society. Historical/cross-cultural comparisons. Interrelationships of families with other social institutions. Race, class, and gender in shaping family experiences. Topics may include marriage, divorce, childbearing, parenthood, family violence, gay/lesbian families. Prereq: 1001 or instr consent; soc majors/minors must register A-F

SOC 3503. Asian American Identities, Families & Communities. (DSJ, SOCS; 3 cr.; Student Option; Every Spring)
Overview of Asian American identities, families/communities. Racial/ethnic identity formation, immigration, intergenerational relationships, dating/family formation, transnational adoption, popular culture, educational/work experiences, ethnic enclaves/activism. Prereq: 1001 recommended

SOC 3505. Transnational Migration: Networks of Power and Places. (GP; 3 cr.; A-F or Audit; Fall Even Year)
How migration affects sending/receiving societies. How transnationalism or cross-border social/economic relations of individuals/households is maintained/perpetuated. Current debates on transnationalism at this stage of globalization. Prereq: Soph, jr, or sr

SOC 3511. World Population Problems. (GP; 3 cr.; A-F only; Every Fall)
Population growth, natural resources, fertility/mortality in less developed nations, population dynamics/forecasts, policies to reduce fertility. Prereq: Soc majors/minors must register A-F, credit will not be granted if credit has been received for 3511H

SOC 3511H. Honors: World Population Problems. (GP; 3 cr.; A-F only; Every Fall)
Population growth, natural resources, fertility/mortality in less developed nations, population dynamics/forecasts, policies to reduce fertility. Prereq: Credit will not be granted if credit has been received for 3511

SOC 3613V. Honors: Stuffed and Starved: The Politics of Eating. (GP, WI, SOCS; 3 cr.; A-F only; Every Fall)
Food issues from sociological perspective. Cross-cultural differences in how groups/societies think about/relate to food.

SOC 3613W. Stuffed and Starved: The Politics of Eating. (GP, WI, SOCS; 3 cr.; A-F only; Every Fall)
Food issues from a sociological perspective. Cross-cultural differences in how groups/societies think about and relate to food. Prereq: Soc majors/minors must register A-F

SOC 3671. Contemporary Chinese Society: Culture, Networks, & Inequality in China. (3 cr.; A-F or Audit; Periodic Fall)
Introduces students to sociological perspectives and analyses of cultures, social networks, and socioeconomic inequalities in post-1980 China. In addition to lectures, the instructor will show video clips about various backgrounds of China and group discussions will be organized to exchange opinions about issues of common interest. Students will gain a basic understanding of how Chinese society operates today. Prereq: 1001 recommended, soc majors/minors must register A-F

SOC 3681. Gender and the Family in the Islamic World. (3 cr.; A-F only; Periodic Spring)
Experiences of Muslim women/families from historical/comparative perspective. Gender/family power relations in colonial representations, sexual politics, family, education/health, paid work, human rights, and Islamic feminism. Prereq: At least soph; 1001 recommended

SOC 3701. Social Theory. (4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Traditions of social theory that have been basic to sociological knowledge. How they
SOC 4090. Topics in Sociology. (3 cr.; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule, prereq: Soph or above or instr consent; 1001 recommended; soc majors/minors must register A-F; cr will not be granted if cr has been received for Soc 5811 (Soc 5811 offered Fall terms only). Undergraduates with strong math background are encouraged to register for 5811 in lieu of 3811. Soc Majors/Minors must register A-F.

SOC 4090W. Directed Research: Senior Project. (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer) Guided research experience at junior/senior level. Prereq: soc majors/minors must register A-F.

SOC 4108. Current Issues in Crime Control. (3 cr.; Student Option; Periodic Spring & Summer) Selected current criminal justice policies from perspective of courts, legislature, community, and interest groups. Impact of criminal justice policy changes on society and on social control agencies. prereq: Soc majors/minors must register A-F.

SOC 4109. Domestic Criminal Violence. (3 cr.; Student Option; Periodic Fall & Spring) Survey of research on family violence within criminological framework. Definition of domestic violence. Empirical/theoretical approaches. Response of social control agencies. prereq: 3101 or 3102 or 3111 or instr consent; soc majors/minors must register A-F.

SOC 4111. Deviant Behavior. (3 cr.; A-F or Audit; Periodic Fall) Definition/nature of deviant behavior. Social processes associated with deviant careers and social reintegration. Relationship of deviant behavior to social control. prereq: 3101 or 3102 or 3111 or instr consent; soc majors/minors must register A-F.

SOC 4114. Women & the Criminal Justice System. (3 cr.; Student Option; Periodic Summer) Historical/current explanations for female criminality. Current trends in women's participation in crime, their treatment in the legal system. prereq: recommend 3101 or 3102 or instr consent; soc majors/minors must register A-F.

SOC 4125. Policing America. (3 cr.; A-F or Audit; Periodic Fall & Spring) Forms, dynamics, philosophical underpinnings of policing/surveillance agencies (formal/informal). Legal limitations, police culture, community relations, aims of policing, state power. prereq: [3101 or 3102 recommended or instr consent], soc majors/minors must register A-F.

SOC 4135. Sociology of White-Collar Crime. (3 cr.; Student Option; Periodic Spring) Causes/consequences of white-collar crime. Control issues, including public perception, legislation, criminal law responses (enforcement, sentencing, punishment), and alternative control mechanisms. prereq: 3101 or 3102 or instr consent; soc majors/minors must register A-F.

SOC 4135H. Honors: Sociology of White-Collar Crime. (3 cr.; A-F only; Periodic Spring) Causes/consequences of white-collar crime. Control issues, including public perception, legislation, criminal law responses (enforcement, sentencing, punishment), and alternative control mechanisms. prereq: 3101 or 3102 or instr consent; soc majors/minors must register A-F.

SOC 4141. Juvenile Delinquency. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Cultural values and practices in a globalized world. Role of international law. Immigration, terrorism, Americanization, and structure of international legal system. prereq: 1001 or 3101 or 3102 or instr consent; soc majors/minors must register A-F

SOC 4190. Topics in Sociology With Law, Criminology, and Deviance Emphasis. (.3 cr. ; [max 6 cr. ]; Student Option; Periodic Fall, Spring & Summer)
Topics specified in Class Schedule.

SOC 4246. Sociology of Health and Illness. (.3 cr. ; A-F or Audit; Periodic Spring)
Context of social, political, economic, and cultural forces and medical knowledge. Social meanings. How people seek help and manage illnesses. How doctors, nurses, and patients interact. Social movements surrounding health. prereq: One sociology course or instr consent; soc majors/minors must register A-F

SOC 4305. Environment & Society: An Enduring Conflict. (ENV; 3 cr. ; A-F or Audit; Every Fall)
Examines how natural/built environments influence human behavior/social organization. Focuses on microenvironments/their influence on individuals. Impact of macroenvironments on societal organization. Environmental movements. prereq: 1001 or environmental course recommended; [soc majors/minors must register A-F]

SOC 4390. Religion in American Public Life: Culture, Politics, & Communities. (CIV; 3 cr. ; Student Option; Every Spring)
How diversity/vitality of American religion shape public life. How religious groups engage in political action, foster understandings of democracy/styles of civic participation. Volunteering/service activities. Race, poverty, the family, sexuality. prereq: Soc majors/minors must register A-F

SOC 4390H. Honors: Religion in American Public Life - Culture, Politics, & Communities. (CIV; 3 cr.; A-F only; Every Spring)
How diversity/vitality of American religion shape public life. How religious groups engage in political action, foster understandings of democracy/styles of civic participation. Volunteering/service activities. Race, poverty, the family, sexuality. prereq: Honors Student, Soc majors/minors must register A-F

SOC 4311. Power, Justice & the Environment. (DSJ; 3 cr.; A-F only; Every Spring)
Global debates over how nature is produced, consumed, degraded, sustained, and defended. Analytics of race/class. Politics of North-South relations. prereq: SOC 1001 recommended

SOC 4315. Never Again! Memory & Politics after Genocide. (GP; 3 cr.; A-F or Audit; Spring Odd Year)
Course focuses on the social repercussions and political consequences of large-scale political violence, such as genocide, war crimes and crimes against humanity. Students learn how communities and states balance the demands for justice and memory with the need for peace and reconciliation and addresses cases from around the globe and different historical settings. prereq: 1001 or 1011V recommended; A-F required for Soc Majors/Minors.

SOC 4321. Globalize This! Understanding Globalization through Sociology. (GP; 3 cr.; A-F or Audit; Every Fall)

SOC 4411. Terrorist Networks & Counterterror Organizations. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Terror involves using violent actions to achieve political, religious, or social goals. This course examines theories and evidence about the origins, development, and consequences of terrorist networks. It analyzes efforts to prevent, investigate, and punish terrorists by counterterror organizations, including law enforcement, security, and military forces. Graduate and honors students are expected to demonstrate greater depth of discussion, depth and, to a degree, length of writing assignments, presentations, and leadership of the students.

SOC 4411H. Honors: Terrorist Networks & Counterterror Organizations. (; 3 cr.; A-F only; Periodic Fall & Spring)
Terror involves using violent actions to achieve political, religious, or social goals. This course examines theories and evidence about the origins, development, and consequences of terrorist networks. It analyzes efforts to prevent, investigate, and punish terrorists by counterterror organizations, including law enforcement, security, and military forces. Graduate and honors students are expected to demonstrate greater depth of discussion, depth and, to a degree, length of writing assignments, presentations, and leadership of the students.

SOC 4451. Modern Sport: Its Power & Paradoxes. (3 cr.; Student Option; Periodic Fall)
How sport is socially organized, what role(s) it plays in society, and what sporting practices tell us about contemporary social life in general. prereq: 1001 recommended, soc majors/minors must register A-F

SOC 4451H. Honors: Modern Sport: Its Power & Paradoxes. (; 3 cr.; A-F only; Periodic Spring)
How sport is socially organized, what role(s) it plays in society, and what sporting practices tell us about contemporary social life in general. prereq: 1001 recommended, soc majors/minors must register A-F

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.

Effects of ethnic migration and of social movements. Construction of ethnic/national identities. Questions of citizenship. Rise of transnational movements, how they help shape racial/ethnic conflicts. prereq: 1001 recommended; soc majors/minors must register A-F

**SOC 4511. Sociology of Youth: Transition to Adulthood.** (3 cr.; Student Option; Periodic Fall)

**SOC 4521. Love, Sex, & Marriage.** (3 cr.; Student Option; Periodic Fall)
Sociological approaches to intimate human relationships. Love, romance, dating, mate selection. Sexuality, cohabitation, marriage, related public policy debates. Current U.S. practices in historical/cross-cultural context. prereq: [1001 or instr consent]; soc majors/minors must register A-F

**SOC 4551. Sociology of Sexualities.** (DSJ,SOCS; 3 cr.; Student Option; Every Spring)
Sexual attitudes, behaviors, identities. Taken-for-granted beliefs about naturalness of sexual phenomena. How social forces shape sexual lives. Diversity of thought, behavior, lived experience with regard to sexuality. prereq: Soc majors/minors must register A-F

**SOC 4551H. Honors: Sociology of Sexualities.** (3 cr.; A-F only; Periodic Fall)

**SOC 4552W. Sociology of Education.** (DSJ,SOCS; 3 cr.; Student Option; Every Spring)
Sociological approaches to the naturalness of educational phenomena. How social forces shape educational lives. Diversity of thought, behavior, lived experience with regard to educational phenomena. Honors students expected to demonstrate greater depth of discussion. prereq: Soc majors/minors must register A-F

**SOC 4570V. Major-Project Seminar.** (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Defining research problem. Collecting/analyzing data. Writing report. prereq: 1001; 3701; 3801; 3811; 12 cr upper div sociology, dept consent

**SOC 4966W. Major-Project Seminar.** (WI; 1 cr.; A-F or Audit; Every Fall & Spring)
Guided individual research for the sociology major's senior project requirement, conducted in conjunction with enrollment in an upper division sociology course.

**SOC 4967W. Advanced Senior Project Independent Study.** (WI; 1 cr.; A-F or Audit; Every Fall & Spring)
Guided individual research for the sociology major's senior project requirement, conducted in conjunction with enrollment in an upper division sociology course.

**SOC 4967H. Honors: Sociology of Sexualities.** (DSJ,SOCS; 3 cr.; A-F only; Periodic Fall)
Sexual attitudes, behaviors, identities. Taken-for-granted beliefs about naturalness of sexual phenomena. How social forces shape sexual lives. Diversity of thought, behavior, lived experience with regard to sexuality. prereq: Soc majors/minors must register A-F

**SOC 4968H. Honors: Sociology of Education.** (DSJ,SOCS; 3 cr.; A-F only; Every Spring)
Sociological approaches to educational phenomena. How social forces shape educational lives. Diversity of thought, behavior, lived experience with regard to educational phenomena. Honors students expected to demonstrate greater depth of discussion. prereq: Soc majors/minors must register A-F

**SOC 4968V. Senior Honors Seminar.** (WI; 3 cr.; A-F or Audit; Every Spring)
Developing the methodology of senior project, researching it, and writing the thesis. Students work individually or in small groups in consultation with seminar director and other faculty. Group discussion of individual projects. prereq: [1001 or instr consent]; soc honors major, dept consent

**SOC 5090. Topics in Sociology.** (1-3 cr. [max 9 cr.]; Student Option; Periodic Spring)
Topics specified in Class Schedule. prereq: Undergrad soc majors/minors must register A-F

**SOC 5101W. Sociology of Law.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring)
Sociological analysis of law/society. Why people obey law. Social forces involved in creating law (civil/criminal). Procedures of enforcement. Impact of law on social change. prereq: 1001, 3101, 3102 or 3701 recommended, soc majors/minors must register A-F

**SOC 5104. Crime and Human Rights.** (3 cr.; Student Option; Periodic Fall & Spring)

**SOC 5170. Sociology of International Law: Human Rights, Trafficking, and Business Regulation.** (GP; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Cultural values and practices in a globalized world. Role of international law. Immigration, terrorism, Americanization, and structure of international legal system.

**SOC 5172. Research Methods.** (3 cr.; A-F or Audit; Spring Odd Year)
Course focuses on the social repercussions and political consequences of large-scale political violence, such as genocide, war crimes and crimes against humanity. Students learn how communities and states balance the demands for justice and memory with the need for peace and reconciliation and addresses cases from around the globe and different historical settings. prereq: 1001 or 1011V recommended, Soc majors/minors must register A-F

**SOC 5174. Criminal Justice.** (3 cr.; Periodic Fall & Spring)
Theories/evidence about origins, development, and consequences of terrorist networks. Efforts to prevent, investigate, and punish terrorists by use of law enforcement, security, and military forces. Terror involves using violent actions to achieve political, religious, or social goals. This course examines theories and evidence about the origins, development, and consequences of terrorist networks. It analyzes efforts to prevent, investigate, and punish terrorists by counterterrorism organizations, including law enforcement, security, and military forces. Graduate and honors students are expected to demonstrate greater depth of discussion, depth and to a degree length of writing assignments, presentations, and leadership of the students.

**SOC 5445. Sociology of Education.** (3 cr.; Student Option; Every Fall)
Structures and processes within educational institutions. Links between educational organizations and their social contexts, particularly as they relate to educational change. prereq: 1001 or equiv or instr consent; soc majors/minors must register A-F

**SOC 5510. Population Problems.** (3 cr.; Student Option; Every Fall)
Population growth, natural resources, fertility/mortality in less developed nations, population dynamics/forecasts, policies to reduce fertility. prereq: Soc majors/minors must register A-F, credit will not be granted if credit has been received for PA 5301

**SOC 5511. Social Statistics for Graduate Students.** (MATH; 4 cr.; Student Option; Every Fall)
This course will introduce statistical measures and procedures that are used to describe and analyze quantitative data in sociological research. The topics include (1) frequency and percentage distributions, (2) central tendency and dispersion, (3) probability theory and statistical inference, (4) models of bivariate analysis, and (5) basics of multivariate analysis. Lectures on these topics will be given
in class, and lab exercises are designed to help students learn statistical skills and software needed to analyze quantitative data provided in the class. Soc 5811 is intended for new graduate students, undergraduate honors students, and students pursuing the Sociology BS degree. prereq; Credit will not be granted if credit has been received for Soc 3811 (Soc 5811 offered Fall terms only). Undergraduates with a strong math background are encouraged to register for Soc 5811 in lieu of 3811. Soc majors must register A-F. 5811 is a good social statistics foundation course for MA students from other programs.

SOC 8001. Sociology as a Profession. (; 1 cr. [max 3 cr.]; S-N or Audit; Every Fall & Spring) Fall: Sample topics for this 1-credit weekly course for new sociology graduate students: role of sociology in society, professional organizations, employment opportunities, professional ethics, and writing for publication or grant proposals. Spring: This 1-credit course meets weekly with the purpose of advancing toward completion a piece of written work for each seminar participant (i.e. preliminary exam, grant proposal, or in-process journal article). Students will need to set writing goals for themselves, report regularly on their progress, and share their work with the group for critique and feedback.

SOC 8011. Teaching Sociology: Theory & Practice. (3 cr.; Student Option; Every Spring) Social/political context of teaching. Ethical issues, multiculturalism, academic freedom. Teaching skills (e.g., lecturing, leading discussions). Active learning. Evaluating effectiveness of teaching. Opportunity to develop syllabus or teaching plan. prereq: Soc grad student or instr consent

SOC 8090. Topics in Sociology. (; 1-5 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Topics specified in Class Schedule. prereq: instr consent

SOC 8091. Independent Study. (; 1-15 cr. [max 20 cr.]; Student Option;) Independent study of an established 8xxx course.

SOC 8093. Directed Study. (; 1-4 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Directed study in sociology. prereq: Grad soc major or instr consent

SOC 8094. Directed Research. (; 1-4 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) May be used to fulfill sociology graduate requirement for advanced methodological training.

SOC 8101. Sociology of Law. (; 3 cr.; Student Option; Periodic Fall & Spring) Sociological analysis of law and society. In-depth review of research on why people obey the law, of social forces involved in creation of law (both civil and criminal), procedures of enforcement, and impact of law on social change.

SOC 8111. Criminology. (; 3 cr.; Student Option; Periodic Fall & Spring) Overview of theoretical developments and empirical research. Underlying assumptions, empirical generalizations, and current controversies in criminological research.

SOC 8148. Law, Society, and the Mental Health System. (; 3 cr.; A-F or Audit; Periodic Fall & Spring) Intensive survey of psychopathology. Reference to criminal behavior, criminal justice system. prereq; [Grad student, 4148] or instr consent

SOC 8190. Topics in Law, Crime, and Deviance. (; 3 cr. [max 9 cr.]; A-F or Audit; Every Fall) Advanced topics in law, crime, and deviance. Social underpinnings of legal/illegal behavior and of legal systems. prereq: Grad student in sociology or instr consent

SOC 8201. Social Stratification and Mobility. (; 3 cr.; Student Option; Periodic Fall & Spring) Form and content of hierarchical arrangements. Relationship of hierarchy to social order and individual behavior. Structures of social stratification. Status attainment. Mobility. Inequality and economic development, social development, and technological change. Economic status in relation to social status, including race, gender. prereq: 3811 or equiv or instr consent

SOC 8211. The Sociology of Race & Racialization. (3 cr.; Student Option; Periodic Fall & Spring) Major theoretical debates. Classic and contemporary theoretical approaches to studying U.S. race relations; contemporary and historical experiences of specific racial and ethnic groups.

SOC 8221. Sociology of Gender. (; 3 cr.; Student Option; Periodic Fall) Organization, culture, and dynamics of gender relations and gendered social structures. Sample topics: gender, race, and class inequalities in the workplace; women's movement; social welfare and politics of gender inequality; theoretical and methodological debates in gender studies; sexuality; science; sociology of emotions.

SOC 8290. Topics in Social Stratification. (; 3 cr. [max 12 cr.]; Student Option; Periodic Fall) Comparative perspectives on racial inequality; race, class, and gender; quantitative research on gender stratification; stratification in post-communist societies; institutional change and stratification systems; industrialization and stratification. Topics specified in [Class Schedule].

SOC 8311. Political Sociology. (; 3 cr.; Student Option; Every Fall) Social dimensions of political behavior and social origins of different forms of the state. How various theoretical traditions--Marxist, Weberian, and feminist--address key issues in political sociology, including citizenship, revolution, state formation, origins of democracy, welfare state, and fascism.

SOC 8333. FTE: Master's. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

SOC 8390. Topics in Political Sociology. (3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Topics with common focus on social underpinnings of political behavior/change. Topics specified in Class Schedule. Sample topics: democracy and development, international legal and political systems, power and protest in advanced capitalist states, xenophobia and international migration, and civil society and democracy.


SOC 8421. Work and Occupations. (; 3 cr.; Student Option; Every Fall) Sociological analysis of work, occupations, and labor markets, including contemporary theory and research. Course emphasis varies with instructor.

SOC 8444. FTE: Doctoral. (; 1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

SOC 8490. Advanced Topics in Social Organization. (; 3 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Content varies with instructor. Sample topics: gender and organizations, interorganizational relations, comparative study of organizations, nonprofit organizations, consumer behavior, industry and technology, social networks, conflict, coercion, and social exchange. Topics specified in [Class Schedule]. prereq: instr consent

SOC 8501. Sociology of the Family. (; 3 cr.; Student Option; Every Fall) Theoretical and empirical works from contemporary family sociology. Content varies with instructor. Sample topics: definitions of the family, family roles, family interactions, marriage and divorce, childbirth, parenthood, and cultural variations in families.

SOC 8540. Topics in Family Sociology. (; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Families and mental health; families, work, and the labor market; historical/comparative research on the family. Topics specified in [Class Schedule].

SOC 8551. Social Structure and the Life Course. (; 3 cr.; Student Option; Every Fall) Central concepts/premises of life course analysis as applied to intersocietal (comparative); intrasocietal (socioeconomic status, race, gender); and historical variability.
**Software Engineering (SENG)**

**SENG 5115. Graphical User Interface Design, Evaluation, and Implementation.** (3 cr.; A-F or Audit; Every Fall & Spring)
Design and evaluation of interactive application interfaces, user- and task-centered approaches to design, guidelines for graphical design, interface evaluation techniques, current interface trends, including web interfaces and information visualization. Group projects that include designing, prototyping, and implementing an application interface. prereq: Grad SEng major

**SENG 5116. Graphical User Interface Toolkits.** (2-3 cr.; A-F or Audit; Periodic Fall)
Toolkit-centered introduction to GUI implementation technology. Students learn to use a GUI toolkit to implement a graphical application. Introduction to advanced techniques, including constraint-based data management, 3D visualization tools, and toolkit structure and design. prereq: Grad SEng major

**SENG 5131. Distributed Application Design and Development.** (3 cr.; A-F or Audit; Every Spring)
Java programming, concurrent programming, workflow, distributed database, security, collaborative computing, object-oriented architecture/design, network publishing, messaging architecture, distributed object computing, and intranet. prereq: Grad SEng major

**SENG 5199. Topics in Software Engineering.** (2-3 cr.; A-F or Audit; Every Spring)
Topics specified in Class Schedule. prereq: SEng grad student

**SENG 5511. Artificial Intelligence.** (2-3 cr.; A-F or Audit; Periodic Spring)
Introduces ideas and theories of AI. Problem solving, search, inference techniques. Logic and theorem proving. Knowledge representation, rules, frames, semantic networks. Planning and scheduling. Introduces Lisp programming language. prereq: Grad SEng major

**SENG 5551. Introduction to Intelligent Robotic Systems.** (3 cr.; A-F or Audit; Periodic Fall)
Transformations, kinematics and inverse kinematics, dynamics, and control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and micro-robotics. prereq: Grad SEng major

**SENG 5707. The Principles of Database Systems.** (3 cr.; A-F or Audit; Every Fall)
Fundamental concepts; representing instances; prototypic model shapes; model evolution; interviewing user skills, reverse engineering; mapping to DBMS schema; database querying. prereq: Grad SEng major

**SENG 5708. Data Analytics.** (2-3 cr.; A-F or Audit; Every Spring)
Applications/motivation. Extended relational, object-relational, and object-oriented data models. Object identifier, types/constructors. Versions, schema evolution. Query language (e.g., recursion, path expressions). Object indices, buffer management, and other implementation issues. Triggers, rules, complex objects, and case studies. prereq: Grad SEng major

**SENG 5801. Software Engineering I: Overview, Requirements, and Modeling.** (3 cr.; A-F or Audit; Every Fall)
Software engineering as a discipline. Preview of topics to be covered in subsequent courses in master of science in software engineering program; in-depth study of requirements engineering; modeling techniques applicable to requirements and specification, including UML and formal modeling. prereq: Grad SEng major

**SENG 5802. Software Engineering II: Software Design.** (3 cr.; A-F or Audit; Every Spring)
Software design quality, processes that produce quality design, graphical and textual representations, including UML, common problems and patterns that solve them, refactoring. Students develop fluency in object-oriented design, and ability to read, critique, and advocate design ideas. Students work in teams to complete a multiphase project. prereq: Grad SEng major

SENG 5831. Software Development for Real-Time Systems. (2-3 cr.; A-F or Audit; Periodic Fall) Analysis, design, verification, and validation of real-time systems. Periodic, aperiodic, and sporadic processes, scheduling theory. Pragmatic issues. prereq: Grad SEng major

SENG 5841. Model-based Development. (3 cr.; A-F or Audit; Every Spring) Formal specification of software artifacts. Applicability of formal specifications. Methods such as Z, SCR, and Statecharts. Formal analysis. Theorem proving. Reachability analysis. Model checking. Tools such as PVS, Statemate, SPIN, and SMV. prereq: Grad SEng major

SENG 5851. Software Project Management. (3 cr.; A-F or Audit; Every Fall & Spring) Concepts used to manage software projects. Project management cycle: initiation, planning/ control, status reporting, review, post-project analysis. Leadership and motivation strategies. Lecture, discussion, individual/team presentations/projects. prereq: Grad SEng major

SENG 5852. Quality Assurance and Process Improvement. (3 cr.; A-F or Audit; Every Fall & Spring) Theory and application of capability maturity model: process assessment, modeling, and improvement techniques. Life cycle issues related to development and maintenance; quality, safety, and security assurance; project management; and automated support environments. Group projects and case studies. prereq: Grad SEng major

SENG 5861. Introduction to Software Architecture. (3 cr.; A-F or Audit; Periodic Fall) Software/systems architecture. Representation/design, how they fit into software engineering process. Description of architectures, including representation and quality attributes. prereq: 2nd year, MSSE grad student

SENG 5899. Software Engineering Seminar. (1 cr. [max 2 cr.]; Student Option; Every Fall) Software engineering trends. Talks by invited speakers, selected readings. prereq: Grad SEng major, instr consent

SENG 5900. Directed Study. (1-3 cr.; Student Option; Every Fall & Spring) Directed study/research in software engineering. Topics/scope decided in collaboration with instructor.

SENG 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

SENG 8494. Capstone Project (Plan B Project). (3 cr.; S-N or Audit; Every Spring) Students work in teams on software project using tools, techniques, and skills acquired during previous coursework. Each team works with a client to establish requirements, agree upon design, and achieve a successful acceptance test of resulting software system. prereq: SEng major

SENG 8891. Independent Project. (2-6 cr. [max 12 cr.]; Student Option; Every Fall & Spring) Independent project arranged with faculty.

SOIL 2125. Basic Soil Science. (ENV, PHYS; 4 cr.; A-F or Audit; Every Fall & Spring) Basic physical, chemical, and biological properties of soil. Soil genesis classification, principles of soil fertility. Use of soil survey information to make a land-use plan. WWW used for lab preparation information. prereq: [CHEM 1015, CHEM 1017] or CHEM 1021 or equiv

SOIL 2601. The Social Life of Soil. (ENV; 3 cr.; Student Option; Every Fall) Soil microorganisms can either promote plant health or wage chemical warfare. And alliances can turn on a dime. Learn about this fascinating dog-eat-dog world and how we can support a rich soil ecosystem that benefits plants and humans.


SOIL 3521. Soil Judging. (1 cr. [max 3 cr.]; A-F or Audit; Every Fall) A field-based course which requires students to apply fundamental knowledge obtained from Basic Soil Science and Field Study of Soils to the description of soils in the field. This course includes an inter-collegiate Soil Judging contest that takes during the course of the class. prereq: An introductory soils course and field studies course.

SOIL 4093. Directed Study. (1-7 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Research, readings, and instruction. prereq: instr consent

SOIL 4094. Directed Research. (1-7 cr.; Student Option; Every Fall, Spring & Summer) Research under the direction of department faculty. prereq: instr consent

SOIL 4111. Introduction to Precision Agriculture. (3 cr.; A-F or Audit; Every Spring) Soil, landscape, and crop spatial variability. GIS, DEM, GPS technologies. Variable rate machinery, PA software, remote sensing. Geostatistics, sampling, experimental designs. Precision integrated crop management. Data acquisition, processing, and management. Socio-economic and e-marketing aspects. prereq: Basic sciences, statistics, soil, agronomy

SOIL 4511. Field Study of Soils. (2 cr.; A-F or Audit; Every Summer) Learn to write soil profile descriptions in the field. Class requires hands-on experience to determine soil texture, color, and horizon designations in the field. prereq: 2125

SOIL 5125. Soil Science for Teachers. (4 cr.; Student Option; Every Fall & Spring) Basic physical, chemical, and biological properties of soil. Soil genesis classification, principles of soil fertility. Use of soil survey information to make a land-use plan. WWW used for lab preparation information.

SOIL 5232. Vadose Zone Hydrology. (3 cr.; Student Option; Every Fall) Basic soil physical properties/processes governing transport of mass/energy in soils. Emphasizes water/solute transport through unsaturated root/vadose zones, their impact on subsurface hydrology and on water quality. Lectures, hands-on laboratory exercises, discussion of real world problems, problem solving, prereq: [Math 1271 or equiv], [Phys 1042 or equiv]

SOIL 5555. Wetland Soils. (3 cr.; A-F or Audit; Every Fall) Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands, Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project. prereq: SOIL 1125 or 2125 or equiv or instr consent; concurrent registration is required (or allowed) in SOIL 4511 recommended

SOIL 5611. Soil Biology and Fertility. (4 cr.; Student Option; Every Fall) Properties of microorganisms that impact soil fertility, structure, and quality. Nutrient requirements of microbes and plants, and mineral transformations in biogeochemical cycling. Symbiotic plant/microbe associations and their role in sustainable agricultural production. Biodegradation of pollutants and bioremediation approaches. prereq: Biol 1009 or equiv, Chem 1021 or equiv; Soil 2125 recommended

SOIL 8005. Supervised Classroom or Extension Teaching Experience. (2 cr.; S-N or Audit; Every Fall & Spring) Teaching experience in one of five departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Participation in discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

SOIL 8110. Colloquium in Soil Science. (3 cr.; [max 6 cr.]; S-N or Audit; Every Fall, Spring & Summer) Research or intellectual areas in soil science or climatology not covered in regular courses.
Topics vary; contact department for current offerings.

**SOIL 8123. Research Ethics in the Plant and Environmental Sciences.** (0.5 cr.; S-N or Audit; Every Spring)

**SOIL 8252. Advanced Soil Physics.** (2 cr.; Student Option; Spring Even Year)

**SOIL 8282. Modeling Water, Carbon, and Nitrogen Dynamics in the Soil-Plant-Air System.** (3 cr.; A-F or Audit; Spring Even Year)
Integrative/quantitative treatment of dynamics of water, carbon, and nitrogen in soil-plant-air continuum.

**SOIL 8510. Advanced Topics in Pedology.** (2-4 cr. [max 12 cr.]; A-F or Audit; Fall Odd Year)
Sample topics: soil-landscape relations, soil genesis, landscape evolution, land use and management, precision agriculture, digital terrain modeling, forest soils. prereq: 5515

**SOIL 8541. Aquatic and Soil Chemistry.** (3 cr.; A-F or Audit; Spring Even Year)
Physical chemical principles, geochemical processes controlling chemical composition of natural waters, soil-/sediment-water interactions. Emphasizes behavior of inorganic contaminants in natural waters, engineered systems, dissolved natural organic matter. prereq: Credit will not be granted if credit has been received for: CE 8541; 5311 or CE 4541

**Somali (SMLI)**

**SMLI 1221. Beginning Somali.** (5 cr.; A-F or Audit; Every Fall, Spring & Summer)
Comprehension, speaking, reading, writing.

**SMLI 1222. Beginning Somali II.** (5 cr.; A-F only; Every Fall, Spring & Summer)
Comprehension, speaking, reading, writing. prereq: 1221

**SMLI 1225. Accelerated Beginning Somali I.** (5 cr.; A-F only; Every Fall & Spring)
Review of grammar/usage, practice in reading/writing. Introduction to Somali literature and formal writing. Topics in Somali culture. prereq: Ability in basic spoken Somali

**SMLI 1226. Accelerated Beginning Somali II.** (5 cr.; A-F only; Every Fall & Spring)
Review of grammar/usage, practice in reading/writing. Introduction to Somali literature and formal writing. Topics in Somali culture. prereq: 1225 or instr consent

**SMLI 3227. Intermediate Somali I.** (5 cr.; A-F only; Every Fall)
Intermediate level Somali language for undergraduate students. prereq: instr consent

**SMLI 3228. Intermediate Somali II.** (5 cr.; Student Option; Every Spring)
Intermediate Somali language for undergraduate students.

**SMLI 4227. Intermediate Somali for Graduate Research I.** (5 cr.; A-F only; Every Fall)
Intermediate Somali language for graduate students.

**SMLI 4228. Intermediate Somali for Graduate Research II.** (5 cr.; A-F only; Every Spring)
Intermediate Somali II for graduate students.

**Spanish (SPAN)**

**SPAN 144. Intermediate Medical Spanish.** (0 cr.; S-N or Audit; Every Fall)
Vocabulary of Spanish medical terms, skills in report writing, proper format for medical communications. Developing conversational fluency for medical-related topics. prereq: [1st yr college-level Spanish or equiv], dept consent

**SPAN 221. Reading Spanish.** (0 cr.; S-N or Audit; Spring Even Year)
Intensive reading of a variety of texts to provide a basic reading knowledge of Spanish. At the end of the semester students may take the equivalent of the Spanish Graduate Reading Examination.

**SPAN 344. Advanced Medical Spanish.** (0 cr.; S-N or Audit; Every Spring)
0 cr. course designed to further develop and strengthen the language skills and cultural awareness students have been exposed to and acquired in Intern Med Span 0144, a course designed to help care professionals communicate with patients who speak Spanish. prereq: Span 0144, 2 yrs. Spanish College Level or equiv, dept consent

**SPAN 1001. Beginning Spanish.** (5 cr.; Student Option; Every Fall & Summer)
Listening, speaking, reading, writing. Emphasizes development of communicative competence. Cultural readings. prereq: Less than 2 yrs of high school Spanish, dept consent, no college-level Spanish

**SPAN 1002. Beginning Spanish.** (5 cr.; Student Option; Every Fall, Spring & Summer)
Listening, speaking, reading, writing. Emphasizes development of communicative competence. Cultural readings. prereq: 1001 completed at UMNTC, dept consent

**SPAN 1003. Intermediate Spanish.** (5 cr.; Student Option; Every Fall, Spring & Summer)
Speaking/comprehension. Developing reading/writing skills based on materials from Spain/Spanish America. Grammar review. Compositions, oral presentations. prereq: [1002 or 1022] or EPT placement

**SPAN 1004. Intermediate Spanish.** (5 cr.; Student Option; Every Fall, Spring & Summer)
Speaking/comprehension. Developing reading/writing skills based on materials from Spain/Spanish America. Grammar review. Compositions, oral presentations. prereq: 1003 or EPT placement

**SPAN 1014. Business Spanish.** (5 cr.; Student Option; Every Fall, Spring & Summer)
Vocabulary, report writing skills. Proper format for business communications. Conversational fluency on trade-related topics. prereq: 1003

**SPAN 1022. Alternate Second-Semester Spanish.** (5 cr.; Student Option; Every Fall & Spring)
For students who have studied Spanish in high school or at community college, or who are transfer students. Begins with accelerated review of 1001 followed by material covered in 1002. prereq: Placement above 1001

**SPAN 1044. Intermediate Medical Spanish.** (5 cr.; Student Option; Every Fall & Spring)
Language needed by health-care workers who interact with Spanish-speaking patients. Basic medical vocabulary, questions/answers in common medical situations. Vocabulary/phrases to conduct patient interviews and physical exams. Readings on Latin American view of health and health care. prereq: 1003 or equiv

**SPAN 1904. Topics: Freshman Seminar.** (GP; 3 cr.; A-F or Audit; Periodic Fall)
Topics specified in class schedule.

**SPAN 1905. Freshman Seminar.** (3 cr.; A-F or Audit; Periodic Fall)
Topic specified in Class Schedule. prereq: Freshman

**SPAN 1910W. Freshman Seminar.** (WI; 3 cr.; Student Option; Every Fall & Spring)
Topics specified in Class Schedule. prereq: Fr

**SPAN 3011W. Spanish Grammar and Composition Workshop.** (WI; 4 cr.; Student Option; Every Fall & Spring)

**SPAN 3015V. Honors: Spanish Composition and Communication.** (WI; 4 cr.; A-F or Audit; Every Fall, Spring & Summer)
Comprehension of written/spoken text. Speaking/reading/ writing. prereq: [1004 or 1014 or 1044]. LPE pass. Honors student
SPAN 3015W. Spanish Composition and Communication. (WI; 4 cr.; Student Option; Every Fall, Spring & Summer) Comprehending written/spoken texts. Speaking, reading, writing beyond intermediate level. prereq: 1004 or 1014 or 1044, LPE pass

SPAN 3022. Advanced Business Spanish. (4 cr.; Student Option; Every Spring) Major issues of culture in relation to business in context of Spanish-speaking world. Important historical-social factors that contribute to understanding of economy/business relationships with industrialized nations. prereq: 3015

SPAN 3044. Advanced Medical Spanish. (4 cr.; Student Option; Every Spring & Summer) How to communicate more effectively in linguistic/cultural terms with Spanish speaking patients. Advanced/specific medical vocabulary, communication strategies, and related cultural aspects. Conducting patient interviews/medical history. Using vocabulary/conversation to conduct physical exams. Latin American views on health/health care. prereq: [1004 or 1014 or 1044 or equiv], Span LPE or instr consent

SPAN 3040. Structure of Spanish. (3 cr.; A-F only; Every Fall) Analysis of phonetics/phonology of modern Spanish language in Spain and Spanish America. How Cervantes' text enters in dialogue with Spain's Renaissance and Baroque periods (sixteenth/seventeenth century). How novel has impacted the cultural assimilation in medieval al-Andalus. Treatises of Averroes and Maimonides. How Spanish Christian intellectuals. Spanish Christian intellectuals. prereq: SPAN 3015, [3104W or 3105W or TLDO 3104 or VENZ 3104 or instr consent]

SPAN 3221. Interpreting Colonial Latin America: Empire and Early Modernity. (3 cr.; Student Option; Every Fall) Conquest, colonization, and forms of resistance in Latin America. prereq: 3015, [3104W or TLDO 3104 or VENZ 3104 or instr consent]

SPAN 3222. Interpreting Modern and Contemporary Latin America. (3 cr.; Student Option; Every Spring) Late modern and contemporary discourses in literature, popular culture, mass media, and film. prereq: 3015, [3104W or TLDO 3104 or VENZ 3104 or instr consent]

SPAN 3300H. Honors Seminar in Spanish and Portuguese Studies. (3 cr.; A-F only; Every Fall) Topics related to cultural studies, literature, linguistics in Iberian/Latin American milieus. Taught in Spanish. May be cross-listed with another department. prereq: honors student, 3015, [3104W or 3105W or TLDO 3104 or TLDO 3105 or VENZ 3104 or VENZ 3512 or instr consent]


SPAN 3404. Medical Spanish and Community Health Service. (3 cr.; Student Option; Every Fall & Spring) Creating materials for effective communication with and education of Spanish-speaking patients. Students engage in service learning with community health care partners that serve the Chicano/Latino population. prereq: 3015 with grade of at least B- or [1044, high pass on at least three sections of LPE]

SPAN 3510. Issues in Hispanic Cultures. (3 cr.; [max 9 cr.]; A-F or Audit; Every Fall, Spring & Summer) Analysis of practices that have shaped cultural identity of Spanish or Portuguese-speaking areas. Topics vary. prereq: 3015, [3105W or TLDO 3105 or VENZ 3512 or instr consent]

SPAN 3512. Modern Latin America. (3 cr.; A-F or Audit; Every Fall & Summer) Impact of various forms of modernization on cultural production in Latin American racial, ethnic, class relations, institutional, and ideological structures. prereq: 3015, [3105W or TLDO 3105 or VENZ 3512 or instr consent]


SPAN 3612. Don Quijote and the Novel. (LITR; 3 cr.; Student Option; Spring Even Year) How Cervantes' text enters in dialogue with prevalent novelistic and social discourses of Spain's Renaissance and Baroque periods (sixteenth/seventeenth century). How novel has managed to interest succeeding generations of readers. Taught in English.

SPAN 3653. Contemporary Latino and Latin American Drama Written in English. (3 cr.; Student Option; Every Spring) Contextual, theoretical, and thematic contributions and formal dimensions of U.S. Latino theater. Issues of gender, identity, class, and cultural politics. Taught in English. prereq: SPAN 1001 or equiv

SPAN 3699. Study of Advanced Spanish Language Abroad. (1-5 cr.; Student Option; Every Fall & Spring) Study of advanced Spanish language in a Spanish-speaking country. prereq: Two yrs college-level Spanish, dept consent

SPAN 3701. Structure of Spanish: Phonology and Phonetics. (3 cr.; Student Option; Periodic Fall & Spring) Analysis of phonetics/phonology of modern Spanish. Regional/social variants of the language in Spain and Spanish America. Emphasizes improving Spanish pronunciation. prereq: 3015, [3107W or TLDO 3107 or VENZ 3107 or instr consent]

SPAN 3702. Structure of Spanish: Morphology and Syntax. (3 cr.; Student Option; Periodic Fall & Spring) Using linguistic concepts such as morpheme, flexional affix, noun phrase, subject,
subordination, and coordination to identify different morphological/syntactic components of Spanish. prereq: 3015, [3107W or TLDO 3107 or VENZ 3107 or instr consent]

SPAN 3703. Origins and History of Spanish and Portuguese. (; 3 cr.; Student Option; Every Fall & Spring) Development of Spanish from its Latin roots. Phonetic, morphological, syntactic, and sociolinguistic aspects of language variations over time. prereq: 3015, [3107W or TLDO 3107 or VENZ 3107 or instr consent]

SPAN 3704. Sociolinguistics of the Spanish-Speaking World. (; 3 cr.; Student Option; Every Spring) Spanish dialects. Spanish in contact with other languages. Bilingualism, language attitudes. Pragmatic analysis of Spanish. Impact of recent political, sociolinguistic, and socioeconomic transformations on language. prereq: 3015, [3107W or TLDO 3107 or VENZ 3107 or instr consent]

SPAN 3706. Spanish Applied Linguistics. (; 3 cr.; Student Option; Every Spring) Introduction to second language acquisition processes as they relate to fundamental analysis of linguistic concepts of Spanish. Features that present difficulties for English speakers. Sociolinguistic aspects of language learning. Application to Spanish language teaching. prereq: 3015, [3107W or TLDO 3107 or VENZ 3107 or instr consent]

SPAN 3707. Linguistic Accuracy Through Translation. (; 3 cr.; A-F only; Every Spring) Analysis of style/audience/lexicon of various texts in Spanish (popular press, business, academic) examined as framework for training to communicate with accuracy in different contexts. Students apply lexical/grammatical choices in translating texts. prereq: 3015, [3104W or 3105W or 3107W or TLDO 3104 or TLDO 3105 or TLDO 3107 or VENZ 3104 or VENZ 3107 or VENZ 3152 or instr consent]

SPAN 3730. Topics in Hispanic Literatures. (; 3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Topics specified in Class Schedule. prereq: 3015, [3107W or TLDO 3107 or VENZ 3107 or instr consent]

SPAN 3800. Film Studies in Spanish. (; 3 cr. [max 9 cr.]; A-F only; Every Fall, Spring & Summer) Films from Spain or Spanish-speaking world in their historical, (geo)political, and socioeconomic contexts. Films analyzed under interdisciplinary frameworks, noting aspects related to cinematography/rhetoric. prereq: 3015, [3104W or 3105W or TLDO 3104 or TLDO 3105 or VENZ 3104 or VENZ 3152 or instr consent]

SPAN 3910. Topics in Spanish Peninsular Literature. (; 3 cr. [max 9 cr.]; A-F or Audit; Every Fall, Spring & Summer) Focus on central theme related to important groups of writers, literary movements, trends, critical approaches, methods. Topics specified in Class Schedule. prereq: 3015, [3104W or TLDO 3104 or VENZ 3104 or instr consent]

SPAN 3920. Topics in Spanish-American Literature. (; 3 cr. [max 9 cr.]; A-F only; Periodic Fall, Spring & Summer) Focus on central theme related to important groups of writers, literary movements, trends, critical approaches, and methods. Topics specified in Class Schedule. prereq: 3015, [3104W or TLDO 3104 or VENZ 3104 or instr consent]

SPAN 3970. Directed Studies. (1-4 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading/study in Hispanic literatures, cultural studies, or peninsular, Latin American, or U.S. Latino theater or literatures. Prereq instr consent, dept consent, college consent.

SPAN 3972W. Graduation Seminar. (WI; 3 cr.; A-F or Audit; Every Fall, Spring & Summer) Completion of a research paper on cultural, literary, or artistic issue in Spanish or Portuguese speaking worlds or on topic related to Hispanic linguistics. In-depth research/conversation with instructor. prereq: 31 cr of 3xxx, instr consent

SPAN 4001. Beginning Spanish for Graduate Student Research. (; 5 cr.; Student Option; Every Fall & Summer) Listening, speaking, reading, writing. Emphasizes development of communicative competence. Cultural readings.

SPAN 4002. Beginning Spanish for Graduate Student Research. (; 5 cr.; Student Option; Every Spring & Summer) Listening, speaking, reading, writing. Emphasizes development of communicative competence. Cultural readings. Meets concurrently with 1002.


SPAN 4014. Business Spanish for Graduate Student Research. (5 cr.; Student Option; Every Spring) Vocabulary, report writing skills. Proper format for business communications. Conversational fluency on trade-related topics. Meets with SPAN 1014.

SPAN 4022. Alternate Second-Semester Spanish for Graduate Student Research. (5 cr.; Student Option; Every Fall, Spring & Summer) For students who have studied Spanish in high school or at community college, or who are transfer students. Begins with accelerated review of 1001/4001 followed by material covered in 1002/4002. Meets concurrently with 1022.

SPAN 5110. Discursive Formations at the Threshold of 20th-Century Spain. (; 3 cr.; Student Option; Periodic Fall & Spring) Theory and representative examples of the realist/naturalist novel (Galdas, Pardo Bazan) in the context of its antecedents ("costumbriismo"), opposites (the idealist/sentimental novel), and turn-of-the-century innovations of modernism and the "generation of 1898." prereq: Grad student or instr consent

SPAN 5150. Contemporary Spanish Literature. (; 3 cr.; Student Option; Periodic Fall & Spring) Major literary works/movements in Spain from 1915 to 2000. Neomodernism, surrealism, social realism, literatures of dictatorship/exile. Postmodernism. Poetry, novel, drama, essays, film, video/TV. Problems of literary history. prereq: Grad student or instr consent

SPAN 5160. Medieval Iberian Literatures and Cultures. (; 3 cr.; Student Option; Periodic Fall & Spring) The major literary genres developed in Spain from the Reconquest to 1502, with reference to the crucial transformations of the Middle Ages, including primitive lyric, epic, clerical narrative, storytelling, debates, collections, chronicles, "exempla," and the Celestina (1499-1502).

SPAN 5170. The Literature of the Spanish Empire and Its Decline. (; 5 cr.; Student Option; Periodic Fall & Spring) Major Renaissance/Baroque works of Spanish Golden Age (16th-17th-century poetry, nonfiction prose, novel, drama) examined against historical background of internal economic decline, national crisis, ideological apparatus developed by modern state. prereq: Grad student or instr consent

SPAN 5180. Don Quixote. (; 3 cr.; Student Option; Periodic Spring) Analysis of Cervantes' 'Don Quixote' in its sociohistorical context; focuses on the novel's reception from the romantic period to postmodern times. prereq: Grad student or instr consent

SPAN 5190. The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism. (; 3 cr.; Student Option; Periodic Fall & Spring) Major literary works/intellectual movements/conflicts represented in written culture, of 18th/early 19th centuries (1680-1845), examined as expressions of long crisis of Spain's Old Regime and rise of bourgeois liberalism. prereq: Grad student or instr consent

SPAN 5316. Spanish Picaresque Narratives. (; 3 cr.; Student Option; Periodic Fall) Literary autobiography, residual elements of Erasmian humanism, post-Tridentine repression/censorship. Picaro's critique of imperial Spain's system of values/authority. Cultural critics' challenge to rediscover popular texts of early modern period. prereq: Grad student or instr consent
SPAN 5531. Hispanic Literature of the United States. (3 cr.; Student Option; Periodic Fall)
Interdisciplinary approach providing a framework for deconstructing issues of national identity, marginalization, and gender. U.S. Hispanic theatre/literature and its ethnic diversity, regional variations, cultural links, and scope of its genres. prereq: Grad student or instr consent

SPAN 5550. Caribbean Literature: An Integral Approach. (3 cr.; Student Option; Periodic Fall & Spring)
Literature of Spanish-speaking Caribbean. Emphasizes historical legacy of slavery, African culture, independence struggles. prereq: Grad student or instr consent

SPAN 5560. Global Colonial Studies in the Hispanic World. (3 cr.; Student Option; Periodic Fall)
Discourse production in Spanish America between 1492 and 1700. Conquest/colonial writing/counter writing. Historical origin, evolution, impact of cultural, political, socioeconomic factors. prereq: Grad student or instr consent

SPAN 5570. Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse. (3 cr.; Student Option; Periodic Spring)
Political/economic contexts. Capitalism, liberalism, conservatism, their discursive media. Essay, journalism, literature, expression of everyday life. Wheels of commerce, progress, industrialization. Romanticism, realism, positivistic faith. prereq: Grad student or instr consent

SPAN 5580. Latin American Cultural Integration in the Neocolonial Order. (3 cr.; Student Option; Periodic Fall & Spring)
Modernismo, historical vanguard, impact of populist politics in patterns of culture/literature. 1900-50. prereq: Grad student or instr consent

SPAN 5590. The Impact of Globalization in Latin American Discourses. (3 cr.; Student Option; Every Fall & Spring)

SPAN 5701. History of Ibero-Romance. (3 cr.; Student Option; Periodic Spring)
Origins and developments of Ibero-Romance languages; evolution of Spanish, Portuguese, and Catalan. prereq: Grad student or instr consent

SPAN 5711. The Structure of Modern Spanish: Phonology. (3 cr.; Student Option; Periodic Fall)
Formulating and evaluating a phonological description of Spanish. Approaches to problems in Spanish phonology within metrical, autosegmental, and lexical phonological theories. prereq: Grad student or instr consent

SPAN 5714. Theoretical Foundations of Spanish Syntax. (3 cr.; Student Option; Periodic Fall & Spring)
Linguistic types/processes that appear across languages. Grammatical relations, word order, transitivity, subordination, information structure, grammaticalization. How these are present in syntax of Spanish. prereq: Grad student or instr consent

SPAN 5715. The Structure of Modern Spanish: Semantics. (3 cr.; Student Option; Periodic Fall)
Applying semantic theory to Spanish: conceptual organization and the structuring of experience; meaning and cultural values; semantic fields; categorization and prototypes; cognitive model theory; metaphor, metonymy, and mental imagery as source and change of meaning. prereq: Grad student or instr consent

SPAN 5716. Structure of Modern Spanish: Pragmatics. (3 cr.; Student Option; Periodic Fall)
Concepts in current literature in Spanish pragmatics. Deixis, presupposition, conversational implicature, speech act theory, conversational structure. prereq: Grad student or instr consent

SPAN 5717. Spanish Sociolinguistics. (3 cr.; Student Option; Periodic Spring)
Sociolinguistic variation, cross-diachronic diversity in different varieties of Spanish in Latin America and Spain. Impact of recent cultural, political, and socioeconomic transformations on language. prereq: Grad student or instr consent

SPAN 5718. Spanish Language Contact. (3 cr.; Student Option; Periodic Fall & Spring)
Analysis of different types/results of Spanish language contact globally, taking into account varying social conditions under which contact occurs. prereq: Grad student or instr consent

SPAN 5721. Spanish Laboratory Phonology. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Core literature on Spanish laboratory phonology. Phonology from a laboratory perspective. Students evaluate laboratory research methodologies, perform basic acoustic analyses, and design laboratory phonology studies. prereq: Grad student or instr consent

SPAN 5910. Topics in Spanish Peninsular Studies. (3 cr. [max 9 cr.]; Student Option; Every Fall & Spring)
Crucial moment or characters, works, or events marking beginning of new phase in literary/cultural landscape. prereq: Grad student or instr consent

SPAN 5920. Topics in Spanish-American Studies. (3 cr. [max 9 cr.]; Student Option; Periodic Fall, Spring & Summer)
Spanish-American literature analyzed according to important groups, movements, trends, methods, and genres. Specific approaches depend on topic and instructor. Topics specified in Class Schedule. prereq: Grad student or instr consent

SPAN 5930. Topics in Ibero-Romance Linguistics. (3 cr. [max 9 cr.]; Student Option; Periodic Spring & Summer)
Problems in Hispanic linguistics; a variety of approaches and methods.

SPAN 5970. Directed Readings. (1-4 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Students must submit reading plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects. Prereq Grad student or instr consent

SPAN 5985. Sociolinguistic Perspectives on Spanish in the United States. (3 cr.; Student Option; Periodic Spring)
Sociolinguistic analysis of issues such as language maintenance/shift in U.S. Latino communities, code switching, attitudes of Spanish speakers toward varieties of Spanish and English, language change in bilingual communities, and language policy issues. prereq: Grad student or instr consent

SPAN 5990. Directed Research. (1-4 cr. [max 9 cr.]; Student Option; Every Fall, Spring & Summer)
Directed research. Prereq Grad student or instr consent.

SPAN 5991. The Acquisition of Spanish as a First and Second Language. (3 cr.; Student Option; Periodic Spring)
Analysis of issues such as the acquisition of Spanish and English by bilingual children; Spanish in immersion settings; developmental sequences in Spanish; classroom language learners' attitudes, beliefs, and motivation; development of pragmatic competence. prereq: Grad student or instr consent

SPAN 6100. Research in Sociolinguistic Approaches to Spanish Literature. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Sociolinguistic functions of Spanish literary works and major theories concerning literary production of texts. Testing modern theories in terms of representative fictional discourse from specific historical periods. prereq: 5xxx courses in Spanish literature and culture

SPAN 8200. Spanish Literary Texts: Theories of Formal Structures. (3 cr. [max 9 cr.]; Student Option; Periodic Fall)
Advanced research in methods of literary analysis of discourse. Emphasizes theoretical and practical frameworks within which representative texts are analyzed and interpreted from differing perspectives. prereq: 5xxx courses in Spanish literature and culture

SPAN 8212. Spanish Theater of the 16th Century: Drama up to Lope. (3 cr.; Student Option; Periodic Fall)
Medieval origins of drama to [La Celestina] (1499-1502), pastoral dialogues, crossover plays of Spanish and Portuguese dramatists. popular theater up to emerging public and private theaters under Italian influence. Rojas, Encina, Vicente, Naharro, Cervantes, and new tragedians. prereq: 5xxx courses in Spanish literature and culture

SPAN 8223. The Poetry of the Spanish Golden Age. (3 cr.; Student Option; Periodic Fall)
New Spanish poetic forms, from Garcilaso de León, mystics, and San Juan de Baroque trends by Góngora, Lope, and Quevedo. Classic traditions and modern adaptations.
Spanish and Portuguese (SPPT)

SPPT 3256. Latin American Cultural Discourse. (3 cr.; Student Option; Periodic Spring) Cultural assumptions in current modes of interpreting Latin American reality. Representative texts are analyzed. prereq: SPPT 3015

SPPT 3600. Topics in Spanish and Portuguese Studies (Taught in English). (3 cr.; Student Option; Fall Odd Year) Latin American, Iberian, or Lusophone topics related to culture, society, art, or linguistics. Taught in English. May be cross-listed with another department.

SPPT 5930. Selected Topics in Hispanic and Lusophone Cultural Discourse. (1-3 cr.; max 9 cr.; A-F or Audit; Every Fall & Summer) Cultural discourses in Spanish- and Portuguese-speaking areas. Historical intersections/divergences. Taught in Spanish or Portuguese, and in English when cross-listed. Topics specified in Class Schedule. prereq: Reading knowledge of Spanish and Portuguese.

SPPT 5995. Directed Teaching. (1 cr.; S-N only; Every Fall) Taken in conjunction with SPPT 5999. Language acquisition theory as applied to foreign language instruction at college level. How current theory translates into practice through hands-on practical application particular to communicative language instruction practiced in Department of Spanish/Portuguese Studies. prereq: Grad student with concurrent enrollment in 5999

Speech-Language-Hearing Science (SLHS)

SLHS 1301V. The Physics and Biology of Spoken Language Honors. (PHYS, WI; 4 cr.; A-F or Audit; Every Fall & Spring) Physics/biology of spoken language, from the talker's production of sounds/words, to the transmission of sound, to listener's perception of what was said. Computer analysis/synthesis of speech.

SLHS 1301W. The Physics and Biology of Spoken Language. (PHYS; 4 cr.; Student Option; Every Fall & Spring) Physics and biology of spoken language, from the talker's production of sounds/words, to the transmission of sound, to the listener's perception of what was said. Computer analysis and synthesis of speech.

SLHS 1302. Rate Your World: Quantifying Judgments of Human Behavior. (MATH; 3 cr.; Student Option; Every Fall & Spring) Methods for acquiring, summarizing, and analyzing judgments of human behavior. Measurement theory as it relates to ratings scales and physiological measures of behavior. Methods for summarizing and visualizing large sets of data, such as those used in research in the social sciences. Statistical analyses of data on human behavior. This course focuses strongly on using computational methods for analyzing and visualizing behavioral data using free open-course statistical software. Weekly laboratory sessions.
SLHS 1401. Communication Differences and Disorders. (SOC; 3 cr.; Student Option; Every Fall & Spring)
Introduction to normal and disordered cognition and communication in regards to hearing, speech, and language in pediatric and adult populations. Specific focus on functional communication, assessment, and intervention as it relates to socially, culturally, and linguistically diverse populations.

SLHS 1402. The Talking Brain. (SOC; 3 cr.; Student Option; Every Fall & Spring)
How the brain produces/understands speech/language, including various aspects of the nervous system involved in producing/understanding speech/language. Differences in brain structure/function among individuals with and without brain injury, based on scientific versus historical, mass media and literature portrayals.

SLHS 1905. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Freshman seminar.

SLHS 1942. Freshman Seminar. (3 cr.; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule. prereq:

SLHS 3302. Anatomy and Physiology of the Speech and Hearing Mechanisms. (3 cr.; Student Option; Every Fall)
Survey of anatomy and physiology of the auditory and speech production systems, including the nervous, respiratory, laryngeal, velopharyngeal and orofacial subsystems. Emphasis on normal processes and functions.

SLHS 3303. Language Acquisition and Science. (3 cr.; Student Option; Every Spring)
Survey of typical language development, major theoretical perspectives about development, and analyses of children's language.

SLHS 3304. Phonetics. (3 cr.; Student Option; Every Spring)
Phonetic transcription of speech produced by children and adults who speak a variety of the world's languages. Extensive practice with transcription. Phonetic theory, including theories of phonetic variation over the lifespan and across the world's languages. A strong emphasis on developing fluency in phonetic transcription, and on appreciating the limits of this skill. Introduction to socially meaningful phonetic variation.

SLHS 3305W. Speech Science. (WI; 3 cr.; Student Option; Every Fall)
Survey of theories, methods, and research in speech science. Emphasis is on the acoustics of speech production and speech perception. Writing assignments focus on communicating theory and clinical aspects of speech communication to professional and to the lay public.

SLHS 3306. Hearing Science. (3 cr.; Student Option; Every Spring)
Theories, methods, and research in physiological and psychological acoustics. Emphasizes relation between physiological measures and perception. Cochlear mechanics, auditory nerve firing patterns, scaling, and object perception. prereq: [3302, 3305W] or instr consent

SLHS 3401. Communication Differences and Disorders. (SOC; 3 cr.; Student Option; Every Fall & Spring)
Introduction to normal and disordered cognition and communication in regards to hearing, speech, and language in pediatric and adult populations. Specific focus on functional communication, assessment, and intervention as it relates to socially, culturally, and linguistically diverse populations.

SLHS 3402V. Major Project in Speech-Language-Hearing Sciences Honors. (WI; 3 cr. [max 6 cr.]; A-F only; Every Spring)
Seminar for completion of undergraduate major project. Emphasis on development of writing skills and service learning.

SLHS 3402W. Major Project in Speech-Language-Hearing Sciences. (WI; 3 cr.; S-N or Audit; Every Spring)
Seminar for completion of undergraduate major project. Emphasis on development of writing skills and service learning.

SLHS 3555H. Honors Thesis. (1-12 cr.; A-F or Audit; Every Fall & Spring)
Research/writing under direction of faculty member. Details of work are determined in consultation with faculty thesis adviser selected based on availability/topic. prereq: See dir of undergraduate studies for [thesis adviser, forms]

SLHS 3994. Directed Research. (1-10 cr.; max 24 cr.) (WI; Student Option; Every Fall, Spring & Summer)
Lab preq: Undergrad doing research

SLHS 4301. Introduction to the Neuroscience of Human Communication. (3 cr.; Student Option; Every Spring)
Basic neuroanatomy and neuropsychology, especially as they relate to normal speech, language, and hearing processes.

SLHS 4402. Assessment and Treatment in Speech-Language Pathology. (3 cr.; A-F or Audit; Every Fall)
Introduction to clinical methods and issues in communication disorders. Professional and legal mandates, collection and analysis of clinical data, principles and models of intervention with adults and children, and clinical reporting. prereq: [3302, 3303, 3304, 4301] (either before registration for 4402 or concurrent registration is required (or allowed) in 4402), or grad student, or instr consent

SLHS 4801. Hearing Measurement and Disorders. (3 cr.; Student Option; Every Fall)
Introduction to theory, administration, and interpretation of behavioral and physiological hearing tests for all age groups. Immittance, pure tone, speech, otocoustic emissions, evoked potential measures. Hearing-screening protocols. preq: [3302, 3305W] or instr consent

SLHS 4802. Rehabilitative Audiology. (3 cr.; Student Option; Every Spring)
Survey of sensory aids and methods used in audiologic intervention across the life span after diagnosis of hearing loss. Impact of hearing loss, developmental level, communication modalities, client and family choice, disability and handicap, and linguistically and culturally diverse populations.

SLHS 5401. Counseling and Professional Issues. (3 cr.; Student Option; Every Fall)
Basic counseling principles and current professional issues related to practice in a dynamic multicultural environment. Application of counseling theory to clinical practice. Analysis of regulation, practice, and future direction of communication disorders. preq: [(concurrent registration is required (or allowed) in 8720 or concurrent registration is required (or allowed) in 8820), grad student] recommended

SLHS 5502. Voice and Cleft Palate. (3 cr.; Student Option; Every Spring)
Disordered voice and resonance. Presentation and discussion of the nature of etiologies, assessment and management of organic/functional voice disorders and cleft palate to meet clinical competencies for speech-language pathology, preq: [3305, 4301] or [CDs 3305, CDs 4301] or instr consent

SLHS 5503. Fluency and Motor Speech Disorders. (3 cr.; Student Option; Every Fall)
Nature/management of stuttering and other speech disorders in adults/children. preq: graduate SLHS student or department permission, [3305, 4301] or instr consent

SLHS 5504. Evaluation and Management of Dysphagia. (2 cr.; Student Option; Every Fall)

SLHS 5602. Speech Sound Disorders: Assessment and Treatment across Languages. (3 cr.; Student Option; Every Fall)
Nature, assessment, and treatment of speech sound disorders in children. Assessment and treatment of phonological awareness and pre-literacy skills. This course covers cross-linguistic issues in speech sound disorders, including characteristics of speech sound disorders in a variety of languages, and the differential diagnosis of speech sound disorder from the effects of normal second-language acquisition. Emphasis on functional speech sound disorders, with some coverage given to disorders of a clear organic origin, like cerebral palsy, hearing impairment, and cleft palate. preq: [3303, 3304, 4601] or instr consent

SLHS 5603. Assessment and Intervention of Language Disorders in Children. (3 cr.; Student Option; Periodic Fall & Spring)
Assessment and intervention techniques approaches for treating language impairment in children with disabilities, such as specific language impairment, developmental delays, and autism spectrum disorder. preq: 3303 or CDs 3303 or equiv or grad student or instr consent

SLHS 5605. Language and Cognitive Disorders in Adults. (3 cr.; Student Option; Periodic Fall & Spring)
Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Behavioral, physiological approaches to assessment and identification, development of the auditory mechanism, etiologies of hearing losses in infants, children, principles of case management with children and families. preq: [4801 or CDIS 4801, SLHS grad] or instr consent

**SLHS 5804. Cochlear Implants.** (3 cr.; A-F or Audit; Periodic Spring) Implantable auditory prostheses. History of device development, including cochlear implants and auditory brainstem implants. Signal processing. Techniques for selection, fitting, and rehabilitation. Behavioral/physiological changes across life span. preq: [4802, 5801, 5802] or [CDIS 4802, CDIS 5801, CDIS 5802]. SLHS grad] or instr consent


**SLHS 5806. Auditory Processing Disorders.** (3 cr.; A-F or Audit; Fall Every Year) Normal and disordered auditory processing abilities. Anatomy and physiology of central auditory pathway, assessments to evaluate auditory processing skills, techniques to address auditory processing weaknesses. Current and historical theories and controversies surrounding auditory processing assessment. preq: [4802 or CDIS 4802, SLHS grad] or instr consent


**SLHS 5808. Pathophysiology of Hearing Disorders.** (3 cr.; A-F or Audit; Summer Odd Year) Disorders of auditory system, including anatomical, physiological, perceptual, and audiological manifestations of pathologies affecting hearing. Focus will be on understanding current data on physiology, pharmacology, and novel treatment alternatives. preq: [8801, 8802] or [CDIS 8801, CDIS 8802].

**SLHS 5810. Laboratory Module in Audiology.** (1-2 cr. max 5 cr.) Intensive study of clinical methods in audiology. Supplements didactic courses in audiology curriculum. Laboratory study, individually or in small groups. Students enroll in this course concurrently with SLHS 5801, 5802, 8801, 8802. preq: [4801 or CDIS 4801, SLHS grad] or instr consent

**SLHS 5820. Clinical Research and Practice: Grand Rounds.** (1-6 cr.; S-N or Audit; Every Fall & Spring) Group discussions of current professional issues in audiology. Case presentations, guest presentations on current technology, research ethics. Group meets an hour weekly with faculty coordinator who leads discussion. Integrates academic/clinical education. preq: [4801 or CDIS 4801] or equivalent, SLHS grad] or instr consent

**SLHS 5830. Clinical Foundations in Audiology.** (1-8 cr. max 24 cr.) S-N or Audit; Every Fall, Spring & Summer) Clinical foundations in audiology for first year AuD graduate students. preq: Grad SLHS major

**SLHS 5900. Topic in Speech-Language-Hearing Sciences.** (3 cr.; max 6 cr.) Student Option; Periodic Fall & Spring) Topics listed in Speech-Language-Hearing Sciences office. preq: SLHS grad student or instr consent

**SLHS 5993. Directed Study.** (1-12 cr. max 18 cr.) Student Option; Every Fall, Spring & Summer) Directed readings and preparation of reports on selected topics. preq: SLHS grad or instr consent

**SLHS 8333. FTE: Masters.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) Advanced study exploring application of experimental and quasi-experimental research designs used in single-subject and group research.

**SLHS 8420. Seminar: Teaching.** (3 cr.; A-F) Student Option; Periodic Fall & Spring) Advanced study to prepare doctoral students for careers in undergraduate and graduate teaching. preq: Grad com dis major

**SLHS 8430. Proseminar in Speech-Language-Hearing Sciences.** (1-6 cr. max 60 cr.) S-N only; Every Fall & Spring) Presentations/discussions led by faculty and PhD students in the department, based on research or issues in the discipline.

**SLHS 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) Advanced study exploring application of experimental and quasi-experimental research designs used in single-subject and group research.

**SLHS 8501. Interdisciplinary Management in Cleft Palate and Craniofacial Disorders.** (3 cr.; Student Option; Every Fall) Communication problems associated with cleft palate and craniofacial disorders within interdisciplinary context; structural bases for speech problems, and physical and behavioral approaches to speech treatment; interdisciplinary medical and dental concerns

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and management. prereq: 3305 or CDis 3305 or instr consent
SLHS 8530. Seminar: Speech. ( ; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Advanced study and analysis of research in speech science and speech pathology.

SLHS 8602. Traumatic Brain Injury. ( ; 3 cr.; Student Option; Periodic Fall) Survey of communicative and cognitive disorders in adults who have traumatic brain injuries. Demographics, neuropathologic substrates, assessment and diagnosis, clinical applications, prereq: [3302, 4301] or [CDIS 3302, CDIS 4301] or instr consent

SLHS 8630. Seminar: Language. ( ; 3 cr. [max 12 cr.]; Student Option; Periodic Fall & Spring) Research in language acquisition, language science, and language disorders.

SLHS 8666. Doctoral Pre-Thesis Credits. ( ; 1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SLHS 8720. Clinical Education in Speech-Language Pathology. (1-8 cr. [max 24 cr.]; S-N or Audit; Every Fall, Spring & Summer) Clinical experience. Prereq Grad CDis major, adviser, DGS consent.

SLHS 8777. Thesis Credits: Master's. ( ; 1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SLHS 8801. Electrophysiologic Assessment of Auditory Function. ( ; 3 cr.; Student Option; Every Spring) Basic terminology and theoretical aspects of the auditory evoked potentials, electrocochleography, acoustic reflectance, and otoacoustic emissions. Topics include case studies with clinical application of short-latency responses such as the auditory brainstem response and otoacoustic emissions in adults. Students enrolled in this course concurrently enroll in SLHS 5810. prereq: 5801 or CDIs 5801 or instr consent

SLHS 8802. Hearing Aids II. ( ; 3 cr.; Student Option; Every Spring) Instrumentation and methods for fitting and evaluating personal hearing aids; ear impression techniques and materials; repair and modification of hearing aids. prereq: 5802 or Cdis 5802 or instr consent

SLHS 8803. Signals and Systems in Audiology. ( ; 3 cr.; Student Option; Every Fall) This mostly laboratory class includes familiarization and application of test equipment and methods for calibrating audiometric equipment. Sessions will include topics such as sound-field calibration, earphone calibration, filters, spectra of transient signals, and use of an artificial mastoid. prereq: [3305, 3306, 4801] or [CDIS 3305, CDIS 3306, CDIS 4801] or instr consent

SLHS 8805. Hearing Science Foundations of Audiology. ( ; 3 cr.; Student Option; Periodic Fall) Physiological/psychological acoustics. Emphasizes hearing loss. Acoustics of the middle and external ear, cochlear mechanics, neural codes for perception, frequency selectivity, loudness, temporal resolution, clear speech, attention, prediction of speech understanding ability using stimulus measures, and binaural hearing. prereq: Knowledge of acoustics, basic anatomy/physiology of ear, intro coursework in hearing/speech science

SLHS 8806. Audiology Capstone. ( ; 1-6 cr.; S-N or Audit; Periodic Fall) Students research a case history of patient with an auditory disorder, write paper that summarizes the literature on the disorder, and recommend assessment tools and treatment plans. prereq: 8802, 8807

SLHS 8807. Balance Assessment. ( ; 3 cr.; Student Option; Spring Odd Year) Anatomy/physiology of vestibular mechanism. Assessment techniques to evaluate balance function. Treatment options available for persons with balance disorders. prereq: 5801, 8801

SLHS 8820. Clinical Education in Audiology. ( ; 1-8 cr. [max 24 cr.]; S-N or Audit; Every Fall, Spring & Summer) Clinical experience. prereq: Grad CDIs major

SLHS 8830. Seminar: Hearing. ( ; 3 cr. [max 12 cr.]; Student Option; Periodic Fall, Spring & Summer) Advanced study and research in research in hearing science and audiology.

SLHS 8840. Audiology Externship. ( ; 1-7 cr.; S-N or Audit; Periodic Fall & Spring) Students intern at external clinical setting under supervision of certified audiologist. Entry-level knowledge and skills required for professional practice as clinical audiologist. External internship settings may include hospitals, schools, private otolaryngology practices, hearing aid dispensing practices, industrial settings, or community clinics. prereq: [8802, 8807] or [CDIS 8802, CDIS 8807]

SLHS 8888. Thesis Credit: Doctoral. ( ; 1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required.

SLHS 8994. Directed Research. ( ; 1-12 cr. [max 18 cr.]; Student Option; Every Fall, Spring & Summer) Directed research prereq: instr consent

Sport Management (SMGT)

SMGT 1701. Introduction to Sport Management. ( ; 2 cr.; A-F or Audit; Every Fall & Spring) Scope/motive of the study of sport from sociological, psychological, historical, economic, and scientific perspective. Issues in sport.

SMGT 1904. Freshman Seminar: Global Perspectives. (GP; 3 cr.; Student Option; Periodic Fall & Spring) Reading, discussion, critical analysis, writing about global perspectives. Intensive, small-group setting. prereq: Fr

SMGT 1905. Freshman Seminar. ( ; 1-3 cr. [max 6 cr.]; Student Option No Audit; Every Fall & Spring) Interdisciplinary seminar. Topics specified in Class Schedule. prereq: Fr

SMGT 2751. Sport and Wellness in China. ( ; 3 cr.; A-F only; Every Summer) Course covers international and governing body selection of host market, economic impact of hosting a sport event, media, communications, working with athletes, marketing, event operations, host politics and culture. Students will also participate in wellness and rec as presented by our Chinese partners.

SMGT 3111. Sports Facility and Event Management. ( ; 3 cr.; A-F or Audit; Every Fall & Spring) Aspects of managing sport facilities/events. Conceptualization of sports events. Event management planning process, budgeting, site selection, booking, ticketing, sponsorship. prereq: SMGT major or instr consent

SMGT 3143. Organization and Management of Sport. ( ; 3 cr.; A-F only; Every Fall & Spring) Principles, policies, and procedures in administration and management of sports programs at interscholastic/intercollegiate levels. prereq: SMgt major

SMGT 3421. Business of Sport. ( ; 3 cr.; A-F or Audit; Every Fall & Spring) Financial aspects of sport. Revenue producing strategies, budget preparation/analysis, controlling expenses. Tax support, municipal bonds, ticket sales, concessions, merchandising. Media, fund raising, prereq: SMGT or kin or rec major or instr consent

SMGT 3501. Sport in a Diverse Society. (DSJ,SOCS; 3 cr.; A-F only; Every Fall & Spring) Relationship between sport and contemporary social institutions. Groups/individuals who have historically been marginalized or excluded from sport participation. Race, sex, social class, sexual orientation, physical (dis)abilities.

SMGT 3501H. Sport in a Diverse Society: Honors. (DSJ,SOCS; 3 cr.; A-F only; Every Fall & Spring) Pervasive and significant relationships between social constructions of sport and physical activity to contemporary social institutions such as politics, religion, economics, education, and mass media. Social issues related to sport. How specific social categories (e.g., age, gender, race, social class) intersect to influence participation/experiences of individuals within

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sport/physical activity contexts. prereq: Honors student

SMGT 3601. Ethics and Values in Sport. (3 cr.; A-F or Audit; Every Fall & Spring) Violence, demonstrative behavior, sportsmanship. Ethical issues in playing of sport and in management/governance of sport industry. prereq: SMGT major

SMGT 3631. Sport Marketing. (3 cr.; A-F or Audit; Every Fall & Spring) Fundamental theories/issues in sport marketing, grounded in traditional marketing principles. Unique applications to sport business industry. prereq: SMGT major or instr consent

SMGT 3632. Sport Sales and Fund-raising. (3 cr.; A-F only; Every Fall, Spring & Summer) Foundation of revenue production in sport management. Necessary skills related to revenue production and sales processes as they apply to the business of sport. prereq: Sport Management major or instr consent

SMGT 3741. Sustainability through Sport. (2 cr.; A-F only; Every Summer) Sport attracts literally millions of followers around the world, in the United States alone the NRDC, makes note of the following, ?13% of Americans follow science, but 63% follow sports?. Sport has a unique and unparalleled influence globally over not just people but industries. Over the past few years the sport industry has embraced increasingly visible and influential positions supporting sustainability and environmental protection, and this course will focus on the sport industry and its conquest to be a leader in the field of ?green?. Specifically focusing on the initiatives of Major League Baseball (MLB), which has in conjunction with its professional counterparts have made statements on the record that encourage all clubs and venues to address ecological issues including climate change, energy efficiency, water conservation, waste reductions, and selection of more environmentally friendly supplies.

SMGT 3861. Sport and Recreation Law. (3 cr.; A-F only; Every Fall & Spring) U.S. legal system, its structure/terminology. Sport and Recreation legal aspects of contract law, statutory law, constitutional law, intellectual property, negligence, risk management. Managerial analysis, decision making. prereq: SMGT or REC major or instr consent

SMGT 3881W. Senior Seminar in Sport Management. (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Presentations/discussions on sport-related topics of interest.

SMGT 3993. Directed Study in Sport Management. (1-13 cr.; A-F only; Every Fall, Spring & Summer) Students work with faculty and grad students on research, scholarly, or creative activities. Students assist with faculty scholarship or carry out projects under faculty supervision. prereq: Undergrad, instr consent

SMGT 3996. Practicum: The Sport Experience. (2-8 cr.; S-N only; Every Fall, Spring & Summer) Practical experience in one or more sport settings. prereq: 3881, SMGT major, instr consent

Statistics (STAT)

STAT 1001. Introduction to the Ideas of Statistics. (MATH; 4 cr.; Student Option; Every Fall, Spring & Summer) Graphical/numerical presentations of data. Judging the usefulness/reliability of results/ inferences from surveys and other studies to interesting populations. Coping with randomness/variation in an uncertain world. prereq: Mathematics requirement for admission to University

STAT 1905. Freshman Seminar. (3 cr.; max 6 cr.; A-F or Audit; Periodic Fall) Topics specified in Class Schedule.


STAT 3021. Introduction to Probability and Statistics. (3 cr.; Student Option; Every Fall, Spring & Summer) This is an introductory course in statistics whose primary objectives are to teach students the theory of elementary probability theory and an introduction to the elements of statistical inference, including testing, estimation, and confidence statements. prereq: Math 1272

STAT 3022. Data Analysis. (4 cr.; Student Option; Every Fall & Spring) Practical survey of applied statistical inference/covering widely used statistical tools. Multiple regression, variance analysis, experiment design, nonparametric models, model checking/selection, variable transformation, categorical data analysis, logistic regression. prereq: 3011 or 3021 or SOC 3811

STAT 3032. Regression and Correlated Data. (4 cr.; Student Option; Every Fall & Spring) This is a second course in statistics with a focus on linear regression and correlated data. The intent of this course is to prepare students, economics and actuarial science students for statistical modeling needed in their discipline. The course covers the basic concepts of linear algebra and computing in R, simple linear regression, multiple linear regression, statistical inference, model diagnostics, transformations, model selection, model validation, and basics of time series and mixed models. Numerous datasets will be analyzed and interpreted using the open-source statistical software R. prereq: STAT 3011 or STAT 3021

STAT 3501. Internship in Statistical Practice. (1 cr. [max 2 cr.]; S-N only; Every Fall, Spring & Summer) Internship for statistics undergraduate students, in the university or in the community with supervision provided by statistics faculty and on-site mentors. prereq: Statistics Major

STAT 3701. Introduction to Statistical Computing. (3 cr.; A-F only; Every Fall & Spring) Elementary Monte Carlo, simulation studies, elementary optimization, programming in R, and graphics in R.

STAT 4051. Applied Statistics I. (4 cr.; A-F only; Every Fall & Spring) This is the first semester of the Applied Statistics sequence for majors seeking a BA or BS in statistics. The course introduces a wide variety of applied statistical methods, methodology for identifying types of problems and selecting appropriate methods for data analysis, to correctly interpret results, and to provide hands-on experience with real-life data analysis. The course covers basic concepts of single factor analysis of variance (ANOVA) with fixed and random effects, factorial designs, analysis of covariance (ANCOVA), repeated measures analysis with mixed effect models, principal component analysis (PCA) and multidimensional scaling, robust estimation and regression methods, and rank tests. Numerous datasets will be analyzed and interpreted, using the open-source statistical software R and Rstudio. prereq: STAT 3032 And Stat 3701 And Stat 4101 or 5101

STAT 4052. Applied Statistics II. (4 cr.; A-F only; Every Fall & Spring) This is the second semester of the core Applied Statistics sequence for majors seeking a BA or BS in statistics. Both Stat 4051 and Stat 4052 are required in the major. The course introduces a wide variety of applied statistical methods, methodology for identifying types of problems and selecting appropriate methods for data analysis, to correctly interpret results, and to provide hands-on experience with real-life data analysis. The course covers basic concepts of classification, both classical methods of linear classification rules as well as modern computer-intensive methods of classification trees, and the estimation of classification errors by splitting data into training and validation data sets; non-linear parametric regression; nonparametric regression including kernel estimates; categorical data analysis; logistic and Poisson regression; and adjustments for missing data. Numerous datasets will be analyzed and interpreted, using the open-source statistical software R and Rstudio.


STAT 4893W. Consultation and Communication for Statisticians. (WI; 3 cr.; A-F only; Every Fall & Spring)
This course focuses on how to interact and collaborate as a statistician on a multidisciplinary team. Students will learn about all aspects of statistical consulting by performing an actual consultation. This includes: understanding the needs of the researcher, designing a study to investigate the client’s needs, and communicating study results through graphs, writing, and oral presentations in a manner that a non-statistician can understand. Students will also discuss how to design research ethically (respecting the rights of the subjects in the research), how to analyze data without manipulating results, and how to properly cite and credit other people's work. Students will also be exposed to professional statisticians as a means of better understanding careers in statistics. prereq: Senior Statistics Major

STAT 5021. Statistical Analysis. (; 4 cr.; Student Option; Every Fall & Spring)
Intensive introduction to statistical methods for graduate students needing statistics as a research technique. prereq: Credit will not be granted if credit has been received for: 3011; College algebra or instr consent; Stat course recommended

STAT 5031. Statistical Methods for Quality Improvement. (; 4 cr.; Student Option; Periodic Spring)
Random variability/sampling. Controlling statistical process. Shewhart/accumulative charting. Analyzing plant data, trend surface, and variance/design of experiments. prereq: [3021 or 3022 or 4102 or 5021 or 5102 or 8102], Math 1272

STAT 5101. Theory of Statistics I. (; 4 cr.; Student Option; Every Fall)
Logical development of probability, basic issues in statistics. Probability spaces. Random variables, their distributions and expected values. Law of large numbers, central limit theorem, generating functions, multivariate normal distribution. prereq: [Math 2263 or Math 2374 or Math 2573H], [CSCI 2033 or Math 2273 or Math 2243]

STAT 5102. Theory of Statistics II. (; 4 cr.; Student Option; Every Spring)
Sampling, sufficiency, estimation, test of hypotheses, size/power. Categorical data, Contingency tables. Linear models. Decision theory. prereq: 5101 or Math 5651

STAT 5201. Sampling Methodology in Finite Populations. (; 3 cr.; Student Option; Every Spring)
Simple random, systematic, stratified, unequal probability sampling. Ratio, model based estimation. Single stage, multistage, adaptive cluster sampling. Spatial sampling. prereq: 3022 or 4102 or 5021 or 5102 or instr consent

STAT 5302. Applied Regression Analysis. (; 4 cr.; Student Option; Every Fall, Spring & Summer)
Simple, multiple, and polynomial regression. Estimation, testing, prediction. Use of graphics in regression. Stepwise and other numerical methods. Weighted least squares, nonlinear models, response surfaces. Experimental research/applications. prereq: 3022 or 4102 or 5021 or 5102 or instr consent

STAT 5303. Designing Experiments. (; 4 cr.; Student Option; Every Fall, Spring & Summer)
Analysis of variance. Multiple comparisons. Variance-stabilizing transformations. Contrasts. Construction/analysis of complete/incomplete block designs. Fractional factorial designs. Confounding split plots. Response surface design. prereq: 3022 or 4102 or 5021 or 5102 or instr consent

STAT 5401. Applied Multivariate Methods. (; 3 cr.; Student Option; Periodic Fall)

STAT 5421. Analysis of Categorical Data. (; 3 cr.; Student Option; Every Fall & Spring)

STAT 5511. Time Series Analysis. (; 3 cr.; Student Option; Every Fall)

STAT 5601. Nonparametric Methods. (; 3 cr.; Student Option; Every Fall & Spring)
Order statistics. Classical rank-based procedures (e.g., Wilcoxon, Kruskal-Wallis). Goodness of fit. Topics may include smoothing, bootstrap, and generalized linear models. prereq: 3022 or 4102 or 5021 or 5102 or instr consent

STAT 5701. Statistical Computing. (3 cr.; A-F or Audit; Every Fall)
Statistical programming, function writing, graphics using high-level statistical computing languages. Data management, parallel computing, version control, simulation studies, power calculations. Using optimization to fit statistical models. Monte Carlo methods, reproducible research. prereq: (Stat 5102 or Stat 8102) and (Stat 5021 or STAT 8051) or consent

STAT 5931. Topics in Statistics. (; 3 cr.; Student Option; Periodic Fall)
Topics vary according to student needs and available staff.}

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STAT 8111. Mathematical Statistics I. (3 cr.; Student Option; Every Fall) Probability theory, basic inequalities, characteristic functions, and exchangeability. Multivariate normal distribution. Exponential family. Decision theory, admissibility, and Bayes rules. prereq: [5102 or 8102 or instr consent], [(Math 5615, Math 5616) or real analysis], matrix algebra.


STAT 8141. Probability Assessment. (3 cr.; Student Option; Periodic Spring) Probability as a language of uncertainty for quantifying and communicating expert opinion and for use as Bayesian prior distributions. Methods for elicitation and construction of subjective probabilities. De Finetti coherence, predictive elicitation, fitting subjective-probability models, computer-aided elicitation, and use of experts. prereq: 5102.

STAT 8171. Sequential Analysis. (3 cr.; Student Option; Periodic Fall) Wald's sequential probability ratio test and modifications. Sequential decision theory. Martingales. Sequential estimation, design, and hypothesis testing. Recent developments. prereq: 8112.

STAT 8201. Topics in Sampling. (3 cr.; S-N or Audit; Periodic Fall) Sampling theory; stratified sampling, ratio estimators, cluster sampling, double sampling, superpopulation theory, Bayesian methods, multiple imputation, nonresponse. prereq: 8102 or instr consent.

STAT 8311. Linear Models. (4 cr.; Student Option; Every Fall) General linear model theory from a coordinate-free geometric approach. Distribution theory, ANOVA tables, testing, confidence statements, mixed models, covariance structures, variance components estimation. prereq: Linear algebra, 5102 or 8102 or instr consent.

STAT 8312. Linear and Nonlinear Regression. (3 cr.; Student Option; Periodic Fall) Nonlinear regression: asymptotic theory, Bates-Watts curvatures, super leverage, parameter plots, projected residuals, transform-both-sides methodology, Wald versus likelihood inference. Topics in linear and generalized linear models as they relate to nonlinearity issues, including diagnostics, semi-parametric models, and model assessment. prereq: 8311.

STAT 8313. Topics in Experimental Design. (3 cr.; Student Option; Periodic Fall) Optimal, Bayes, and nonlinear designs; algorithms for computing designs; sample size; recent developments. prereq: 8311.


STAT 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent.


STAT 8411. Multivariate Analysis. (3 cr.; Student Option; Periodic Fall & Spring) Multivariate normal distribution. Inference on the mean, covariance, and correlation and regression coefficients; related sampling distributions such as Hotelling's T-squared and Wishart distributions. Multivariate analysis of variance. Principal components and canonical correlation. Discriminant analysis. prereq: 8152.

STAT 8421. Theory of Categorical Data Analysis. (3 cr.; Student Option; Periodic Fall) Categorical data, multidimensional cross-classified arrays, mixed categorical and continuous data. Loglinear, logit, and multinomial response models. Ordinal responses. Current research topics. prereq: 8062 or instr consent.

STAT 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent.

STAT 8501. Introduction to Stochastic Processes with Applications. (3 cr.; Student Option; Periodic Fall) Markov chains in discrete and continuous time, renewal processes, Poisson process, Brownian motion, and other stochastic models encountered in applications. prereq: 5101 or 8101.

STAT 8511. Time Series Analysis. (3 cr.; Student Option; Periodic Fall) Characteristics of time series. Stationarity. Second-order descriptions. Time-domain representation, ARIMA/GARCH models. Frequency domain representation, univariate/multivariate analysis. Periodograms, non-parametric spectral estimation, state space models. prereq: 5102 or 8111 or instr consent (max 12 cr.; 3 cr. max 12 cr.; S-N or Audit; Every Fall & Spring).

STAT 8666. Doct Pre-Thesis Cr. (1-6 cr.; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; dept consent for 3rd/4th registrations, up to 24 combined cr.; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.

STAT 8701. Computational Statistical Methods. (3 cr.; Student Option; Every Spring) Random variate generation, variance reduction techniques. Robust location estimation and regression, smoothing additive models, regression trees. Programming projects; basic programming ability and familiarity with standard high-level language (preferably FORTRAN or C) are essential. prereq: 8311, programming exper.

STAT 8711. Statistical Computing. (3 cr.; Student Option; Periodic Fall) Basic numerical analysis for statisticians. Numerical methods for linear algebra, eigenanalysis, integration, and optimization and their statistical applications. prereq: 8701 or instr consent.

STAT 8721. Programming Paradigms and Dynamic Graphics in Statistics. (3 cr.; Student Option; Periodic Fall) Alternative programming paradigms to traditional procedural programming, including object-oriented programming and functional programming. Applications to development of dynamic statistical graphs and representation and use of functional data, such as mean function in nonlinear regression log likelihoods and prior densities in Bayesian analysis. prereq: 8062, 8102.

STAT 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only].

STAT 8801. Statistical Consulting. (3 cr.; S-N or Audit; Every Fall & Spring) Principles of effective consulting/problem-solving, meeting skills, reporting. Aspects of professional practice/behavior, ethics, continuing education. prereq: STAT 8051 and STAT Grad Student or Instructor Consent.

STAT 8811. Statistical Consulting Practicum. (3 cr.; max 12 cr.; S-N or Audit; Every Fall & Spring) Providing (under faculty supervision) statistical support to clients, primarily University researchers. Exercises in problem solving, ethics, listening/communication skills. prereq: Statistics grad student or instr consent.

STAT 8821. Curricular Practical Training. (1 cr.; max 3 cr.; S-N only; Every Fall, Spring & Summer) Industrial work assignment using advanced statistical techniques. Grade based on final report and presentation covering work assignment. prereq: Statistics grad student, dept consent.

STAT 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall & Spring).
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SCB 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Fall, Spring & Summer) FTE: master's prerequisite; Master's student, adviser consent, DGS consent

SCB 8777. Thesis Credits: Master's. (1-18 cr.; [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) Thesis credits: master's

**Studies in Cinema Media Culture (SCMC)**

SCMC 1201W. Cinema. (AH, WI; 4 cr.; Student Option; Every Fall & Spring) Introduction to the critical study of the visual in modernity, presented through sustained analysis of the cinema and cinematic codes. Emphasizes on formal film analysis and major film movements and conventions in the international history of cinema. Students develop a vocabulary for formal visual analysis and explore major theories of the cinema.

SCMC 1202W. Media: Word, Image, Sound. (AH, WI; 4 cr.; Student Option; Every Fall & Spring) Introduction to the critical and theoretical study of media and technology from Aristotle to the modern world. The first half of the course emphasizes theoretical readings in dialogue with historical apparatuses (printing press, photography, radio, cinema, television) and various expressive objects (the bible, early film, ethnographic sound recordings). The second half turns to the modern culture industry since World War II, and introduces students to the critical study of mass culture, the concept of ideology, and of the relationship between corporate power and media conglomerates.

SCMC 3001W. History of Cinema and Media Culture. (WI; 4 cr.; Student Option; Every Fall & Spring) Genealogy of cinema in relation to other media, notably photography, radio, television/video and the Internet. Representative films from decisive moments in global development of cinema. Rise/fall of Hollywood studio system, establishment of different national cinemas, cinematic challenges to cultural imperialism, emergence of post-cinematic technologies.


SCMC 3202. Intermediate Digital Filmmaking. (4 cr.; A-F only; Every Spring) Students complete a film of any length, 24 frames or feature-length. Emphasizes formal analysis of frames, shots, sequences, and relations of unit (frame or shot) to whole. prereq: 3201 or instr consent

SCMC 3220. Screen Cultures. (3 cr.; Student Option; Every Spring) Study of the ways that technologies of film, television, and computing have shaped the twentieth and twenty-first centuries, especially our forms of cultural expression and identity. These topics are approached from both critical and historical perspectives in order to explore the complex relationship between media technologies and audiences.

SCMC 3993. Directed Study. (1-3 cr.; [max 6 cr.]; Student Option; Every Fall & Spring) Guided individual reading or study.

SCMC 4993. Directed Study. (1-3 cr.; [max 6 cr.]; Student Option; Every Fall & Spring) Guided individual reading or study.

SCMC 5001. Critical Debates in the Study of Cinema and Media Culture. (4 cr.; Student Option; Every Fall & Spring) Basic concepts in historical/international debates over production/reception of media culture. Emphasizes cinema. Advanced orientation toward intellectual traditions that inform contemporary scholarship.

SCMC 5002. Advanced Film Analysis. (4 cr.; A-F only; Every Fall) Application of textual analysis to the reading of a film. Students work collaboratively to discern and interpret all component aural/visual elements of what the film says and how it says it. prereq: [1201 or ARTH 1921W or CSCL 1201 or CSCL 1921 or equiv coursework]; SCMC major

SCMC 5993. Directed Study. (1-3 cr.; [max 6 cr.]; Student Option; Every Fall & Spring) Guided individual reading or study.

**Studies of Science and Tech (SST)**

SST 8000. Colloquium. (.5 cr.; [max 3 cr.]; S-N or Audit; Every Fall & Spring) Series of weekly lectures by nationally and internationally known scholars with diverse disciplinary and methodological backgrounds speaking on a variety of issues. prereq: Grad SST minor

SST 8100. Seminar: Models, Theories, and Reality. (3 cr.; Student Option; Every Fall & Spring) Students participate in ongoing research on the role of models and theories in science, and prepare and present research papers. prereq: HSCI 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or instr consent

SST 8200. Seminar: Philosophy of the Physical Sciences. (3 cr.; [max 6 cr.]; Student Option; Periodic Fall) Students participate in ongoing research in history, philosophy, and social study of physical sciences and prepare and present research papers. prereq: instr consent

SST 8300. Seminar: The Biological and Biomedical Sciences. (3 cr.; Student Option; Every Fall & Spring) Students participate in ongoing research in history, philosophy, and social study of biological and biomedical sciences, and prepare and present research papers. prereq: HSCI 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or instr consent
Inflation, structural change, poverty, changes in the external/rural sector. Taught in English.

ARGN 3005. Buenos Aires: City of the Arts. (3 cr; A-F only; Every Fall & Spring)
Unique artistic side of Buenos Aires. Theory classes, art/literature workshops. Excursions to museums, theaters, tango clubs, and opera houses. European and Latin American influences that make the city unique. Taught in English.

ARGN 3006. Topics in Argentine History. (3 cr; A-F only; Every Fall & Spring)
Study Argentina's history. Main topics include the legacy of Peron, the army in politics and government, the return of democracy, and current events. Taught in English.

ARGN 3008. Latin American Literature and Cinema. (3 cr; max 6 cr; A-F only; Every Fall & Spring)

ARGN 3009. Argentina: Stereotypes and Identity. (3 cr; Student Option; Every Fall, Spring & Summer)
Inter-cultural perspectives on Argentina. How others perceive Argentines and how Argentines perceive themselves, through literature, humor, art, music, and history. Prereq: 1004

ARGN 3015. Spanish Composition and Communication. (4 cr; max 8 cr; A-F only; Every Fall, Spring & Summer)
Writing, speaking, reading, and understanding modern Spanish at level of majors/minors. Students generate compositions and read texts from Spain and Latin America. Grammar review, audio tape exercises, paired work, small group work, discussion, oral presentations, peer editing, process writing.

ARGN 3104W. Introduction to the Study of Hispamric Literatures. (WI; 3 cr; max 6 cr; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ARGN 3640. Service Learning in Buenos Aires: ENG. (3 cr; max 6 cr; Student Option; Every Fall, Spring & Summer)
Aims to develop skills in the non-governmental community service sector. Students work with non-governmental and community service organizations devoted to helping children/adults in impoverished urban areas, immigrants from border countries, and groups at high risk (women, children, seniors).

ARGN 3641. Service Learning in Buenos Aires: SPANISH. (3 cr; max 6 cr; Student Option; Every Fall, Spring & Summer)
Students work with non-governmental organizations and community service organizations to help children/adults in impoverished urban, immigrants from border countries, and groups at high risk (women, children, seniors).

ARGN 3752. International Marketing. (3 cr; max 6 cr; Student Option; Every Fall, Spring & Summer)
Study abroad course.

ARGN 4621. The Global Economy. (3 cr; max 6 cr; Student Option; Every Fall, Spring & Summer)
Study abroad course.


ARGN 1000. Language and Culture in Buenos Aires Program. (1-18 cr; max 54 cr; A-F only; Every Fall & Spring)
Study abroad.

ARGN 1001. Beginning Spanish I. (5 cr; A-F only; Every Fall & Spring)
Listening, speaking, reading, writing. Some cultural readings.

ARGN 1002. Beginning Spanish. (5 cr; A-F only; Every Fall & Spring)
Listening, speaking, reading, writing. Some cultural readings.

ARGN 1003. Intermediate Spanish III. (5 cr; A-F only; Every Fall & Spring)
Conversation, comprehension proficiency. Reading/writing through literary analysis and grammar review.

ARGN 1004. Intermediate Spanish IV. (5 cr; A-F only; Every Fall & Spring)
Conversation, comprehension proficiency. Reading/writing through literary analysis and grammar review.

ARGN 1002. Alternate Second Semester Spanish. (5 cr; max 10 cr; Student Option; Every Fall, Spring & Summer)
Study abroad.

ARGN 3000. Language and Culture in Buenos Aires Program. (1-18 cr; max 54 cr; A-F only; Every Fall & Spring)
Study abroad.

ARGN 3001. Colloquio Spanish. (3 cr; A-F only; Every Fall & Spring)
Spanish language in its spoken colloquial form. Variations based on age, social status, and regional background. Vocabulary, grammar, language characteristics.

ARGN 3003. Politics and Society in Latin America. (3 cr; A-F only; Every Fall & Spring)
Comparative analysis of social/political structures of Argentina and Latin America in 20th century. Taught in English.

ARGN 3004. Latin American Economy: The Argentine Perspective. (3 cr; A-F only; Every Fall & Spring)
Privatization, industrialization, and economic reforms in Latin America and Argentina.

Study Abroad in Florence (FLOR)

FLOR 1001. Beginning Italian. (5 cr; A-F only; Every Fall & Spring)
Listening, speaking, reading, communicative competence.

FLOR 1002. Beginning Italian. (5 cr; A-F only; Every Fall & Spring)
Listening, speaking, reading, communicative competence.

FLOR 1003. Intermediate Italian. (5 cr; A-F only; Every Fall & Spring)
Listening, speaking, reading, communicative competence.

FLOR 1004. Intermediate Italian. (5 cr; A-F only; Every Fall & Spring)
Listening, speaking, reading, communicative competence.

FLOR 1101. Drawing. (3 cr; A-F only; Every Fall & Spring)
Figure/object drawing. Materials, techniques.

FLOR 1102. Watercolor. (3 cr; A-F only; Every Fall & Spring)
Concepts of color, form imagery, line, composition, volume, and space. Use of watercolor as medium.

FLOR 1201. Beginning Drawing Studio. (3 cr; max 6 cr; Student Option; Every Fall, Spring & Summer)
Study abroad.

FLOR 1301. Figurative Sculpture. (3 cr; A-F only; Every Fall & Spring)
Three-dimensional work in figurative sculpture through means of clay and wax.

FLOR 1302. Oil Painting. (3 cr; max 6 cr; A-F only; Every Fall & Spring)
Beginning level oil painting for the Study Abroad in Florence program.
FLOR 1303. Life Drawing. (; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Life-drawing course on the Study Abroad in Florence program.

FLOR 1401. Introduction to Photojournalism. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3001. Italian Renaissance Art. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3002. Women and Italian Politics. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3003. Graphic Design and Visual Communication. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3004. Photography: Exploring Society Through the Camera’s Lens. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3005. History and Sociology of Modern Consumerism. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3006. Cross Cultural Psychology. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3007. Made in Italy: Retail Merchandising in Florence. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3008. Entrepreneurship: Small Businesses in Florence. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3009. Internships in Florence: A Comparative Approach to the Italian Workforce. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3010W. Literary Representations of Florence: Space, Self & Other. (WI; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3011. Bookmaking: The Art of the Book in Florence. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3040. The Impact of Globalization on European Markets. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Theoretical analysis of international trade/commerce.

FLOR 3100. Advanced Italian Grammar and Conversation. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3101. Intermediate Drawing. (; 3 cr.; A-F only; Every Fall & Spring) Study abroad course.

FLOR 3102. Intermediate Watercolor. (; 3 cr.; A-F only; Every Fall & Spring) Study abroad course.

FLOR 3201. Intermediate Drawing Studio. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3210. Renaissance Art History. (; 3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Study abroad course.

FLOR 3211. Contemporary Italian Literature. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3212. Medieval and Renaissance Italian Literature. (; 3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Study abroad course.

FLOR 3213. History of Italian Art From Antiquity to the Baroque. (; 3 cr.; A-F only; Every Fall & Spring) Foundation in history of art though painting, sculpture, and architecture.

FLOR 3214. History of Italian Art, From Early Renaissance to Early 20th Century. (; 3 cr.; A-F only; Every Spring) Study abroad course.

FLOR 3215. Italian Cinema: Contemporary Italy on the Screen. (; 3 cr.; A-F only; Every Fall & Spring) Study abroad course.

FLOR 3216. Understanding Modern Italy: A Comparative Approach to the Italian Workforce. (; 3 cr.; A-F only; Every Fall & Spring) Study abroad course.

FLOR 3217. Political and Economic History of Europe in the 20th Century. (; 3 cr.; A-F only; Every Fall & Spring) Not printed in catalog.

FLOR 3218. Great Works of Italian Literature. (; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Great works of Italian authors from 14th-20th Centuries. Students look at how Italian masterpieces have effected European culture as a whole.

FLOR 3335. Cross Cultural Psychology. (; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Communication/culture. How they relate to one another. Students use Italy and its culture as backdrop for learning intercultural awareness. Students reflect on their experiences in the culture as they are experiencing them.

FLOR 3336. Learning Through Internships: Florence. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3340. Italian for Interns. (; 4 cr. [max 8 cr.]; A-F only; Every Fall & Spring) Study abroad course.

FLOR 3342. Understanding Modern Italy (taught in Italian). (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

FLOR 3344. Italian-taught Great Works of Italian Literature. (; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

LNDN 3201. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

LNDN 3202. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

LNDN 3203. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

LNDN 3204. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

LNDN 3205. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

LNDN 3210. Historical Backgrounds of English Literature. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3211. Terror and the Witch: Fictions of Witchcraft from Shakespeare to Harry Potter. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3212W. Travel Writing: Topics in Composition. (WI; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.
LNDN 3213. 20th and 21st Century Art. (3 cr.; A-F only; Every Fall, Spring & Summer) Art movements and major artists of Modern period, 1900-1970. Various visual media in relation to theories, historic events, scientific/technological changes, and literature. Emphasizes European art. Influences from other cultures.

LNDN 3214. Modern Acting. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3215. British Theatre Now and Then. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3216. Practical Shakespeare Acting. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3217W. Writing the City: London. (WI; 3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3218. Contemporary British Film. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3219. London Across History, Literature and Film. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3220W. Contemporary World Architecture in London. (WI; 3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3221W. Writing a Play. (WI; 3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3222. Detective Fiction: Crime and the City. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3223. Special Studies in Economics: Globalization Studies. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3224. International Dimensions of Organizational Behavior. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3225. Issues in Global Economic Development. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3226. Religion in Modern Britain: A Comparative Perspective. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3227. Global Workforce Management. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer)

LNDN 3228. Managing Global Supply Chains. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3229. Dateline London: Reporting and News Writing in a European Context. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3230. The Aesthetics of Power, Prestige and Social Change: A Survey of Renaissance through Modern Art Hist. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3231. Internet 2.0. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3232. Modern Art in London: From the Sublime to the Ridiculous. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3233. Queer Studies and LGBTQ Life in London and the Global World. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3234. Styles of Acting. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3235. Witchcraft and Magical Performance in London. (3 cr.; max 6 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

LNDN 3236. Shakespeare in London. (3 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3237. 20th Century British Fiction. (3 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3238. British Cinema. (3 cr.; A-F only; Every Fall, Spring & Summer) Major works of 20th century British drama. Focuses on postwar period. Students read/see plays.

LNDN 3239. Understanding Modern Britain. (3 cr.; A-F only; Every Fall, Spring & Summer) Introduction to social/cultural differences between Britain and the United States. British class/culture, monarchy/aristocracy, education system, media.

LNDN 3324. European Economic History. (3 cr.; A-F only; Every Fall, Spring & Summer) European economic history, 1000 AD to today. Industrial revolution, development of capitalism from feudalism. Reasons Europe took world technological lead during Middle Ages. Factors affecting economic growth, prosperity, and technological change.

LNDN 3343. Postwar Popular Culture. (3 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3345. London Through Internships. (3-6 cr.; max 12 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3347. Western European Government and Politics. (3 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3348. British Broadcasting Today. (3 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3349. 20th Century British Fiction. (3 cr.; A-F only; Every Fall, Spring & Summer) Study abroad course.

LNDN 3350. CAPA Seminar in London. (3 cr.; max 6 cr.; Student Option; Every Summer) Study abroad course.

LNDN 3351. Telling the Story - London. (3 cr.; max 2 cr.; Student Option; Every Summer) Study abroad course.

LNDN 3352. Theatre Production Management. (3 cr.; A-F only; Every Fall, Spring & Summer) Lecture/seminar from professional theatre practitioner on their job specialization. Structure of theatrical organizations. Development/marketing of theatrical productions. Wider factors that influence theatrical organizations/productions. Workshops. Visits to various venues to see how they operate.

LNDN 3354. Ethical Issues and the Media. (3 cr.; A-F only; Every Fall, Spring & Summer)
Principal ethical issues facing print/broadcast journalism. Practical dilemmas, moral framework. Real time arguments that arise in media coverage of matters of public controversy. Regulation, codes of practice. Case studies, visits, guest lectures.

**LNDN 3531. Advertising and Marketing in Britain.** (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Forms of advertising and public relations techniques used by organizations to communicate with stakeholders. Consumer motivation/appeal. Media structures, effectiveness. Target audiences. Print/broadcast production, budgeting and promotion mix planning. Students design, cost, and implement an advertising campaign, and project the likely success rate.

**LNDN 3532. Visualizing Britain: Film and Television Documentaries.** (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Canon of British film/television documentary from end of the 19th century to beginning of 21st Century. Drama-documentaries tackling/attracting major public controversies.

**LNDN 3533. Women in Britain in the 21st Century.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Momentous changes in women's lives during 20th Century. Impact of two world wars, economic dislocation/recovery, revolutions in colonial states, super power rivalry, proxy wars, end of cold war, new international alliances/collectivities.

**LNDN 3534. Criminal London: Aspects of Crime and Criminal Justice in Britain.** (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Late Middle Ages, Tudor/Stuart periods. Eighteenth, nineteenth, and twentieth centuries. Evolution of courts/criminal procedure. Debates, including death penalty and jury system. Visits to courts and places of interest.

**LNDN 3536. Child Development in a British Context.** (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)

**LNDN 3613. Analyzing and Exploring the Global City: London—Modernity, Empire, and Globalization.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**LNDN 3614. Citizenship and Gender in Modern Europe.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**LNDN 3615. Urban Underworlds in Medieval and Early Modern London: A Literary Exploration.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**LNDN 3616. Global Mental Health Professions: A Comparison of U.S. and U.K..** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**LNDN 3733. International Finance.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Focuses on Europe. International marketing strategies of European companies. Special features of European Common Market, business environment.

**LNDN 3752. International Marketing.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Focuses on Europe. International marketing strategies of European companies. Special features of European Common Market and business environment.

**LNDN 3753. International Economics.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Comparative advantage, classical/neoclassical models, distribution consequences of trade. Resource endowments, technological gaps, economies of scale, product differentiation, location. Tariffs, quotas, other forms of intervention. Preferential trading arrangements.

**LNDN 3754. Creative Writing.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Creative writing course for the Study and Internships in London program.

**LNDN 3755. Topics in London.** (3 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Topics course for the Study and Internships in London program.

**LNDN 3756. Topics in London.** (3 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Topics course for the Study and Internships in London program.

**LNDN 3757. British History in the 20th Century.** (3 cr.; A-F only; Every Fall, Spring & Summer)
British history course for the Study and Internships in London program.

**LNDN 3758. International Business Environment.** (3 cr.; A-F only; Every Fall, Spring & Summer)
Study abroad course on Study and Internships in London program.

**LNDN 3759. Islam, Politics, and Britain: A Case Study of London's East End.** (3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) Study abroad course.

**LNDN 3795. Social Dynamics of London: Contemporary Issues Through Service-Learning.** (3-6 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Study Abroad Course

**Study Abroad in Montpellier (MONT)**

**MONT 1000. Intensive French Session Lower Division.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.
MONT 1601. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1602. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1603. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1604. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1605. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1606. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1607. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1608. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1609. Institute Course. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1610. French Expression. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1611. Advanced French Grammar and Communication. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1612. Advanced French Composition and Communication. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1613. French Communication. (1-2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1614. French Oral Communication. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1615. French Comprehension. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1616. French Literature and Heritage. (1.5 cr. [max 3 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1617. French Culture and Heritage. (1.5 cr. [max 3 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1618. French History of Art. (1.5 cr. [max 3 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1619. French Grammar and Technology. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1620. French Literature and Technology. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1621. French Linguistics. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1622. French Translation 1. (1.5 cr. [max 3 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1623. History of Theater. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 1624. Literature of the Fantastic. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.
MONT 3409. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3410. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3411. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3412. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3413. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3414. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3415. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3416. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3417. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3418. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3419. Integrated Course. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3501. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3502. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3503. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3504. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3505W. Academic Writing. (WI; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3506. Directed Research. (; 1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3507. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3508. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3509. Special Course for Americans. (; 0-10 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

MONT 3601. Institute Course. (; 1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3602. Institute Course. (; 1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3603. Institute Course. (; 0-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3604. Institute Course. (; 1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3605. Institute Course. (; 1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3650. Topics in French Culture. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3701. Sports and Culture in France. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

MONT 3801. Comparative Business Environment: France, Europe and the US. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

SDNY 1201. Integrated Course. (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

SDNY 1202. Integrated Course. (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

SDNY 1203. Integrated Course. (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

SDNY 1204. Integrated Course. (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

SDNY 3002. Art Down Under: From the Dreamtime to the Present. (; 3 cr.; Student Option; Every Fall & Spring) Works of art produced during the last century. Controversial contemporary Aboriginal art. Major 20th century art movements in relation to advances in technology, historical events, and sociological changes.


SDNY 3006. Learning Through Internships in Sydney. (; 3-6 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer) Internship course for Sydney program.


SDNY 3009. Human Resource Management in the Australia/Pacific Rim Context. (; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) How Australian and Pacific Rim companies are attempting to achieve competitive advantage in domestic/international markets through HRM. Structural changes HRM is undergoing in Singapore, Hong Kong, and Japan. Increased responsibility of line managers for HRM. Talent/ performance/industrial relations management.

SDNY 3011. Australian Government and Politics in the Pacific Rim. (; 3 cr. [max 6 cr.]; A-F only; Every Fall & Spring) History, concepts, and structures of politics/government in Australia. Debates, problems, and changes in relation to Pacific Rim. Discussing these issues critically.

SDNY 3012. Intercultural Communication: Theories, Practices, Factors. (; 3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Communication between people from different racial, ethnic, and cultural backgrounds within Australia, including Aboriginal, and immigrant populations. Theory/research in intercultural communication. Improving human interaction in study-abroad environment and international contexts.

**SDNY 3013. Analyzing and Exploring the Global City: Sydney.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3014. Australian History: Aboriginal History to Colonization—Current Issues in Historical Perspective.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3015. International Marketing.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3016. Australian, Asian and Pacific Literatures.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3017W. Writing the City - Sydney.** (Wt; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3018. Advertising and Promotions.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3019. Advertising and Society.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3020. Indigenous Peoples and Modernity: Culture, Rights and Development in a Globalizing World.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3021. International Finance.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3022. International Economics.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3023. International Dimensions of Organizational Behavior.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3024. Global Workforce Management.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3025. Managing Global Supply Chains.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3026. People, Place and Culture: Environmental Debates in Australia, New Zealand and the Pacific.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3027. Investment Management.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3028. Gender, Culture and Society.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3029. Campaigning for Change: Advocacy, Activism and Policy in the Digital Age.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3030. Integrated Course.** (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3031. Integrated Course.** (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3032. Integrated Course.** (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3033. Integrated Course.** (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3034. Integrated Course.** (1-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**SDNY 3500. CAPA Seminar in Sydney.** (3 cr. [max 6 cr.]; Student Option; Every Summer) Study abroad course.

**SDNY 3501. Telling the Story - Sydney.** (1 cr. [max 2 cr.]; Student Option; Every Summer) Study abroad course.

**SDNY 3502. Directed Research Project for Study Abroad.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 1221. Beginning Swahili I.** (5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 1222. Beginning Swahili II.** (5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3001. Tanzania in Context.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3002. Environmental Challenges in Tanzania.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3003. Leadership Through Community Engagement.** (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3004. Community Health in Tanzania.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3005. Public Health in Tanzania.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3006. Medicine in Tanzania.** (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3007. Human Rights and Social Change.** (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3008. Tanzanian History and Political Development.** (3 cr.; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3225. Intermediate Swahili I.** (5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3226. Intermediate Swahili II.** (5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3231. Advanced Swahili.** (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

**TANZ 3975. Service Learning in Tanzania.** (4 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

### Study Abroad in Venezuela (VENZ)

**VENZ 1001. Beginning Spanish.** (5 cr.; A-F only; Every Fall, Spring & Summer) Essential Spanish for real-life, everyday situations. Stresses communicative competency. Simultaneous work on reading, speaking, listening, and writing.

**VENZ 1002. Beginning Spanish.** (5 cr.; A-F only; Every Fall, Spring & Summer) Reading, speaking, listening, writing. prereq: Span 1001

**VENZ 1003. Intermediate Spanish.** (5 cr.; A-F only; Every Fall, Spring & Summer) Spanish grammar, conversation. prereq: Span 1002

**VENZ 1004. Intermediate Spanish.** (5 cr.; A-F only; Every Fall, Spring & Summer) Spanish grammar, conversation. prereq: Span 1003

**VENZ 2015. Spanish Composition and Communication.** (4 cr.; A-F only; Every Fall, Spring & Summer) Development of communication skills. Comprehending written/spoken texts. Speaking, reading, and writing in Spanish, beyond intermediate level.
VENZ 3016. Advanced Spanish
Conversation and Composition. (4 cr.; A-F only; Every Fall, Spring & Summer)
Reading, listening, writing.

VENZ 3021. Advanced Communication
Skills. (4 cr.; A-F only; Every Fall, Spring & Summer)
Challenging points of grammar. Written communication of various styles and in various fields.

VENZ 3022. Advanced Business Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)
Challenging points of grammar. Written communication of various styles and in various fields of business.

VENZ 3030. Cross-Cultural Comm in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Helps students understand cultural differences and develop sensitivity/curiosity about issues related to cultural diversity and cross-cultural understanding. Taught in English.

VENZ 3031. Geography of Venezuela in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Geographical placement of Venezuela in its international context. Outstanding physical features. Relationship between territory of Venezuela and its significant socioeconomic features.

VENZ 3032. Latin American Folklore in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)

VENZ 3033. International Business in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Problems faced by firms engaging in international activities. Patterns in contemporary international business. History, culture, commerce, exchange, markets, corporate strategies. Taught in English.

VENZ 3034. International Economics in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Theories of international trade, commercial policy, balance of payments, and international monetary issues. Comparative advantage, exchange rates, protectionism, open-economy, fiscal/monetary policies, common markets, free-trade areas.

VENZ 3035. International Finance in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)

VENZ 3036. Tropical Ecology in English. (4 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer)

VENZ 3037. Field Botany in the Andes in English. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)

VENZ 3038. Nutrition in Latin America (in English). (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

VENZ 3039. Nutrition in Latin America (in Spanish). (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

VENZ 3040. Cross-Cultural Communication in Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)
Cultural differences when dealing with people from different cultures. Issues related to cultural diversity and cross-cultural understanding. Prereq: Two yrs college-level Spanish.

VENZ 3041. International Economics in Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)
Theories of international trade, commercial policy, balance of payments, and international monetary issues. Comparative advantage, exchange rates, protectionism, open-economy, fiscal/monetary policies, common markets, free-trade areas.

VENZ 3104W. The Art of Reading Literary Texts. (WI; 3 cr.; Student Option; Every Fall, Spring & Summer)
Major current theoretical approaches to literary texts. Contemporary categories of analysis/methodology. Literary sociology, psychological critique, semiotics, comparative literature.

VENZ 3106. Latin American Art. (3 cr.; A-F only; Every Fall, Spring & Summer)
Panoramic view of Latin American art from prehistoric times to the present day. Emphasizes Venezuelan art production in its historical, political, and social context and relating it to other Latin American countries.

VENZ 3107. Introduction to the Study of Hispanic Linguistics. (WI; 3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3108. The Spain of Cervantes’ Don Quijote: History and Fiction. (3 cr.; A-F only; Every Fall, Spring & Summer)
Analysis of Don Quijote as crossroad of literary eras/genres, visions of the world, and attitudes towards life, and as synthesis of styles and an encounter of two centuries. Prereq: Adv-lev written/spoken Span.

VENZ 3200. Field Botany in the Andes in Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3251. Spanish-American Literature: Aspects of Prose and Fiction. (3 cr.; A-F only; Every Fall, Spring & Summer)
Several writers whose work has become essential for contemporary Spanish American literature. Critical reading of various works. Background knowledge of authors, and of their work and historical context. Prereq: Two yrs col-lev Span.

VENZ 3260. Natural Resource Economics (in English). (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

VENZ 3261. Natural Resource Economics (in Spanish). (3 cr.; Student Option; Every Fall, Spring & Summer)
Basic economic concepts most relevant to natural resources, factors affecting them. Property rights, conservation, regulations, government policy, and evaluation of resources.

VENZ 3262. Natural Resource Development. (3 cr.; A-F only; Every Fall, Spring & Summer)
Organization/development of agriculture/mining in Latin America, from colonial era to present. Socio-political/economic ramifications of natural resources, their exploitation covering several countries.

VENZ 3263. Sustainable Tropical Agriculture (in Spanish). (3 cr.; Student Option; Every Fall, Spring & Summer)
Economics of tropical agriculture development. Potential for developing world trade and for improving standards of living in areas dependent on production of tropical agricultural products.

VENZ 3264. Sustainable Tropical Agriculture (in English). (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

VENZ 3301. History of Venezuela. (3 cr.; A-F only; Every Fall, Spring & Summer)
Survey of Venezuela's historical processes, fundamental historical problems, Conquest, colonization, independence, 19th/20th centuries. Prereq: Two yrs col-lev Span.

VENZ 3302. Curriculum and Material Development. (3 cr.; A-F only; Every Fall, Spring & Summer)
Applications of theories, principles, and current research related to second language acquisition, instructional techniques, and materials relevant to development of TESOL curriculum. Emphasizes teaching students whose English proficiency is limited.

VENZ 3303. Applied Linguistics. (3 cr.; A-F only; Every Fall, Spring & Summer)
Applications of theories, principles, and current research related to second language acquisition, instructional techniques, and materials relevant to development of TESOL curriculum. Emphasizes teaching students whose English proficiency is limited.
acquisition. Instructional techniques/materials relevant to development of TESOL curriculum. Emphasizes teaching students whose English proficiency is limited.

VENZ 3404. Testing and Evaluation of TESL. (3 cr.; A-F only; Every Fall, Spring & Summer)
Discussion, review, and critique of instruments of evaluation for English language acquisition. Selection/development of assessment instruments valid for (a) placing students at appropriate levels, (b) evaluating progress toward goals, and (c) grading promoting students.

VENZ 3405. Methods of Teaching English Proficiency. (3 cr.; A-F only; Every Fall, Spring & Summer)
Identifying/applying major TESL methodologies to needs of students with various cultural/ language backgrounds, ages, and learning styles. Emphasizes differentiating teaching English to native speakers and to speakers of other languages.

VENZ 3407. Tropical Ecology in Spanish. (4 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3409. Cultural Anthropology. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course.

VENZ 3410. Cultural Anthropology. (3 cr.; A-F only; Every Fall, Spring & Summer)
Diversity/universality of culture from anthropological point of view. Concepts of culture. Representative cases that demonstrate human adaptation in its diverse variations. Diversity of values/lifestyles. Aspects of pre-Hispanic and contemporary Venezuelan Andean culture.

VENZ 3410. Caribbean Literature. (3 cr.; A-F only; Every Fall, Spring & Summer)
Aspects of Caribbean culture related to development of literature of the region. Caribbean literature within context of Latin American literature. Analytical strategies for studying texts. prerequisite: Two yrs col-lev Span

VENZ 3500. History of the Spanish Language. (3 cr.; A-F only; Every Fall, Spring & Summer)
Evolution of the Spanish language starting from vulgate Latin and viewing its major synchronous states. Languages that influenced the formation of Spanish. Popular vocabulary items, educated/semi-educated language features.

VENZ 3509. Latin American Politics and Civilizations: Eng. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Study abroad course.

VENZ 3510. Latin American Politics and Civilizations. (3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3511. Film Criticism and Appreciation in Latin America. (3 cr.; A-F only; Every Fall, Spring & Summer)
Latin American culture through eyes of outstanding Latin American filmmakers. Aesthetics/language of cinema. Emphasizes four most important Latin American film industries: Mexico, Cuba, Argentina and Venezuela. Overview of other productions. prerequisite: Two yrs col-lev Span

VENZ 3512W. Spanish-American Civilization: Modern Latin America. (WI; 3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3513. Latin America and Cultural Discourse. (3 cr.; A-F only; Every Fall, Spring & Summer)
Essential Latin American texts on culture with relation to important works on universal culture. How to distinguish between various historic/cultural currents. Contributions of major Latin American thinkers, diverse sources of principal/cultural systems of Latin America. prerequisite: Two yrs col-lev Span

VENZ 3520. Geography of Venezuela in Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)
Venezuelan geography in its international context. Outstanding physical features. Socioeconomic patterns. prerequisite: Two yrs college-level Spanish

VENZ 3521. Education in Venezuela. (3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3530. Critical Writing. (3 cr.; A-F only; Every Fall, Spring & Summer)
Critical Writing course offered in Merida, Venezuela.

VENZ 3540. Folklore in Latin America in Venezuela. (3 cr.; A-F only; Every Fall, Spring & Summer)
Principal manifestations of folklore of various countries of Spanish America. Emphasizes process of syncretism. Original elements related to later influences. Development of folklore as historical process. Music, oral tradition. prerequisite: Two yrs college-level Spanish

VENZ 3590. Children’s Literature. (3 cr.; A-F only; Every Fall, Spring & Summer)
Critical analysis of children’s literature. Theoretical aspects from different points of view. Set of criteria for evaluating a variety of authors and their work. prerequisite: Two yrs col-lev Span

VENZ 3600. Spanish Linguistics. (3 cr.; A-F only; Every Fall, Spring & Summer)
Present state of theory, research, and application of linguistics to Spanish speaking world. Variation and linguistic changes. Analysis of Spanish speech/writing modes.

VENZ 3604. International Finance in Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3650. Cross-Cultural Management. (3 cr.; A-F only; Every Fall, Spring & Summer)
Strategies for overcoming cultural differences in business environment, from perspective of management. Issues of cultural diversity.

VENZ 3661. International Business in Spanish. (3 cr.; A-F only; Every Fall, Spring & Summer)
Problems faced by firms engaging in international activities. Major currents/patterns in contemporary international business. History, culture, commerce, exchange, markets, corporate strategies.

VENZ 3662. Comparative Constitutional Law. (3 cr.; A-F only; Every Fall, Spring & Summer)
Course offered in Merida, Venezuela.

VENZ 3703. Psycholinguistics. (3 cr.; A-F only; Every Fall, Spring & Summer)

VENZ 3704. Sociolinguistics. (3 cr.; A-F only; Every Fall, Spring & Summer)
Introduction to study of linguistic phenomena that are related to social factors. Language-society relationship in the Venezuelan environment. Builds on studies by linguists of Venezuela. prerequisite: Two yrs col-lev Span

VENZ 3705. Structure of Spanish: Phonology and Phonetics. (3 cr.; A-F only; Every Fall, Spring & Summer)
Theoretical background in phonetics. Practice in oral articulation. Differences between Spanish spoken in Spain and in Hispanic America. Emphasizes Spanish spoken in Venezuela. prerequisite: Two yrs col-lev Span

VENZ 3790. Venezuelan Literature. (3 cr.; A-F only; Every Fall, Spring & Summer)
Venezuelan literature, from 1950 to present. Different styles of literary expression. Principal authors, works, and literary groups.

VENZ 3792. Spanish-English Dictionary. (3 credits; A-F only; Every Fall, Spring & Summer)
Vocabulary and grammar. A practical guide to English/Spanish translation. Emphasis on word choice and phrasing. prerequisite: Two yrs col-lev Span

VENZ 3800. Spanish-English Dictionary. (3 credits; A-F only; Every Fall, Spring & Summer)
Vocabulary and grammar. A practical guide to English/Spanish translation. Emphasis on word choice and phrasing. prerequisite: Two yrs col-lev Span

VENZ 3801. Beginning Italian I. (5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)

Basic listening, speaking, reading, writing, and communication skills. Cultural readings.

ROME 1002. Beginning Italian II. (; 5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Basic listening, speaking, reading, writing, and communication skills. Cultural readings.

ROME 1003. Intermediate Italian I. (; 5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Conversation/comprehension proficiency. Reading/writing skills. Grammar review.

ROME 1004. Intermediate Italian II. (; 5 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer)
Conversation/comprehension proficiency. Reading/writing skills. Grammar review.

ROME 1200. Intensive Italian Language and Culture. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad.

ROME 1300. Italian for Design. (1 cr. [max 2 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3001. Society, Citizenship, and Ethics in Post-Unification Italy. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Culture/identity from Italian historical perspective. Students visit Orvieto, a medieval hilltop town famous for its paintings, frescos, and 'underground city' of tunnels/passageways.

ROME 3002. Roman Art. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Uses Rome as a campus to address role of patrons, nationality of artists, and actual technical production of works of art. Students visit Pompeii, a city frozen in time that reveals the historical heritage of ancient Rome.

ROME 3003. Made in Italy. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) "Made in Italy" as brand and lifestyle. Lectures, site visits, development of a student group marketing plan. Students visit Castello Banfi Winery in Tuscany.

ROME 3004. Italian Communications: Popes, Politicians, and Popular Culture. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3005. The History of Art and Design in Italy: From Pompeii to Present. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3006. Community Engagement in Rome. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3007. Design Theory, Technology, and the Environment. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3008. Sustainable Foods of Italy. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3009. Italian Cinema. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3010. Neighborhoods of Modern Rome. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3011. Roman Design Studio. (; 6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3012. Intensive Italian Language and Culture. (; 3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3013. Internships in Rome: A Comparative Approach to the Italian Workplace. (3-6 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3014. Sport and Society in Modern Italy. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3191. Materials and Design: Integrity and Innovation. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3192. Remapping of a Neighborhood for Students of Architecture. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3193. Exploring Identity: Community Design for Marginalized Groups. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

ROME 3194. As if People Mattered: Architectural & Urban Lessons in the Eternal City. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer) Study abroad course.

Supply Chain and Operations (SCO)

SCO 2550. Business Statistics: Data Sources, Presentation, and Analysis. (; 4 cr.; A-F or Audit; Every Fall, Spring & Summer) Data analysis, basic inferential procedures, statistical sampling/design, regression/time series analysis. How statistical thinking contributes to improved decision making. prereq: [Math 1031 or equiv], at least 30 cr


SCO 3041. Project Management. (; 2 cr.; A-F or Audit; Every Fall) Principles and methods useful for planning and controlling a project, including development of project plan, resource planning and scheduling, and project monitoring and control. Selected computerized packages are studied, including PERT and CPM, and examples of different types of projects from manufacturing and service industries are used. prereq: 3000 or instr consent

SCO 3045. Sourcing and Supply Management. (2 cr.; A-F only; Every Fall & Spring) Strategic/operational role of purchasing/supply. Supply management. Supplier-selection criteria such as quality, value added, price considerations. Buyer-supplier relationships. prereq: 3001

SCO 3048. Transportation and Logistics Management. (; 2 cr.; A-F only; Every Fall) Linkages between logistics/transportation and marketing, operations, and finance. How different industries integrate logistics, warehousing, transportation, and information systems. prereq: 3001

SCO 3051. Service Management. (; 2 cr.; A-F only; Every Fall) Issues unique to managing service processes. Identifying service needs, designing services, and managing services. prereq: 3001

SCO 3056. Supply Chain Planning and Control. (; 4 cr.; A-F or Audit; Every Fall & Spring) Decisions/tradeoffs when directing operations of supply chain. Forecasting, capacity/production planning, just-in-time, theory of constraints, supply chain flows, enterprise resource planning, supply chain design. prereq: 3001 or instr consent

SCO 3059. Quality Management and Lean Six Sigma. (; 4 cr.; A-F or Audit; Every Fall & Spring) Process management from Quality Management and Six Sigma perspective. Managerial/technical aspects of improvement. Strategy, improvement tools/methods, Malcolm Baldrige Award, ISO 9000, Six Sigma. prereq: 3001 or equiv or instr consent

SCO 3061. Lean Thinking. (; 2 cr.; A-F only; Every Fall) Approaches to waste, flow, error proofing, and daily management that simultaneously improves quality, cost, and delivery, while building worker engagement/skill. Philosophical foundations. Tools to identify, measure, and eliminate non-value-added activities. prereq: 3001

SCO 3072. Managing Technologies in the Supply Chain. (; 2 cr.; A-F only; Every Fall) Technologies and technological change within/between firms as opportunities for professional leadership. Selecting technologies, nurturing
their adoption, and ensuring their exploitation. prereq: 3001

SCO 4065W. Supply Chain and Operations Strategy. (WI; 4 cr.; A-F only; Every Fall & Spring)
Senior capstone. How to achieve/sustain competitive advantage through consistent decisions in manufacturing/service operations. Marketing/business strategy in global context. Vertical integration, capacity, facilities. technology/infrastructure. prereq: 3001, 3056, 3059, 4 [OMS or SCO] elective cr

SCO 6041. Project Management. (; 2 cr.; A-F only; Every Fall & Spring)
In the course of their careers, contemporary managers spend a significant amount of time either participating in or leading projects. Projects are frequently used as proving-grounds for high-potentials. The skills that are required in project management are often the very same attributes that are required for successfully managing a business. While every project is by definition unique, some concepts and tools (e.g., critical path method, time and cost tradeoffs, resource utilization, methods to deal with uncertainties) in project management apply to a wide range of different types of projects. The aim of this course is to equip students with these concepts and tools (e.g., Monte Carlo simulation, risk analysis) and to develop them into successful project managers, as well as team members.

SCO 6045. Strategic Sourcing. (2 cr.; A-F only; Every Spring)
Procurement and supply management has become increasingly visible in a world where supply is a major determinant of organizational success. Supply chain performance influences not only operational and financial risks but also reputational risk. Although this course explores cost containment and supply process improvement methods, it also pushes into revenue enhancement. The job of the supply manager today goes way beyond the scope of value and efficiency to the search for competitive advantage through the supply network. In addition to organizing the supply function for strategic advantage, the course explores strategic sourcing, supplier selection and evaluation techniques, supplier development methods, global sourcing techniques, as well as legal and ethical challenges. High-performance supply managers live for the challenges associated with building and maintaining a high-performance supply chain.

SCO 6048. Logistics and Transportation. (2 cr.; A-F only; Every Spring)
As supply chains become increasingly global, managing the complexity of distribution and transportation is critical to supply chain performance. This course focuses on the role of logistics and distribution networks in customer order fulfillment. Particular emphasis is placed on the linkage among logistics, warehousing and information systems, and the trade-offs involved in alternative distribution strategies. The course also explores the role of third-party logistics providers. Students learn models and techniques related to designing distribution networks that align with the firm's supply chain and corporate strategy

SCO 6051. Service Management. (; 2 cr.; A-F only; Every Fall)
Service management from cross-disciplinary point of view. Defining service package, designing delivery system, dealing with service encounters, improving quality, managing capacity, implementing yield management systems. prereq: [ MBA 6220 or equiv], MBA student

SCO 6052. International Operations Management. (2 cr.; A-F only; Every Fall)
Managing operations in global economy. Coordinating product design, technology transfer, sourcing, supply chains, quality standards, product assignment, facility location, and multicultural workforce management across national boundaries. Cross-functional decision making, prereq: [ MBA 6220 or equiv], MBA student

SCO 6090. Sales, Inventory, and Operations Planning. (2 cr.; A-F only; Every Fall)
Sales, Inventory, and Operations Planning (SI&OP) is an important process for a firm and can provide significant payoffs. SI&OP links strategic goals with production while coordinating financial, operations, sales, marketing, and HR objectives. Sales, inventory, and operations planning inputs to the master production schedule (MPS), helping coordinate material resources and capacity levels with strategic business objectives. SI&OP focuses on getting the big picture right by balancing demand and supply at product family level. Planning of mix (individual products and orders) becomes easier once volume (rates & levels) is effectively planned. Course is designed to address these questions: What should an executive know about SI&OP? How does SI&OP link with strategic planning, MPS, capacity plans, etc.? What are challenges in developing an effective SI&OP process? What techniques are most effective? To address these questions, the course covers: forecasting, aggregate planning, master production scheduling, capacity planning, inventory planning, and material requirement planning.

SCO 6091. Process Improvement Methods. (2 cr.; A-F only; Periodic Spring)
This course introduces the tools, problem solving methods, and organizational structures for process improvement. The course is organized around the DMAIC (Define Measure Analyze Improve and Control) method for process improvement in Six Sigma, but will also consider more general methods like PDCA (Plan Do Check Act). In addition, the course will consider broader aspects of process improvement that includes understanding organizational change and aligning process improvements with strategy. This course takes both a project level and organizational level perspective to understand process improvement and Six Sigma.

SCO 6092. Supply Chain Quality and Security. (2 cr.; A-F only; Periodic Spring)
This course covers the organizational and behavioral aspects of managing quality and security within and across organizations. It covers various frameworks such as Six Sigma, Baldrige Award, ISO 9000 (quality), and ISO 28000 (security) as a starting point. It covers various organizational issues such as managing organizational culture and navigating
across national boundaries to address quality and security issues. It draws on various management theories to understand how to manage quality, security, and disruptions across the supply chain. The course draws on examples from a variety of industries and government.

SCO 6093. Negotiations in Supply Chain. (2 cr.; A-F only; Periodic Spring)
Negotiations is the art and science of securing agreements between two or more interdependent parties. Managing supply chains often requires extensive negotiations related to pricing, joint problem solving and collaboration. This course (i) helps students understand the theory and processes of negotiation as it is practiced in supply chains, (ii) highlight the components of an effective negotiation, and (iii) help students analyze their own behavior in negotiations. The course is largely experiential, providing an opportunity to develop skills by participating in supply chain negotiation exercises and integrating experiences with the principles presented in the assigned readings and class discussions.

SCO 6094. Responsible Supply Chain Management. (2 cr.; A-F only; Every Spring)
Companies around the world are facing increasing pressure to perform well on the triple bottom line?People, Planet, and Profit?and responsible supply chain management is often a cornerstone of the CSR strategy for many companies. This course looks at how and why responsible supply chain management could be a powerful strategy to enhance a company's triple bottom line. The course focuses on the social and environmental aspects of managing supply chain operations. Particular emphasis is placed on human rights, health and safety, and environmental issues faced by supply chain managers and the linkage to the firm's supply chain strategy.

SCO 6095. Supply Chain Management in the Food and Agribusiness Sector. (2 cr.; A-F only; Periodic Spring)
The food and agribusiness supply chain is complex. It spans input companies, farmers, traders, food companies, and retailers. The goal of this supply chain is to provide access to affordable food, feed, fiber, and fuel in a sustainable manner. The course covers topics relevant to achieving this goal such as supply management, production management, and demand management to consumers. Issues such as diversity of production and demand, bulkiness of produce, perishability, seasonality, and complexity of supply chains of food and agricultural products will be addressed.

SCO 6096. Supply Chain Management in the Health Care and Medical Devices Sector. (2 cr.; A-F only; Periodic Spring)
This course identifies the inter-relationships between the partners in a health care supply chain that links the development of care to the delivery of care. Issues addressed in the course include managing health care supply chain with: increasing complexity of manufacturing pharmaceuticals and medical devices; increasing variety in drugs, devices and equipment to meet rapidly changing markets; increasing demand for affordable products from emerging economies; growing quality and compliance challenges with drugs and devices becoming more complex and regulatory scrutiny becoming stricter; and increasing frequency of recalls. Some examples of specific problems in health care delivery are: capacity planning and management in hospitals, location of health care facilities, supply chain management of blood banks, ambulance service planning, etc.

SCO 6097. Supply Chain Management in the Retail Sector. (2 cr.; A-F only; Periodic Spring)
This course reviews how the retail sector has evolved over the years and the significance of supply chain management in the retail sector. The course examines the various functional components of retail supply chain management, and focuses on analysis and metrics required to effectively manage a retail supply chain. The students learn the "language" of retailing and acquire the fundamental skills needed to effectively analyze the performance of retail supply chains. Cases are discussed to illustrate how customers are becoming more exacting and demanding ever-increasing levels of service; and how retailers are responding by increasing product variety, becoming more price competitive, striving towards higher service levels, and utilizing advances in computing capabilities, information technologies, and retail analytics to improve their supply chain efficiency.

SCO 6098. Operations Excellence via Lean Thinking. (2 cr.; A-F only; Every Fall)
This course introduces the concepts and theory of quality control, philosophical foundations of lean thinking, and technical concepts related to flow and pull, and tools such as value stream mapping, A3, and SS. Students learn to identify, measure, and eliminate non-value added activities; process capability analysis; statistical process control; and acceptance sampling from extended value chains in manufacturing and service settings through hands-on exercises.

SCO 6190. Statistics. (2 cr.; A-F only; Every Fall)
This course introduces quantitative and business statistics concepts for managerial decision making and problem solving. The course first focuses on the nature of statistical studies and the differences between observational and experimental studies. Methods for producing data, including sampling techniques, process monitoring, and designed experiments will be discussed. Students learn graphical and numerical methods for descriptive statistics. Foundations for statistical inference are covered, including basic probability, discrete and continuous probability distributions, and sampling distributions of statistics. Students then learn how to apply the two basic inferential methods of statistics, statistical estimation, and tests of statistical hypotheses. These methods are used to make inferences about population parameters including means, proportions, and standard deviations. The students also learn to identify sample size requirements.

SCO 6191. Big Data Analytics in Supply Chains. (2 cr.; A-F only; Every Fall)
With the advancement of digital technologies and networking capabilities, firms are actively engaged in capturing "big data" related to their supply chains. Firms recognize the immense potential in mining big data for improving the quality and timeliness of decisions, and becoming proactive in sensing and responding to external and internal signals of threats and opportunities. Course develops the capability to analyze and interpret data that is fundamental to managing supply chains and provides an overall understanding of the data and information management framework. This includes an overview of enterprise resource planning, value chain management and customer relationship management frameworks, the interconnections and interdependencies of functions from an information and data perspective. Through a combination of case studies and hands-on exercises, students learn (i) various facets of data analytics: data access, data aggregation, data analysis and data visualization; (ii) appropriateness and inappropriateness of big data analysis; and (iii) big data based predictive analytics.

SCO 6192. Supply Chain Finance. (2 cr.; A-F only; Every Summer)
Managing the financial flows and capital is just as important as managing the physical flow of goods and services. This course focuses on the underlying link between supply chain performance and the financial systems within an organization. Students learn concepts and tools related to supply chain costing, valuation, and projecting cash flow and capital requirements. The course looks at issues including tax and trade credits, and students develop an understanding of how financial considerations influence and inform a firm's supply chain strategy.

SCO 6290. Managing Supply Chain Operations. (4 cr.; A-F only; Every Fall)
This course serves as an introduction to the program, providing an overview of the fundamental concepts of supply chain and operations management. The course is taught as a cohort experience with opportunities to interact outside the classroom. Supply chain professionals from a variety of industries are featured throughout to highlight how the concepts apply in different contexts. Students learn methods and models for evaluating and improving end-to-end processes and gain an understanding of the operational challenges inherent in managing global supply chains. The course takes a strategic and cross-functional view of supply chains in both product and service based industries.

SCO 6291. Leadership Development. (0-2 cr.; A-F only; Every Fall, Spring & Summer)
Carefully designed lectures, exercises and assignments are positioned throughout the year to assess and develop leadership skills personalized to each student at three levels: (i) how to lead self: leveraging current strengths,
(ii) how to lead others: teamwork, collaboration, motivation, and feedback, and (iii) how to lead organizations: operating in complex global work environments. Substantively, the course is committed to creating an intellectual context that is now viewed as central to developing supply chain leaders. Specifically, the course provides opportunities for raising environmental, social and political awareness; learning about social media and related communications technologies and channels; and interacting with non-commercial organizations such as government and NGOs.

SCO 6292. Global Operations Capstone. (4 cr.; A-F only; Every Summer) This course will examine, compare and contrast business models that work globally, and require a careful design of processes and supply chains to deliver the capabilities necessary to create a competitive advantage. This course helps students understand the strategic nature of decision making in operations, and allows them to apply such thinking to the design and improvement of global supply chain networks that span both developed and developing economies. The course contains an essential experiential component. Students will work with companies, either locally in Minnesota or across the world, on real world supply chain applications.

SCO 6850. Topics in Operations and Management Science. (3 cr.; A-F only; Every Fall & Spring) Topics seminar. Provides forum for topics in operations/management science.

SCO 8651. Experimental Design. (3 cr.; A-F or Audit; Spring Even Year) Analysis of variance for one-way, two-way, and multi-way data. Basic concepts of statistical design and analysis of results. Randomized block, Latin square, cross-over, factorial designs, confounding, estimation and comparison of effects, response surfaces, and applications to management. prereq: MBA 6120 or equiv or business admin PhD student or instr consent; offered alt yrs

SCO 8652. Regression Analysis. (3 cr.; A-F or Audit; Periodic Spring) Regression and correlation models, inferences in simple and multiple regression, multicollinearity, indicator variables, variable selection techniques, treatment of assumption violations, applications to management problems, basic concepts of experimental design. prereq: MBA 6120 or equiv, business admin PhD student or instr consent; offered alt yrs

SCO 8711. Research in Operations Strategy. (3 cr.; A-F or Audit; Periodic Fall) Operations performance; competitive advantage; focused factory, product, and process innovation; and operations strategy implementation. Research results and methods. prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8721. Management of Technological Operations. (3 cr.; A-F or Audit; Periodic Spring) Theories and models used to address problems of managing technological operations and operations in manufacturing and service firms. Technology strategy, economic organizational perspectives on technology, productivity analysis, technology evaluation, project selection and evaluation, learning, etc. prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8735. Supply Chain Management. (3 cr.; A-F or Audit; Periodic Spring) Research on forecasting, inventory control, materials requirements planning, just-in-time manufacturing, aggregate planning, scheduling, routing, sequencing, and dispatching in manufacturing and service industries. Research papers and methods are discussed. prereq: Business admin PhD student or instr consent

SCO 8745. Research on Quality Management. (3 cr.; A-F or Audit; Periodic Fall & Spring) Research literature, methods, and results. Research on quality strategy, economics of quality, statistical process control, vendor management, off-line quality, and quality practice. prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8755. Behavioral Operations. (3 cr.; A-F only; Periodic Fall & Spring) Research/review classic behavioral literature in economics and other business disciplines; identify behavioral problems within operations contexts; test/analyze operations phenomenon through experimental study, empirical methods, and analytical modeling. Supply chain problems. prereq: Business admin Ph.D. student or instr consent

SCO 8800. Research Topics in Operations and Management Science. (2-4 cr. [max 12 cr.]; A-F only; Every Fall & Spring) Topics selected from new areas of research. Research methods, issues in operations/management science. prereq: Business admin Ph.D. student or instr consent

SCO 8892. Readings in Operations and Management Science. (1-8 cr.; [max 16 cr.]; A-F or Audit; Periodic Fall) Readings useful to student's individual program and objectives that are not available in regular courses. prereq: Business admin PhD student or instr consent

SCO 8894. Graduate Research in Operations and Management Science. (1-8 cr. [max 16 cr.]; Student Option; Every Fall, Spring & Summer) Individual research on an approved topic appropriate to student's program and objectives. prereq: Business admin PhD student or instr consent

Surgery (SURG)


SURG 7501. Preparation for Surgical Internship. (4 cr.; H-N only; Every Spring) Four-week rotation. Students work with University surgery faculty/residents. Interactive didactics, simulation, technical skills practice. Managing emergencies in surgical ward, discharging patients, dosing common medications. Wound care, suturing, use of radiologic tests. Placement of chest tubes and central lines. prereq: 7500 Surgery Clerkship, or equiv; designed for student entering general surgery categorical resident or beginning a surgical subspecialty or preliminary candidate for surgery.

SURG 7502. Externship in the Surgical Intensive Care Unit. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This service provides the student with direct bedside experience and opportunities to apply the principles of physiology, biochemistry, and metabolism to critically ill and injured patients. Required reading: Abrams and Cerra, Essentials of Surgical Critical Care, Quality Medical Publishers, 1993. prereq: 7500

SURG 7503. Research Problems in Surgery. (2-8 cr.; H-N or Audit; Every Fall, Spring & Summer) The student participates in a research experience designed around a specific topic.

SURG 7504. Externship in Hospital-based Nutrition. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) This multidisciplinary patient care service is designed to provide one student with direct experience in hospital-based parenteral and enteral nutrition.

SURG 7505. Solid Organ Transplant Surgery. (3-6 cr.; H-N only; Every Fall, Spring & Summer) Deceased and live donor kidney, liver, and pancreas transplantation. Pre-operative evaluation and management and post operative care (including immune monitoring). Intra-operative management (donor and recipient) of transplant patients and back-table work. Clinical rounds/teaching conferences/ seminars. Complete abstract in area of interest. Scrub in organ donor operations as well as kidney, liver, and pancreas transplant.

SURG 7509. Externship in Burn Surgery. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer) The student is exposed to all aspects of burn care including small outpatient burns as well as massive life threatening burns. prereq: 7500

SURG 7510. Advanced Surgery Externship (Subinternship) at Fairview-University Medical Center. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer) Instruction and advanced experience in surgery and its components. Students participate in patient care at level similar to first year intern. Students work with team in general/vascular surgery, surgical oncology/colorectal, or MIS/
thoracic/foregut under faculty supervision and participate in care of patients, in operating room, and in clinics. Students take call on assigned service. prereq: 7500, dept consent

SURG 7511. Advanced Surgery Externship (Subinternship) at VA Medical Center. (3-6 cr. [max 12 cr.]; H-N or Audit; Every Fall, Spring & Summer)
Instruction/experience in surgery and its components. Students participate directly in patient care at a level of responsibility exceeding that given to beginning students. Students work under direct supervision of faculty and participate fully with surgical team on assigned service in care of hospitalized patients, in operating room, and in clinics. Experience in general surgery, vascular surgery, trauma, or burn center. prereq: 7500, dept consent

SURG 7512. Advanced Surgery Externship (Subinternship) at Regions Hospital. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Instruction/experience in surgery and its components. Students participate directly in patient care at a level of responsibility exceeding that given to beginning students. Students work under direct supervision of faculty and participate with surgical team in care of hospitalized patients, in operating room, and in clinics. Experience in general surgery, vascular surgery, trauma, or burn center. prereq: 7500, dept consent

SURG 7513. Advanced Surgery Externship (Subinternship) at Hennepin County Medical Center. (2-6 cr. [max 12 cr.]; H-N or Audit; Every Fall, Spring & Summer)
Instruction and advanced experience in surgery/trauma. Students participate directly in patient care at a level of responsibility similar to first year intern. Students work with assigned surgery/trauma team under supervision of faculty and participate fully in care of hospitalized patients, in operating room, and in clinics. Students take call on assigned service. prereq: 7500, dept consent

SURG 7522. Plastic and Reconstructive Surgery. (2-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
The student is exposed to the full spectrum of plastic and reconstructive problems while on the rotation. Each student must contact the plastics office at 625-1188 before enrolling in this course to arrange the rotation. prereq: 7500

SURG 7523. Externship in Colon and Rectal Surgery. (3-6 cr.; H-N or Audit; Every Fall & Spring)
Each student has the opportunity to become adept in the use of the sigmoidoscope as well as performing various outpatient anorectal procedures. prereq: 7500

SURG 7524. Externship in Outpatient and Ambulatory Surgery. (3 cr.; H-N or Audit; Every Fall, Spring & Summer)
Surgery clinic. Operating room experience. Surgical pathology review. prereq: instr consent

SURG 7525. Externship in Cardiovascular and Thoracic Surgery. (3-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Students are incorporated at level of sub-intern on clinical services and become involved in evaluation/management of patients with cardiac/thoracic surgical diseases. Surgical procedures, patient ICU management. Students also attend teaching conferences. prereq: 7500

SURG 7526. Externship in Pediatric Surgery. (2-6 cr.; H-N or Audit; Every Fall, Spring & Summer)
Students participate in all aspects of patient care. Initial evaluation, detailed history, physical exams, initiation/evaluation of diagnostic laboratory/radiologic testing. Formulating plans of resuscitation and patient care. Students also participate in outpatient clinics. prereq: 7500

SURG 7910. Surgery Medical Residency. (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Surgery medical residency.

SURG 7930. Surgery Medical Fellowship. (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Surgery medical fellowship.

SURG 8200. Clinical Surgical Problems in Management. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Diagnostic and management instruction in all phases of clinical surgery, inpatient and outpatient. prereq: Grad surg major

SURG 8201. Surgery Roentgenological Pathology Conference. (1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Weekly review of surgical patients presenting interesting roentgen and pathological findings. Staff from the Departments of Surgery, Radiology, and Laboratory Medicine and Pathology. Basic science and management principles of the surgical patient. prereq: Grad surg major

SURG 8202. Surgical Research. (3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Graduate students undertake original investigation of problems in either experimental or clinical surgery. prereq: Grad surg major

SURG 8203. Surgery Complications and Research Conference. (1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Evaluation of surgical patients, including postoperative course. Discussion and critical evaluation of current research problems. prereq: Grad surg major

SURG 8207. Transplantation Conference. (1 cr.; A-F or Audit; Every Fall, Spring & Summer)
Interdepartmental discussion and evaluation of current clinical and research problems. prereq: Grad surg major

SURG 8293. Applied Statistics. (1 cr.; S-N or Audit; Every Fall & Spring)
Interactive computer course. Concepts of applied statistics. Examples, problem sets based on surgical research. How to independently set up appropriate experiments and perform basic descriptive/inferential analysis. prereq: Grad student in [surgery or experimental surgery or health sciences] or

SURG 8333. FTE: Master’s. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SURG 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SURG 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SURG 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SURG 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Sustainability Studies (SUST)

SUST 3003. Sustainable People, Sustainable Planet. (ENV; 3 cr.; Student Option; Every Fall & Spring)
Introduction to interdisciplinary Sustainability Studies minor. Scientific, cultural, ethical, and economic concepts that affect environmental sustainability and global economic justice. Key texts. Participatory classroom environment. prereq: Soph or Jr or Sr

SUST 3480. Topics in Sustainability. (1-4 cr. [max 24 cr.]; A-F only; Every Fall, Spring & Summer)
Topics in sustainability encompass special courses related to issues such as renewable energy, food and waste systems, sustainable planning, water and climate change.

SUST 4004. Sustainable Communities. (3 cr.; A-F only; Every Fall & Spring)
Students synthesize multiple disciplinary perspectives and integrate insights gained from various approaches/methods. Concepts/scholarship related to sustainability. Applying knowledge/experience to real sustainability problems. prereq: [3003 or GLOS 3304, Jr or Sr in sustainability studies minor] or instr consent

SUST 4096. Sustainability Internship. (3-4 cr. [max 8 cr.]; A-F only; Every Fall & Spring)
Eight to ten hour per week internship experience related to a sustainability theme or approach, such as sustainable foods, green
Building, renewable energy or environmental justice. Intern in a nonprofit, governmental, educational or business organization, from choices provided or approved by instructor. Prereq: Familiarity with sustainability concepts through academic work or other experiences.

**Sustainable Agricultural Syst (SAGR)**

SAGR 4096. Professional Experience Program: Internship in Sustainable Agriculture. (1-3 cr. [max 6 cr.]; S-N or Audit; Every Fall, Spring & Summer) Professional experience in sustainable agriculture attained through supervised practical experience. Students create a learning agreement specific to their internship host and project, consulting with faculty advisers/hosts. This course meets the internship requirement for the Undergraduate Minor in Sustainable Agriculture. Prereq: Undergraduate minor in sustainable agriculture.

SAGR 8010. Colloquium in Sustainable Agriculture. (; 2 cr.; A-F or Audit; Every Fall) Forum for University faculty and students, and representatives of the farming community, including farmers, grassroots organizations, agricultural businesses, and representatives of state agencies, to engage in discussions on topics related to sustainability of food production. Prereq: Coursework in biological or social sciences that provides intro to ag practices or issues.

SAGR 8020. Field Experience in Sustainable Agriculture. (; 1-4 cr.; S-N or Audit; Every Fall, Spring & Summer) 3- to 14-week internship with growers or organizations working with sustainable agriculture issues. Students analyze issues in final written project, oral seminar. Prereq: Coursework in biological or social sciences that provides intro to ag practices or issues.

**Sustainable Systems Management (SSM)**

SSM 1004. Sustainable Systems Management Orientation. (1 cr.; S-N only; Every Fall) Students will receive an introduction to the Sustainable Systems Management Major. They will learn about internships in the field and about career paths that may follow. There will also be presentations and assignments on proposing resumes and finding jobs in out there. Graduates and professionals in the related fields of sustainable systems will present for the class. Combining course work and field trips, this class will provide students with the opportunity to meet their fellow students and to form a cohort of students with similar interests and careers aspirations. Prereq: None.

SSM 2003. Systems Thinking: Development and Applications in Sustainability. (3 cr.; A-F only; Every Fall) This course will provide introduction to basic systems thinking fundamentals: defining a systems perspective about any situation or problem, solving problems with that perspective, describing and modeling problems, and designing and improving upon system solutions.

SSM 3301. Global Water Resource Use and Sustainability. (ENV; 3 cr.; Student Option; Every Fall & Spring) What is the value of clean water? Explore the many facets of water, earth’s most abundant resource. Ponder the value for you, society, a region or nation; the complexities of ownership and protection; the influence of culture and traditions; and potential impacts of climate change. Consider realistic and holistic solutions to water issues.

SSM 3503. Marketing of Bio-based Products. (4 cr.; A-F or Audit; Every Fall) Intro to marketing function as it relates to current/emerging bio-based products industries (building materials, paper, fuels, etc.). Product positioning, pricing, promotion, and channel management within strategic planning and environmental marketing management.

SSM 4407W. Sustainable Manufacturing Principles and Practices. (WI; 3 cr.; A-F only; Every Fall) In this course students will learn about ways in which companies are embracing sustainability in their strategy and operations to increase growth and global competitiveness, including manufacturing processes for major sustainable products and biobased products. This includes processes and approaches for environmental mitigation and “green” manufacturing, reduce industrial waste and emissions, environmental footprint, and associated costs through more efficient manufacturing practices and incorporate bio-based product formulation. Students will acquire a working knowledge of management policies, tools and techniques to improve operational and environmental performance.

SSM 5503. Marketing of Bio-based Products. (1-3 cr.; A-F or Audit; Every Fall) Introduction to marketing function as it relates to current/emerging bio-based products industries (building materials, paper, fuels, etc.). Product positioning, pricing, promotion, and channel management within strategic planning and environmental marketing management.

SSW 1221. Beginning Swahili, Semester I. (; 5 cr.; Student Option; Every Fall) Comprehension, speaking, reading, writing.

SSW 1222. Beginning Swahili II. (; 5 cr.; Student Option; Every Spring) Continuation of skill development from 1221. Prereq: 1221 or equiv

SSW 3225. Intermediate Swahili. (; 5 cr.; Student Option; Every Spring) Readings of contemporary Swahili texts. Review of grammar and complex verb forms. Vocabulary, communication skills. Prereq: 1 yr Swahili or equiv

SSW 3226. Intermediate Swahili II. (; 5 cr.; Student Option; Every Spring) Continuation of skill development from 3225. Prereq: 3225 or equiv

SSW 3425. Advanced Swahili. (5 cr.; A-F only; Every Fall) Speaking, reading, writing. An emphasis on vocabulary development and refining of grammar points and cultural issues. The materials to supplement the standard textbook include literary texts, film, music, newspaper articles, radio and TV broadcasts, audio, video and computer interactive material, and
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Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
Instructors lead students in four Saturday workshop intensives. Student forge interdisciplinary collaborations as they journey through their respective programs. prereq: [Fr or transfer] student from BFA actor training or BA or BFA dance or BA theater

**TH 1391. BFA Acting I.** (3 cr.; A-F or Audit; Every Fall)
Acting. prereq: Accepted into BFA acting program

**TH 1392. BFA Voice and Speech I.** (2 cr.; A-F or Audit; Every Fall & Spring)
Study/practice in breath centering/expansion; vocal resonance, musicality, placement; ear training; strengthening and making more flexible the muscles of speech. prereq: Accepted into BFA acting program

**TH 1393. BFA Movement I.** (2 cr.; A-F or Audit; Every Fall)
Focuses on building a foundation for further work in program. prereq: BFA-acting major

**TH 1395. BFA Acting II.** (3 cr.; A-F or Audit; Periodic Fall & Spring)
Continuing the process of interpreting dramatic material. prereq: 1391

**TH 1396. BFA Voice and Speech II.** (2 cr.; A-F or Audit; Periodic Fall & Spring)
Building a foundation for further work in the program. Emphasizes practicing the sounds of good American speech and of the written phonetic alphabet. prereq: 1392

**TH 1397. BFA Movement II.** (2 cr.; A-F or Audit; Periodic Fall & Spring)
May include sections such as African dance, yoga, movement for actors, and circus techniques. Focuses on building a foundation for further work in the program. prereq: 1393

**TH 1501. Introduction to Design and Technology for Live Performance.** (3 cr.; A-F only; Every Fall & Spring)
Principles, processes, and possibilities in all areas of stage design and production. Process and relationship between artistic and production staff members. Collaboration, compromise, creation. Student are assigned to a lab in a technical area. prereq: 1101 or concurrent registration is required (or allowed) in 1101

**TH 1904. Freshman Seminar.** (3 cr.; max 6 cr.; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule.

**TH 1905. Freshman Seminar.** (3 cr.; max 6 cr.; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule.

**TH 1910W. Topics: Freshman Seminar.** (WI; 3 cr.; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule.

**TH 1950. Topics in Theater.** (1-3 cr.; max 6 cr.; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

**TH 2391. BFA Acting III.** (3 cr.; A-F or Audit; Periodic Fall & Spring)
Applying concepts of first year of training to an ensemble performance project. Beginning of Shakespeare foundation unit. prereq: BFA student in theatre arts

**TH 2392. BFA Voice and Speech III.** (2 cr.; A-F or Audit; Periodic Fall & Spring)
Continuing to build a strong, healthy voice. Mastering written phonetics, sounds of good American speech for stage. Students begin to explore speaking of heightened verse, particularly Shakespearean text. prereq: BFA student in theatre arts

**TH 2393. BFA Movement III.** (2 cr.; A-F or Audit; Periodic Fall & Spring)
Deepens/refines foundation laid in BFA Movement I/II. prereq: BFA student in theatre arts

**TH 2395. BFA Acting IV.** (3 cr.; A-F or Audit; Periodic Fall & Spring)
Application of process towards performance. Emphasizes Shakespeare. prereq: BFA-Acting sophomore

**TH 2396. BFA Voice and Speech IV.** (2 cr.; A-F or Audit; Periodic Fall & Spring)
Continuing to build a strong, healthy voice. Mastering written phonetics and the sounds of good American speech for the stage. Students begin basic dialect acquisition work for the stage. Emphasizes English/Irish dialects. prereq: BFA-acting sophomore

**TH 2397. BFA Movement IV.** (2 cr.; A-F or Audit; Periodic Fall & Spring)
May include sections such as jazz dance, partner dances, and movement for actors. prereq: BFA-acting sophomore

**TH 3100. Theatre Practicum.** (1 cr.; max 4 cr.; S-N or Audit; Every Fall, Spring & Summer)
Participation in University Theatre main stage play as actor, construction/running crew personnel, or theatre management operations personnel.

**TH 3115. Introduction to Playwriting.** (3 cr.; Student Option; Every Fall & Spring)
Study of traditional play structure, characterization, dialogue, dramatic action, and theme. Final project is a one-act play.

**TH 3120. Theatre: Theory and Practice.** (3 cr.; max 6 cr.; Student Option; Every Fall & Spring)
Introduction to diverse ways of thinking about theatre and its representational practices. Students explore traditional/non-traditional modes of performance through readings, discussions, and hands-on performance projects. Seminar-style course. prereq: 1101

**TH 3171. History of the Theatre: Ancient Greece Through Neo-Classicism.** (3 cr.; Student Option; Every Fall, Spring & Summer)
History of Western theater and drama; theatrical practices, staging conventions, and dramatic structure of plays. Ancient to mid-18th century.

**TH 3172. History of the Theatre: Age of Enlightenment to Present.** (3 cr.; Student Option; Every Fall, Spring & Summer)
Theatrical practices, staging conventions, dramatic structure of plays. prereq: Th major or instr consent

**TH 3314. Text and the Actor.** (3 cr.; A-F or Audit; Every Fall & Spring)
Standard stage speech, international phonetic alphabet transcription, and textual analysis to perform heightened language texts such as Shakespearean/Shavian monologues, Cheaure's Canterbury Tales, and Beowulf. Videos viewed/discussed. prereq: 1101, 1321, 1322

**TH 3316. Voice for the Actor.** (3 cr.; A-F only; Every Fall & Spring)
Anatomy/physiology of vocal/respiratory mechanisms. Abdominal breathing, forward tonal placement, articulation of consonants, vocal projection. IPA phonetic transcription and vowel standardization for American Standard Stage Speech. Techniques applied to performance of monologues. prereq: 1101, 1321, 1322

**TH 3321. Stanislavski and Techniques for Characterization.** (3 cr.; Student Option; Every Fall & Spring)
Analysis of text, character, and relationship in scenes/monologues from contemporary/modern psychologically-based drama, early 20th-century texts, and classical repertoire. Lecture, discussion, exercises, performance. prereq: 1322, [3314 or concurrent registration is required (or allowed) in 3314], audition

**TH 3322. Advanced Techniques for Characterization.** (3 cr.; Student Option; Every Fall & Spring)
Analysis of text, character, and relationship in scenes/monologues from contemporary/modern psychologically-based drama and from early 20th-century texts. Lecture, discussion, exercises, performance. prereq: 3321

**TH 3330. Physical Approaches to Acting.** (3 cr.; max 6 cr.; Student Option; Every Fall & Spring)
Dynamic physical approach to acting. Expanding expressiveness/creativity. Strengthening connections between physical/vocal expression. Uniting instinct and intellectual analysis. Techniques as advanced by Delsarte, Meyerhold, Grotowski, Kantor, Suzuki, Barba, etc., and structured improvisation, are incorporated in solo/collective performance projects. prereq: 1322, [3314 or concurrent registration is required (or allowed) in 3314], audition, instr consent

**TH 3332. Circus Performance.** (1 cr.; A-F only; Every Fall & Spring)

**TH 3361. Introductory Musical Theater.** (3 cr.; A-F or Audit; Periodic Fall & Spring)
History of American musical theater. Videos/discussions, basic music theory, voice, dance, acting, audition techniques. Solo/ensemble presentations for public class performance.

**TH 3370. BA Mentoring.** (1 cr.; max 4 cr.; A-F only; Every Fall & Spring)
Prepare BA theatre performance majors/minors with essential skills that will enhance performing careers as actors, directors, playwrights. Attend non-traditional
performances by national/international touring companies. Engage in vigorous discussions led by those artists who are at the forefront of creation models. Rigorous skill-building workshops led by artists, scholars, technicians.

**TH 3381. Theater Storytelling and Solo Performance.** (3 cr.; Student Option; Every Fall) Live storytelling and solo performance as theatrical art form. How to turn personal experiences into stage stories. Guests perform, discuss their work, and critique student work. Students develop short monologues/performances and conclude with original solo theater performance/story.

**TH 3391. BFA Acting V.** (3 cr.; A-F or Audit; Every Fall) Experiencing a foreign theater culture/history. Applying process of interpreting dramatic material to plays of that culture.

**TH 3392. BFA Voice and Speech V.** (2 cr.; A-F or Audit; Every Fall & Spring) Experiencing a foreign theater culture/history. Applying voice training to dramatic material of that culture.

**TH 3393. BFA Movement V.** (2 cr.; A-F or Audit; Every Fall) Experiencing a foreign theater culture/history, applying training to dramatic material of that culture. prereq: BFA student in theatre arts

**TH 3395. BFA Intensive I.** (2 cr.; A-F or Audit; Every Spring) Incorporating disciplines of acting/voice/movement. prereq: BFA-acting jr

**TH 3398. BFA Rehearsal & Performance I.** (2 cr.; A-F or Audit; Periodic Fall & Spring) Continuing the application of process towards performance. prereq: BFA-acting jr

**TH 3399. BFA Rehearsal and Performance II.** (2 cr.; A-F or Audit; Periodic Fall & Spring) Continuing the application of process towards performance. prereq: BFA-acting jr

**TH 3521. Introduction to Scenic Design for Theater and Performance.** (3 cr.; Student Option; Every Spring) Use of space/illusion to create environments for theater/performance. Collaborative vocabulary through script interpretation/analysis. Visual literacy through sketching, painting, and drafting. Individual/group projects. prereq: TH 3571

**TH 3531. Introduction to Theatrical Costume Design.** (3 cr.; Student Option; Every Spring) Costume design process, including: researching, script analysis, the costume designer's role throughout the production process, and design problems. prereq: TH 3571

**TH 3541. Introduction to Stage Lighting Design.** (3 cr.; Student Option; Every Spring) Composition, color theory, instrumentation, and control (dimming) as they apply to theater, opera, and dance. Collaborative process of the lighting designer through individual and group projects in a lab setting (i.e., a theater.) prereq: TH 3571

**TH 3559. Introduction to Sound Design for the Theatre.** (3 cr.; Student Option; Every Fall & Spring) Basics of audio design for theatre. Script analysis, audio editing, music research, basic system design, paperwork, cue building. Basic components of audio design. Final project will involve applying skills to partially realized design. prereq: 1501


**TH 3711. Beginning Directing.** (3 cr.; Student Option; Every Fall & Spring) Introduction to/ application of techniques/theories of stage direction. Script analysis, composition, blocking, rehearsal methods, improvisation, actor coaching, scene production, prereq: 1101, 1321, 1322

**TH 3716. Stage Management.** (4 cr.; A-F only; Every Fall & Spring) Production process, pre-production to maintaining/closing. Managing rehearsals, communication, conflict resolution. Individual/group projects: promptbook building, blocking notation, Cue placement execution, scene breakdowns, creating/maintaining checklist, building a form library. prereq: 1501 or instr consent

**TH 3950. Topics in Theatre.** (1-4 cr. [max 8 cr.]; Student Option; Every Fall & Spring) Topics specified in Class Schedule.

**TH 3993. Directed Study.** (1-6 cr. [max 18 cr.]; Student Option; Every Fall, Spring & Summer) Guided individual reading or study. prereq: 6 Th cr, instr consent, dept consent, college consent

**TH 4115. Intermediate Playwriting.** (3 cr.; Student Option; Every Spring) New methods of play construction. How characteristic plays from particular contemporary styles create original theatrical effects by using/breaking dramatic conventions. Writing exercises, workshop of student plays. prereq: 3115 or [writing sample, instr consent]

**TH 4177W. Survey of Dramatic Literature I: Strategic Interpretation.** (WI; 3 cr.; Student Option; Every Fall & Summer) Basic principles of script analysis as applied to stage practice from traditional/postmodern approaches. Students read plays, critical perspectives. Discussion, critical writing, performance. prereq: [3171, 3172], [jr or sr] or instr consent

**TH 4178W. Survey of Dramatic Literature II: Representation and its Effects.** (WI; 3 cr.; Student Option; Every Spring) In-depth look at how plays actively participate in production of social values and of society itself. Emphasizes consequences of choices theatre artists make. prereq: [3171, 3172], [jr or sr] or instr consent

**TH 4321. Career Preparation for the Actor.** (3 cr.; Student Option; Every Fall) Information/techniques necessary for professional acting career. prereq: 3322

**TH 4322. Acting for the Camera.** (3 cr.; Student Option; Every Fall & Spring) Differences between stage acting and acting for camera. Hands-on experience with film equipment. Scenes/monologues rehearsed/performed for camera. Videotape playback for class critique. prereq: 1301 or 3321

**TH 4380. Creative Collaboration.** (1-3 cr. [max 12 cr.]; Student Option; Every Fall) Ensemble creation of a single theatre performance work. Creative/dramaturgical work. Public showing of work, completed or in-progress. Students work collaboratively with faculty or affiliate guest artists. prereq: Audition, interview, instr consent

**TH 4391. BFA Intensive II.** (2 cr.; A-F or Audit; Every Fall) Applying first three years of training toward performance. Seventh in sequence of eight. Acting, voice, and movement. Integrating the disciplines. prereq: BFA student in theatre arts

**TH 4393. BFA Rehearsal and Performance III.** (2 cr.; A-F or Audit; Periodic Fall & Spring) Acting, voice, movement. Application of process toward performance. prereq: BFA student in theatre arts

**TH 4394. BFA Rehearsal and Performance IV.** (2 cr.; A-F or Audit; Periodic Fall & Spring) Acting, voice and movement. Application of process toward performance. prereq: BFA student in theatre arts

**TH 4395. BFA Intensive III.** (2 cr.; A-F or Audit; Every Spring) Incorporating the disciplines of acting/voice/movement. prereq: BFA-acting sr

**TH 4398. BFA Rehearsal and Performance V.** (2 cr.; A-F or Audit; Periodic Fall & Spring) Acting, voice and movement. Continuing the application of process towards performance. prereq: BFA-acting sr

**TH 4399. BFA Rehearsal and Performance VI.** (2 cr.; A-F or Audit; Periodic Fall & Spring) Acting, voice and movement. Continuing the application of process towards performance. prereq: BFA-acting sr

**TH 4532. Makeup for the Actor.** (2 cr.; Student Option; Every Fall & Spring) Topics vary. May include functions/aesthetics of stage makeup, application techniques, prosthetics, and facial hair.

**TH 4550. Video Technology.** (3 cr.; Student Option; Every Fall & Spring) Lighting, camera operation, audio, and recording for video/film production, using the state-of-the-art equipment in Studio B.
TH 4555. Audio Technology. (3 cr.; Student Option; Periodic Fall)
Sound as science. Technology to create/manipulate sound. Recording techniques. Effects/signal processing. Microphone/mixing techniques. prerequisites: 1501 or instr consent

TH 4556. Projection Media Design, Creation, and Development. (3 cr.; Student Option; Fall Odd Year)
Focus of this course is to develop skills and explore creativity in designing and creating multimedia for use in projections for live performance. The course will address topics in the field including: communication and collaboration with the rest of the artistic team (director, choreographer, other designers); ways to incorporate the images into the production and supporting the action and storytelling on stage; use of software and other technologies for design and development; paperwork, organization and communication to bring everything to a successful conclusion. Projects will include designing with multimedia and working with software and technologies to develop individual and group presentations. This course is about development and will not get into the specifics of projectors, playback, projection surfaces, systems design and hook up. That will be covered in TH4558 Projection Technology, Design, Engineering, and Installation.

TH 4711. Intermediate Stage Direction. (3 cr.; Student Option; Every Fall & Spring)

TH 4901. Senior Seminar. (2 cr.; S-N or Audit; Every Fall & Spring)
Development of senior project, alone or in groups, under guidance of faculty members. prerequisite: Sr. [Th or Dnce major]

TH 4905H. Honors: Tutorial Seminar in Theatre Arts. (2-4 cr.; A-F only; Every Fall & Spring)
Independent research/preparing honors thesis or selected creative project. prerequisite: Credit will not be granted if credit has been received for: 4905; honors, theatre arts, dept consent; limit [2 cr for [cum laude or magna cum laude], 4 cr for summa cum laude]

TH 5100. Theatre Practicum. (1-4 cr.; max 20 cr.; Student Option; Every Fall & Spring)
Individual creative projects in production of approved plays as an actor, director, dramaturgy, or playwright. (See 5500 for design practicums.) prerequisite: instr consent, dept consent; 4 cr of 3100 for undergrads

TH 5117. Performance and Social Change. (3 cr.; A-F or Audit; Periodic Fall)
Reading, writing, research, presentations and workshops explore activist performance projects. Theories of social formation and ideology provide framework to discuss/animate theater's potential for social change. prerequisite: Jr or sr or grad student

TH 5179W. Text and Performance. (Wi; 3 cr.; A-F or Audit; Every Fall)
How to read texts toward performance in various dramatic/nondramatic material. Method of unlocking metaphoric energy of texts. Vocabulary/techniques of analysis that transform text from page to stage. prerequisite: [1322, [3171 or 3172]] or grad student

TH 5181W. Blacks in American Theatre. (Wi; 3 cr.; Student Option; Periodic Spring)
Historical survey of significant events in the development of American black theatre traditions. Essays, plays, playwrights, and theatres from early colonial references to the Black Arts Movement.

TH 5182W. Contemporary Black Theatre: 1960-Present. (Wi; 3 cr.; Student Option; Spring Even Year)
Essays, plays, playwrights, and theatres that have contributed to contemporary Black theatre from beginning of Black Arts Movement to present.

TH 5183. Critical Literacy, Storytelling, and Creative Drama. (3 cr.; Student Option; Every Summer)
How storytelling and creative drama can be used as tools to help develop K-12 students' critical literacy and to assist them in becoming more fluent readers/writers. prerequisite: Jr or sr or grad student

TH 5320. Comedy: Advanced Physical Performance Studio. (3 cr.; A-F only; Every Spring)
Mechanics of creating physical comedy. Focuses on process using clown, Commedia dell'arte, Bouffons, or improvisational comedy. Exercises on how comedy is born from tragedy and state of conflict within one's self. prerequisite: 3331, instr consent

TH 5340. Tragedy/Poetry: Advanced Physical Performance Studio. (3 cr.; max 6 cr.; Student Option; Every Fall)
Specific tragic/poetic training paradigms in physical theatre employed by Stanislavski, Grotowski, Brecht, Lecoq, etc. Psychological, emotional, technical, and physical work. Tragic action in Greek tragedy, Shakespeare, Melodrama, operatic characterization. Brecht. Original tragic/poetic work. prerequisite: [3322, 3331, grad student] or instr consent

TH 5340. Tragedy/Poetry: Advanced Physical Performance Studio. (3 cr.; max 6 cr.; A-F only; Every Fall)
Specific tragic/poetic training paradigms in physical theatre employed by Stanislavski, Grotowski, Brecht, Lecoq, etc. Psychological, emotional, technical, and physical work. Tragic action in Greek tragedy, Shakespeare, Melodrama, operatic characterization. Brecht. Original tragic/poetic work. prerequisite: [3322, 3331, grad student] or instr consent

TH 5355. Puppetry: Techniques and Practice in Contemporary Theater. (3 cr.; Student Option; Every Fall & Spring)
Fundamentals of puppet and object theater/performance are introduced through traditional/modern puppetry forms. Focuses on object theater, toy theater, hand puppets, and shadow/Bunraku-style puppets. Readings, in-class screenings of videos/slides. Students build/create series of short works for in-class performance. prerequisite: [3513 or concurrent registration is required (or allowed) in 3513], instr consent or grad student

TH 5370. Hand, Mind, and Gesture: An Independent Study in the Creation of Image

Course listed in this catalog are current as of November 20, 2016. For up-to-date information, visit catalogs.umn.edu.
Current trends in historiography; research strategies and methods.

**TH 8111. History and Theory of Western Theatre: Ancient World and Early Medieval.** (3 cr.; Student Option; Periodic Fall) History, theories, arts, and crafts of western theatre from the ancient world to the present.

**TH 8112. History and Theory of Western Theatre: Medieval Through Renaissance.** (3 cr.; Student Option; Periodic Fall) History, theories, arts, and crafts of western theatre from the ancient world to the present.

**TH 8113. History and Theory of Western Theatre: National Theatres to the French Revolution.** (3 cr.; Student Option; Periodic Fall & Spring) History, theories, arts, and crafts of western theatre from the ancient world to the present.

**TH 8114. Theatre: Performance and Political Modernity.** (3 cr.; Student Option; Periodic Fall & Spring) History, theories, arts, and crafts of western theatre from the ancient world to the present.

**TH 8115. History and Theory of Western Theatre: 20th Century Through World War II.** (3 cr.; Student Option; Periodic Fall) History, theories, arts, and crafts of western theatre from the ancient world to the present.

**TH 8116. History and Theory of Western Theatre: 20th Century From 1945 to the Present.** (3 cr.; Student Option; Periodic Fall) History, theories, arts, and crafts of western theatre from the ancient world to the present.

**TH 8120. Seminar.** (3 cr.; Student Option; Every Fall & Spring) Selected research topics from various theatre fields and periods. Sample topics: Border Crossings—Theatre History and Representation; The Theatre and Drama of the Third Reich, 1927-1944.

**TH 8333. FTE: Master's.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, adviser and DGS consent

**TH 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

**TH 8500. Theatre Design Practicum.** (1-3 cr.; Student Option; Every Fall, Spring & Summer) Individual creative projects in production of approved plays as a designer for scenery/properties, costumes, lighting, or sound (see 8100 for other creative practicums). prereq: instr consent, dept consent

**TH 8510. Professional Design Workshop.** (2 cr.; max 4 cr.; A-F only; Every Fall & Spring) Development of graduate student as individual artist working collaboratively in performing arts industry. Further mastery of designer collaboration, self-promotion, management, displaying of job materials. Attend both professional/university productions throughout semester. prereq: MFA candidate

**TH 8590. Theatre Technology Practicum.** (1-3 cr.; max 20 cr.; Student Option; Every Fall & Spring) Individual creative projects in the technology or craft of costume, lighting, makeup, props, scenery, sound, or theatre management. prereq: instr consent, dept consent

**TH 8666. Doctoral Pre-Thesis Credits.** (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer) tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**TH 8711. Theory and Practice of the Modern Stage Director.** (3 cr.; Student Option; Periodic Fall) Survey of principal stage directors (e.g., Saxe-Meiningen, Meyerhold, Brecht, Strehler, Mnouchkine, Brook) and their theories and practices from 1871 to today using books, journals, firsthand accounts, and videos.

**TH 8750. MFA Directing Practicum.** (2-3 cr.; max 10 cr.; A-F or Audit; Every Fall & Spring) Rehearsed and performed production of published or original one-act (2 cr) or full-length play (3 cr) with budgeted design and technical support. prereq: MFA directing specialization

**TH 8777. Thesis Credits: Master's.** (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall & Spring) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**TH 8888. Thesis Credit: Doctoral.** (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 24 cr required

**TH 8950. Topics in Theatre.** (1-4 cr.; max 8 cr.; Student Option; Every Spring) Topics specified in Class Schedule.

**TH 8980. Internship.** (1-5 cr.; max 10 cr.; Student Option; Every Fall & Spring) tbd prereq: instr consent, dept consent

**TH 8990. MFA Creative Thesis.** (3-4 cr.; Student Option; Every Fall & Spring) tbd prereq: instr consent, dept consent

**TH 8994. Directed Research.** (1-5 cr.; Student Option; Every Fall & Spring) tbd prereq: instr consent, dept consent

**Therapeutic Radiology (TRAD) **

**TRAD 7170. Basic Radiological Physics.** (3 cr.; H-N or Audit; Every Fall & Spring)

**TRAD 7171. Physics of Nuclear Medicine.** (2 cr.; H-N or Audit; Periodic Fall) N/A prereq: 7170 or instr consent

**TRAD 7174. Physics of Diagnostic Radiology.** (2 cr.; H-N or Audit; )
TRAD 7177. Radiation Therapy Physics Laboratory: Radiation Physics Basics. (3 cr.; A-F only; Every Spring)
Hands-on experience with hardware/software used in radiation therapy clinic for physics measurements. prereq: 7170 or concurrent registration is required (or allowed) in 7173 or instr consent

TRAD 7340. Special Problems in Radiation Therapy. (1-15 cr.; H-N or Audit; Every Fall)

TRAD 7440. Special Problems in Radiological Physics. (1-15 cr. [max 1 cr.]; H-N or Audit; Every Fall)

TRAD 7505. Externship in Radiation Oncology. (3-4 cr.; H-N or Audit; Every Fall, Spring & Summer)
This course is designed not only for the student who plans to go into radiation therapy, but for those who plan to go into a field such as family practice, internal medicine, pediatrics, or surgery, where oncologic patients may be part of their practice. It provides training in clinical oncology, especially the diagnosis, disposition, and care of patients with cancer. The student attends all departmental and interdepartmental functions including follow-up clinics, new patient oncology conference, etc. The program is geared to give the extern direct patient contact, with intensive teaching by residents and staff. Lectures on basic radiology and radiation physics will provide supplemental teaching. There is no night call.

TRAD 7507. Advanced Externship in Radiation Oncology. (6 cr.; H-N or Audit; Every Fall & Summer)
This course is designed not only for the student who plans to go into radiation therapy, but for those who plan to go into a field such as family practice, internal medicine, pediatrics, or surgery, where oncologic patients may be part of their practice. Here the student gains more familiarity with the role of radiation therapy in the treatment of cancer patients. The student acts as a junior resident in the program, work-up new patients and presents them to the staff, assists in the treatment planning, follows patients through therapy, and helps care for them on the ward service. There is no night call. The student attends follow-up and new patient clinics, assists in the treatment of patients, assists in brachytherapy source implantation for gynecology cancer, and attends all conferences, seminars, and courses given by the department. Each student reports to an assigned tutor for discussion of treatment and natural history of disease.

TRAD 7510. Radiation Oncology Clinical Research. (6 cr.; H-N or Audit; Every Fall & Summer)
This elective provides an opportunity for each interested student to participate in a clinical research project designed around a specific topic related to radiation oncology. The student may choose to participate in an ongoing research project within the radiation oncology division or in an original investigative project of the student's design arranged on an individual basis by Dr. Chung Lee with staff members in the Department of Therapeutic Radiology-Radiation Oncology. The student may do a retrospective clinical study, reviewing patient medical records and films, collecting and analyzing data, and presenting an oral as well as written report on the project. In addition, the student may elect to spend up to 20 percent of their time in regularly scheduled clinical activities of the radiation oncology division.

TRAD 7511. Outpatient Diagnosis, Evaluation and Treatment of Adults and Children with Cancer. (6 cr.; H-N or Audit; Every Fall & Spring)
This course is designed for the student who plans to go into fields such as family practice, internal medicine, pediatrics, or surgery, where oncologic patients may be part of their practice. This multidisciplinary course allows the student to spend two weeks in therapeutic radiology, and four weeks in pediatric oncology and medical oncology combined. During this time the student evaluates and participates in the care of patients primarily in an outpatient setting. In all areas, the student is responsible for the evaluation of patients, and opportunity is provided for follow-up throughout the course. There is no night call. prereq: Med 7500

TRAD 7583. Fundamentals of Clinical Oncology. (4 cr.; H-N or Audit; Every Fall, Spring & Summer)
This multidisciplinary course provides an introduction to the fundamentals of clinical oncology (adult and pediatric) and is designed for the medical student interested in entering any specialty. Emphasis is on understanding important concepts of oncology, acquiring practical skills relevant to the diagnosis and treatment of the common malignancies, and gaining confidence in providing psychosocial support to patients and families. The student is able to follow newly diagnosed patients as they go through their initial evaluation/staging tests for malignancy and participate in planning treatments. Approximately two hours a day are devoted to conferences and tutorial sessions developed specifically for each student enrolled in this course. prereq: Med 7500 or Ped 7501

TRAD 7910. Therapeutic Radiology Residency. (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Therapeutic radiology residency.

TRAD 7930. Therapeutic Radiology Fellowship. (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Therapeutic radiology fellowship.

TRAD 8149. Advanced Topics in Radiation Therapy Physics. (3 cr.; A-F only; Every Fall)
Special procedures, including total body irradiation, intensity-modulated radiation therapy, stereotactic radiosurgery/radiotherapy, image-guided radiation therapy. Treatment planning algorithms and techniques. Advanced techniques in brachytherapy. prereq: [7170, 7173] or [BPHY 5170, BPHY 5173]

TRAD 8240. Radiation Therapy Conference. (0 cr.; Student Option; Every Fall)

TRAD 8310. Fundamentals of Radiation Therapy. (1 cr.; Student Option; Every Fall)

TRAD 8315. Radiation Therapy Pathology. (1 cr.; Student Option; Every Fall)

TRAD 8320. Radiation Therapy Treatment Planning Problems. (1 cr.; Student Option; Every Fall)

TRAD 8325. Radiation Therapy Pediatrics Oncology. (1 cr.; Student Option; Every Fall)

TRAD 8350. Research: Radiation Therapy. (1-15 cr.; Student Option; Every Fall)

TRAD 8450. Research: Radiation Biology. (1-15 cr.; Student Option; Every Fall)

TRAD 8550. Research: Radiological Physics. (1-15 cr.; Student Option; Every Fall)

Toledo International Program (TLDO)

TLDO 3001. 20th Century Spanish Literature. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Spanish literature.

TLDO 3002. Survey of Spanish American Colonial Literature. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Spanish American literature.

TLDO 3004. Marketing in European Business. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

TLDO 3005. Introduction to Interpretation for Spanish Speakers. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

TLDO 3006. The Camino de Santiago: Past and Present. (3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer)
Study abroad course.

TLDO 3022. Spanish for Business and Professional Life Development. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Vocabulary/usage of interest in business, economics, international relations, or tourism. prereq: Two yrs of college-level Spanish

TLDO 3023. Cross Cultural Business: Business in Spain and the United States Compared. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)

TLDO 3024. Tracing Three Cultures in Spain. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Three-week intensive course. Lectures, discussions, field trips, including Madrid's 'Museo del Prado', 'El Escorial' Palace, Guided Tours of Judaic Toledo and Mozarabic Segovia. Christian, Muslim, and Jewish culture in literature/art, how they conform to identity of modern Spain. Sephardic heritage in literature/architecture in Toledo. Interaction between Islamic/Hispano-Mozarabic
courses listed in this catalog are current as of november 20, 2016. for up-to-date information, visit www.catalogs.umn.edu.

TLDO 3025. Exploring Spanish Culture Through Digital Technology. (3 cr. [max 6 cr.]; A-F only; every summer) Study abroad course.


TLDO 3105W. Cultural Heritage of Spain. (Wt; 3 cr.; A-F only; every fall, spring & summer) Main periods of Spanish history. Political, social, anthropological, and economic characteristics of each. Spanish culture/society, from beginning of Franco regime in 1939 to present. Cultural trends in literature/arts in relation to social phenomena. Prereq: Two yrs of college-level Spanish

TLDO 3107W. Introduction to the Study of Hispanic Linguistics. (Wt; 3 cr.; A-F only; every fall, spring & summer) Phonology, morphology, syntax, semantics, lexicology, pragmatics, discourse analysis, sociolinguistics. History of Spanish language. Introduction to Hispanic linguistics as a discipline in relation to social, cultural, and literary studies.

TLDO 3211. Writers of the Spanish Empire and Its Decline. (3 cr.; A-F or Audit; every fall) Major works of medieval Spain in connection with its social background, from Auto de los Reyes Magos and Cantar del Mio Cid to Celestina and other pre-Renaissance literature.

TLDO 3212. The Age of Don Quijote. (3 cr.; A-F or Audit; every spring) Major works of Cervantes, Don Quijote de la Mancha, and Novelas Ejemplares as stepping stones to understanding 16th/17th century Spain.

TLDO 3215. Spanish Golden Age Theater. (3 cr.; A-F or Audit; every spring) Spanish Baroque theater. Plays by Lope de Vega, Calderon, Cervantes, Garciailo, Gongora, Quevedo, and authors of picaresque novels and mystic poetry.

TLDO 3216. Contemporary Spanish Women Writers. (3 cr.; A-F only; every fall, spring & summer) Literary works by women writers of last three decades. Spanish history of 20th century.

women's participation across political spectrum. Feminist movement. Sociopolitical/cultural changes since Franco's death in 1975. Role of Spanish women writers in transition to democracy and social change.

TLDO 3217. Directed Studies in Literature. (3 cr.; A-F only; every fall, spring & summer) Individual research projects or readings in literature, under faculty direction, to meet objectives not covered by regular curriculum.

TLDO 3218. Discovering the Hispanic World Through the Baroque. (3 cr. [max 6 cr.]; student option; every fall, spring & summer) Study abroad course.

TLDO 3222. Narrative in Spanish America. (3 cr.; A-F or Audit; every fall & spring) Narrative currents in Spanish America, from Cervantes and emergence of magical realism to present day. Authors studied include Garcia Marquez, Borges, Vargas Llosa, and Cortazar.

TLDO 3230. Advanced Spanish Conversation. (3 cr. [max 6 cr.]; every fall, spring & summer) Contemporary issues in Spain, other subjects of interest. Error evaluation. Review of frequent structural/grammatical problems. Prereq: Two yrs of college-level Spanish

TLDO 3231. Spanish Composition and Communication. (3-4 cr. [max 8 cr.]; every fall, spring & summer) Difficult aspects of Spanish grammar/structures mastered through composition writing. Problems of style/language. Several compositions written outside class. Common errors. Prereq: Two yrs of college-level Spanish


TLDO 3233. Christian, Muslim, Jewish Art: Toledo. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Art of three cultures are studied in/around Toledo.

TLDO 3234. Master Painters of Spain. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Development of Spanish painting studied in works of El Greco, Velazquez, Goya, Picasso, and Dali. Visits to Madrid's Museo del Prado and Centro de Arte Reina Sofia.

TLDO 3235. Politics and Society in Latin America. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Contrasts in political/social/structural of various Spanish-American nations in 20th century. Their diversity, common problems.

TLDO 3236. Structure of Spanish: Phonology and Phonetics. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Practical/theoretical aspects of Spanish phonetics. Correcting specific pronunciation problems of non-native speaker. Small practice groups divided according to native languages.


TLDO 3238. Spain and the European Union. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Formation of EU. impact of building a single European market on Spanish and greater European economies. Readings from daily press.

TLDO 3239. Management of Cultural Heritage. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Theoretical/practical approach to managing Spain's cultural heritage. Historical, artistic, social, and economic aspects of life in a patrimonial city.

TLDO 3240. Advanced Problems in Spanish Grammar. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Aspects of Spanish syntax in context of written language. Different methods in teaching Spanish grammar. Prereq: Two yrs of college-level Spanish

TLDO 3241. Directed Studies in Art History. (3 cr. [max 6 cr.]; A-F only; every fall, spring & summer) Individual research projects or readings in art or archeology, under faculty direction, to meet objectives not covered by regular curriculum. Prereq: Two yrs of college-level Spanish

TLDO 3242. History and Memory. (3 cr. [max 6 cr.]; student option; every fall, spring & summer) Study abroad course.

TLDO 3301. Archaeology of the Iberian Peninsula. (3 cr.; A-F or Audit; every fall, spring & summer) Diverse cultures of iberia as seen through an analysis of most important archaeological sites of the peninsula. Prereq: Two yrs of college-level Spanish

TLDO 3302. Ethnology and Folklore of the Iberian Peninsula. (3 cr.; A-F or Audit; every fall, spring & summer) Traditional forms of life in Iberian Peninsula in terms of social/economic features. Literary, artistic, and religious aspects. Prereq: Two yrs of college-level Spanish

TLDO 3303. Directed Studies in Anthropology and Archeology. (1-4 cr.; A-F or Audit; every fall, spring & summer) Individual research projects or readings in anthropology or archeology, under faculty direction, to meet objectives not covered by regular curriculum. Prereq: Two yrs of college-level Spanish

TLDO 3314. 20th Century Spanish Art. (3 cr.; A-F or Audit; every spring)
Spanish artists who were most affected by European avant-garde movements and have greatly affected art in/outside Spain (e.g., Pablo Picasso, Salvador Dalí, Juan Miro, Juan Gris).

TLDO 3502. Spain Since 1936. (; 3 cr.; A-F or Audit; Every Fall, Spring & Summer)
Main features and social significance of General Franco's authoritarian regime as opposed to German/Italian models. Origins of the Civil War. Later social/economic development. Problems in political/constitutional transition since Franco. prereq: Two yrs of college level Spanish

TLDO 3503. Directed Studies in History. (; 1-3 cr.; A-F only; Every Spring)
Individual research projects or readings in history, under faculty direction, to meet objectives not covered by regular curriculum.

TLDO 3515. Theology of Spanish Mysticism. (; 3 cr.; A-F or Audit; Every Spring)
Historical, social, cultural, and theological basis of Spanish mysticism. Carmelites, Franciscans, Jesuits. prereq: Two yrs of college level Spanish

TLDO 3516. Spanish Philosophical Thought. (; 3 cr.; A-F or Audit; Every Fall)
Characteristics of Spanish Renaissance (16th century), influence of Erasmus, mysticism, philosophy of Juan Luis Vives. Overview of philosophical development from 17th to 20th centuries. Contemporary Spanish philosophy, focusing on Unamuno, Ortega y Gasset, and Zubiri. prereq: Two yrs of college level Spanish

TLDO 3517. Introduction to the History and Present Situation of Spanish Women. (; 3 cr.; A-F or Audit; Every Fall & Spring)
Theoretical/practical approach to fundamental transformations that have conditioned lives of Spanish women, from Golden Age to present. Aspects of women's participation in economic world and in culture.

TLDO 3599. Advanced Individualized Spanish. (; 1-4 cr.; A-F only; Every Fall & Spring)
Directed study with individual tutoring to improve specific language skills identified by student and supervising professor. prereq: Two yrs of college-level Spanish

TLDO 3703. History of the Spanish Language. (; 3 cr.; A-F only; Every Spring & Summer)
Trends in historical development of Spanish. Emphasizes grammar and Spanish sound system.

TLDO 3706. Colloquial Spanish. (; 3 cr.; A-F only; Every Fall, Spring & Summer)
Characteristic phenomena of Spanish in its colloquial spoken form. Variations based on age, social, and regional background. New lexical, morphological, and syntactical coinages.

TLDO 3800. Society Through Spanish and Latin American Film. (; 3 cr.; A-F only; Every Fall)
Contemporary Spanish and Latin American societies explored through films with Spanish and Latin American artists. Approximately 10 films are analyzed from historic-sociological point of view. prereq: Two yrs of college level Spanish

TLDO 3810. Seminar: Spanish Language Film. (3 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer)
Contemporary cultural/aesthetic trends in Spanish film industry. Viewing/analysis of most significant films of Saura, Bardem, Guirierrez, Aragon, and other directors.

TLDO 3900. Topics in Toledo. (; 1-6 cr.; A-F only; Every Fall, Spring & Summer)
Study abroad course.

TLDO 3970. Internships in Spain. (3-6 cr.; A-F only; Every Fall, Spring & Summer)
Experiential learning in many fields. Classroom component on meaning of work in Spain and social organizational structure/culture of workplace. prereq: Two yrs of college-level Spanish

TLDO 3975. Service-Learning and the Immigrant Experience in Spain. (3-4 cr. [max 8 cr.]; A-F only; Every Fall, Spring & Summer)
Students volunteer at one of several Toledo institutions and collaborate with immigrant population or with Spaniards who work with the immigrant community. Weekly seminar, readings, discussion, reflection, presentations.

Toxicology (TXCL)

TXCL 5000. Directed Research in Toxicology. (1-5 cr.; A-F or Audit; Every Fall & Spring)
Special project that addresses specific issue in toxicology. Under guidance of faculty member. prereq: instr consent

TXCL 5011. Principles of Toxicology. (2 cr.; A-F or Audit; Periodic Fall)
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers. prereq: Grad toxl major or instr consent

TXCL 5012. Principles of Toxicology. (3 cr.; A-F or Audit; Every Spring)
Science of toxicology. Biomedical principles. Regulatory practices governing protection of human health and environmental quality. prereq: At least one semester [biochemistry, calculus, cell biology]; at least one semester of [human or animal] physiology recommended

TXCL 5013. Chemical Toxicology. (3 cr.; A-F or Audit; Every Fall)
Signs, symptoms, and mechanism of toxicity of different classes of chemicals spanning several organ systems, including chemical carcinogenesis. prereq: 5012, instr consent

TXCL 5101. Molecular and Cellular Basis of Nanoparticle Toxicology. (3 cr. [max 6 cr.]; A-F or Audit; Fall Odd Year)
Introduction to science of nanotoxicology. Nanotechnology in scientific research. Assessment of impact on biological systems. prereq: Introductory toxicology course

TXCL 5195. Veterinary Toxicology. (3 cr.; A-F or Audit; Every Fall)
Toxicology of minerals, pesticides, venom, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisons. prereq: Grad student or instr consent

TXCL 5545. Introduction to Regulatory Medicine. (2 cr.; A-F or Audit; Periodic Spring)
Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market. prereq: Grad student or instr consent

TXCL 8012. Advanced Toxicology I. (3 cr.; A-F or Audit; Every Spring)
Absorption, distribution, metabolism, and excretion of xenobiotics; toxicokinetics; mechanisms of toxicity or specific classes of chemical agents. prereq: 5011 or BioC 4331, PubH 5104 or instr consent

TXCL 8013. Advanced Toxicology II. (3 cr.; A-F or Audit; Every Fall)
Kinetic and dynamic determinants of target organ toxicity; pathological alterations in structure/function relationships for major target organ systems; mechanisms of mutagenesis, carcinogenesis, and teratogenesis. prereq: 8012, BioC 4332, PubH 5062 or PubH 6101 or instr consent

TXCL 8100. Investigative Toxicology. (1 cr.; max 2 cr.; A-F or Audit; Every Fall & Spring)
Evaluating toxicology research issues and literature. prereq: 8013 or instr consent

TXCL 8333. FTE: Master's. (1 cr.; No Grade Associated; Every Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

TXCL 8444. FTE: Doctoral. (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

TXCL 8666. Doctoral Pre-Thesis Credits. (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

TXCL 8777. Thesis Credits: Master's. (1-18 cr.; max 50 cr.; No Grade Associated; Every Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

TXCL 8888. Thesis Credit: Doctoral. (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required
TRIN 900. Special Education for Interpreters. (0 cr.; S-N only; Every Spring) Terminology, processes, concepts, and legalities involved in interpreting in special education settings.

TRIN 990. Interpreting in Special Education Settings. (0 cr.; S-N only; Every Fall) Advanced skills to apply special education protocols/concepts to simulated interpreting encounters. Self-assessment, glossary compilation, critical analysis, review of ethical procedures.

TRIN 1201. Health Care Terms and Concepts for Interpreters. (3 cr.; A-F or Audit; Every Fall) Technical vocabulary, oral discourse patterns used by health care providers in talking to patients, family members. Language of American health care interview.


TRIN 1901. Special Education Terms and Concepts for Interpreters. (3 cr.; Student Option; Periodic Fall & Spring) This course is designed to introduce students to the terminology, processes, concepts, and legalities involved in interpreting in special education settings.

TRIN 3001. Introduction to Translation. (3 cr.; Student Option; Every Fall & Summer) Theory of and supervised practice in translation. Re-expressing meaning in a second language. Translation primarily of English language texts concerning public health/safety, legal/voting rights, regulations, and procedures. prereq: Bilingual proficiency in [English, second language of instruction]

TRIN 3002. Intermediate Translation. (3 cr.; max 6 cr.; Student Option; Periodic Spring) Additional instruction and supervised practice in translation. prereq: 3001

TRIN 3005. Principles of Translation. (3 cr.; Student Option; Periodic Fall) Key linguistic principles that help us understand how language makes meaning. Applying principles to translation. prereq: Fluent in English, proficient in a second language, not in CCE certificate prog in interpreting; basic knowledge of English grammar recommended

TRIN 3101. Introduction to Interpreting. (3 cr.; Student Option; Every Fall & Spring) Practical and theoretical introduction to interpreting in health, human service, and legal settings. Emphasis on understanding the unique role of the interpreter, current models and modes of interpreting, ethical issues and professional standards of practice, and developing pre-interpreting skills. prereq: high level of proficiency in spoken English and another language; 3001 recommended

TRIN 3102. Consecutive Interpreting. (3 cr.; Student Option; Every Spring) Practice/theory at professional level in interpreting in health, human service, legal settings. Emphasizes professional/client dialogues. Consecutive interpreting skills, vocabulary research/storage, intercultural issues. Analyzing interpretive process. Performance assessment through audio/ videotaping. Subject languages (e.g., Spanish, Russian, Somali) specified for each section. prereq: 3101, high level of proficiency in [spoken English, another language]

TRIN 3900. Topics in Translation and Interpreting. (6 cr. [max 24 cr.]; Student Option; Periodic Summer) Topics specified in Class Schedule.


TRIN 5993. Directed Study. (1-3 cr. [max 6 cr.]; Student Option; Every Fall, Spring & Summer) Directed study in translation/interpretation.

Turkish (TURK)

TURK 1002. Beginning Turkish II. (5 cr.; Student Option; Every Spring) Listening, speaking, reading, and writing.

TURK 3001. Intermediate Turkish I. (3-4 cr.; Student Option; Every Fall) Listening, speaking, reading, and writing skills in modern standard Turkish.

TURK 3002. Intermediate Turkish II. (3 cr.; Student Option; Every Spring) Listening, speaking, reading, and writing skills in modern standard Turkish. prereq: 3001 or instr consent

TURK 3031. Advanced Turkish I. (3 cr.; A-F only; Every Fall) This advanced course is designed to build proficiency in both Turkish and Azeri languages through encounters with a variety of authentic texts, audio, video and multimedia materials. The course will not only develop language skills but will also explore the similarities, differences and relationships between these two languages and the cultures. The course will proceed in thematic units which have both Turkish and Azeri components. Students will have the opportunity to develop comprehension and advanced grammar analysis through reading the authentic materials and listening comprehension through a variety of audio and video materials, speaking competence through discussion and debate, and writing competence.

TURK 3032. Advanced Turkish II. (3 cr.; A-F only; Every Fall) This advanced course is designed to build proficiency in both Turkish and Azeri languages through encounters with a variety of authentic texts, audio, video and multimedia materials. The course will not only develop language skills but will also explore the similarities, differences and relationships between these two languages and the cultures. The course will proceed in thematic units which have both Turkish and Azeri components. Students will have the opportunity to develop comprehension and advanced grammar analysis through reading the authentic materials and listening comprehension through a variety of audio and video materials, speaking competence through discussion and debate, and writing competence.

Undergraduate Summer Research (UGRD)

UGRD 4999. Undergraduate Summer Research. (0 cr.; No Grade Associated; Every Summer) Undergraduate Summer Research

University College (UC)

UC 1005. Global Perspectives on Higher Education. (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring) Provides international students with the skills to examine, process, and articulate the values, contexts, and goals of the American higher educational system as it compares to their previous experiences. prereq: International student

UC 1485. Creativity: Photography. (4 cr.; Student Option; Every Fall & Spring) Conceptual, technical, and historical aspects of photography as art. Hands-on experience with camera control, film development, enlarging, and printing in black-and-white. Individual/group critiques of student portfolios. Lab. prereq: Own camera [35 mm w/adjustable controls preferred]. UC; $50 lab fee

UC 3201. Web Designer Introduction. (4 cr.; Student Option; Every Fall, Spring & Summer) Web design process: plan, design, launch, and publish using industry standard Web design software. Adobe Photoshop and Dreamweaver are used to build and publish a personal Web site using HTML5 and CSS. Design principles, business practices, site analysis, Bootstrap, jQuery and Animate are also covered. Lectures, exercises, lab. No previous experience necessary.

UC 3950. Special Topics. (1-4 cr. [max 12 cr.]; Student Option; Every Fall, Spring & Summer)
Special topics course.

**URBS 1001W. Introduction to Urban Studies: The Complexity of Metropolitan Life.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring)
Interdisciplinary course, ranging across spatial, historical, economic, political, and design perspectives, among many others.

**URBS 3001W. Introduction to Urban Studies: The Complexity of Metropolitan Life.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring)
Interdisciplinary course, ranging across spatial, historical, economic, political, and design perspectives, among many others.

**URBS 3011W. Introduction to Urban Studies: The Complexity of Metropolitan Life.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring)
Interdisciplinary course, ranging across spatial, historical, economic, political, and design perspectives, among many others.

**URBS 3201. Urban Studies Colloquium.** (1 cr.; max 4 cr.; A-F or Audit; Every Fall)
Urban/metropolitan issues. Topics vary to reflect current concerns. In-depth reading, intensive group discussion. Prereq: dept consent.

**URBS 3202. Urban Studies Colloquium.** (1 cr.; max 4 cr.; A-F or Audit; Every Spring)
Urban/metropolitan issues. Topics vary to reflect current concerns. In-depth reading, intensive group discussion.

**URBS 3301W. American Cities As Settings for Cultural Diversity.** (WI; 3 cr.; Student Option; Every Fall)
Explores cultural diversity in American cities, considering patterns of and reasons for racial and class segregation and interaction. Its foci are the problems, conflicts, and successes of cultural diversity from a multidisciplinary perspective.

**URBS 3500. Urban Studies Workshop.** (3 cr. [max 9 cr.]; A-F or Audit; Every Fall & Spring)
Links academic learning to actual urban problems/issues. Focuses on specific topic using local community as laboratory. Field work, contact with local institutions/agencies. Prereq: instr consent.

**URBS 3751. Understanding the Urban Environment.** (ENV; 3 cr.; A-F or Audit; Every Spring)
Examine links between cities and the environment with emphasis on air, soil, water, pollution, parks and green space, undesirable land uses, environmental justice, and the basic question of how to sustain urban development in an increasingly fragile global surrounding.

**URBS 3771. Fundamentals of Transit.** (3 cr.; A-F only; Spring Odd Year)
Importance of transit to an urban area. Issues surrounding development/operation of transit. Defining various modes of transit, evaluating why/where each may be used. Making capital improvements to transit system. Finance, travel demand forecasting, environmental assessment, scheduling, evaluation of effectiveness/accessibility.

**URBS 3861. Financing Cities.** (3 cr.; Fall Odd Year)
Readings, lecture, discussion, coursework. Services/projects cities provide/finance. Ways in which developers/consumers participate in urban development through policies and financial tools. Challenges cities face in determining budgets.

**URBS 3871. A Suburban World.** (3 cr.; Student Option; Fall Odd Year)
Suburbs as sites of urgent battles over resources, planning practices, land use, and economic development. How suburban life shapes values, political ideals, and worldviews of its populations.

**URBS 3900. Urban Studies Internship Seminar.** (2 cr. [max 4 cr.]; A-F or Audit; Every Fall, Spring & Summer)
Weekly seminar integrates internship experience with academic program. Prereq: Sr, internship placement, dept consent, instr consent.

**URBS 3955W. Senior Paper Seminar.** (WI; 2 cr.; A-F or Audit; Every Fall & Spring)
Methods/resources for research. Substantial writing, prerequisite: dept consent.

**URBS 3993. Urban Studies Directed Study.** (1-3 cr.; max 6 cr.; A-F or Audit; Every Fall, Spring & Summer)
For students with a specific educational objective that cannot be satisfied through regular curriculum (e.g., foreign study) and for honors students to complete an honors opportunity. Prereq: nrB or MjS majors, instr consent, dept consent.

**URBS 5861. Financing Cities.** (3 cr.; A-F only; Fall Odd Year)
Services/projects cities provide/finance. Ways in which developers/consumers participate in urban development through policies and financial tools. Challenges cities face in determining budgets.

**URBS 5950. Special Topics.** (1-8 cr.; max 16 cr.; Student Option; Every Fall, Spring & Summer)
Special topics.

**Urban Studies (URBS)**

**UROL 1001W. Introduction to Urology.** (5 cr.; A-F or Audit; Every Fall & Spring)
Examine links between cities and the environment with emphasis on air, soil, water, pollution, parks and green space, undesirable land uses, environmental justice, and the basic question of how to sustain urban development in an increasingly fragile global surrounding.

**UROL 7200. Surgical Specialty: Urology.** (2-4 cr.; P-N or Audit; Every Fall & Spring)
Each student learns the basic principles of urology in this externship. Pediatric and adult urology are available. At the completion of the rotation, the student should be able to read an IVP, place Foley catheters, and read a urinalysis.

**UROL 7252. Urological Conference.** (3 cr.; No Grade Associated; Every Fall, Spring & Summer)
Urological conference.

**UROL 7253. Research in Urology.** (3 cr.; No Grade Associated; Every Fall & Spring)
Two-week urologic surgery externship. Principles of Urology students are use in the general medical practice. Urologics emergencies, infections, hematuria, stones, prostate cancer, and erectile dysfunction. How to read an IVP, place Foley catheters, and read a urinalysis. Frequent opportunities for student participation in rural consultations in primary care offices.

**UROL 7500. Advanced Urological Surgery.** (2-6 cr.; H-N or Audit; Every Spring & Summer)
Advanced clinical urology rotation. Students act as sub-interns on busy clinical urology service. Students participate in weekly conferences and function as integral component of health care team. Students may select to rotate at Fairview University or VAHCs Minneapolis sites. Prereq: 7200 or course director approval.

**UROL 7503. Urologic Research.** (1-15 cr.; H-N or Audit; Every Fall, Spring & Summer)
This is a full-time laboratory course in which the student learns the basics of urologic cell biology as they apply to urologic research. Basic techniques of protein purification for amino acid composition and sequencing, electrophoresis, Western blots, immunocytochemistry, and tissue culture are used in a well-defined project. The mechanics of working in a lab and research methodology are covered in this course.

**UROL 7910. Urologic Surgery Medical Residency.** (6 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Urologic surgery medical residency.

**UROL 7930. Urologic Surgery Medical Fellowship.** (8 cr. [max 120 cr.]; No Grade Associated; Every Fall, Spring & Summer)
Urologic surgery medical fellowship.

**UROL 8254. Urological Seminar.** (2 cr.; Student Option; Every Spring & Summer)

**UROL 8255. Urological Radiological Elective.** (2-4 cr.; H-N or Audit; Periodic Fall & Spring)

**UROL 8256. Urological Radiological Conference.** (2 cr.; Student Option;)

**UROL 8257. Selected Topics in Genitourinary System.** (1 cr.; Student Option;)

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
# Veterinary Medicine (CVM)

**VCM 6000. Gopher Orientation and Leadership Experience.** (2 cr. [max 4 cr.]; S-N only; Every Fall & Spring) Introduces first-year students to the veterinary college, program, and profession. Two-day and one-night off-site orientation program and monthly meetings are experiential in design and focus on leadership development, emotional intelligence, communication, and conflict management. Third orientation day on campus and subsequent noon meetings introduce students to the college facilities and resources and address logistics necessary for participation in the program. Students work in mentor groups of 9-11 students and 2-3 faculty mentors throughout the course. prereq: Admission to veterinary program

**CVM 6001. Opportunities in International and Cultural Immersion.** (0.5 cr. [max 1 cr.]; S-N only; Every Fall & Spring) Finding and applying for opportunities. Securing funding. Travel safety. Topics in cultural competence. Presentations from students who have participated in international projects.

**CVM 6004. Foundations of Interprofessional Communication and Collaboration.** (1 cr. [max 2 cr.]; S-N only; Every Fall) Proper use of social networking software. Tools for self/peer assessment. Professional communities as moral communities. Professional identity/integrity. Professional relationships. prereq: AHC student

**CVM 6005. Global One Health: Thailand.** (3 cr.; S-N only; Periodic Spring) Self-guided study. Monthly in person seminars prior to three week study abroad in Thailand. Journal on recommended topics. Assessment via evidence of reading provided references through active participation in discussions, presentation of learning topics, active participation.

**CVM 6006. Small Animal ICU Practicum: Year 4.** (1 cr. [max 3 cr.]; S-N or Audit; Every Fall, Spring & Summer) Management of dogs/cats requiring urgent medical care, intensive medical management. Providing primary case care through patient evaluation, problem solving, health care delivery, equipment operation. Practicum in Small Animal Intensive Care Unit.

**CVM 6007. Large Animal Practicum: Year 3.** (1 cr.; S-N only; Every Fall & Spring) Experience in procedures/policies involved in after-hours care of hospitalized/emergency cases in the large-animal hospital. Prereq: 3rd DVM or [inst consent, college consent]

**CVM 6028. Large Animal Hospital Practicum: Year 4.** (4 cr. [max 12 cr.]; S-N or Audit; Every Fall, Spring & Summer) Team leadership in procedures/policies involved in after hours care of hospitalized/ emergency cases in large-animal hospital. prereq: All 4th year students in Food Animal, Equine, Mixed tracks, as well as affiliate students.

**CVM 6029. Small Animal Hospital Practicum: Year 3.** (1 cr. [max 2 cr.]; S-N only; Every Fall, Spring & Summer) Management of dogs/cats requiring urgent medical care, intensive medical management. Providing primary case care and service support through patient evaluation, problem solving, health care delivery, equipment operation. Practicum is served in Small Animal Intensive Care Unit. prereq: DVM 3rd yr or instr consent

**CVM 6030. Veterinary and Community Public Health.** (2 cr. [max 6 cr.]; A-F only; Every Fall, Spring, Spring & Summer) Epidemiological approach to veterinary public health. Major zoonoses, animal sentinels, meat/milk inspection, preharvest food safety, environment, occupational health/safety, euthanasia, carcass disposal methods, cruelty investigations, welfare issues. Problem-solving examples. prereq: 6201, 6202, 6220

**CVM 6137. Small Animal Clinical Nutrition.** (2 cr. [max 6 cr.]; A-F only; Every Fall, Spring, Spring & Summer) Students participate in clinical nutrition service of VMC, manage nutritional needs of patients, perform nutritional assessments of ICU patients, perform internal/refferring nutritional consults, and see outpatient appointments. prereq: 3rd or 4th yr DVM or instr consent

**CVM 6222. Advanced Clinical Epidemiology.** (1 cr. [max 2 cr.]; A-F only; Every Fall) Apply epidemiologic principles to control of infectious diseases in animal populations. Scientific literature. Global impacts of infectious diseases. Diagnostic tests, disease outbreak investigation, economics of disease control/ surveillance.

**CVM 6308. Lab Animal Medicine.** (2 cr.; A-F only; Every Spring & Summer) This course is designed to introduce students to the field of laboratory animal medicine and provide a strong foundation in the discipline. Using a mix of didactic and hands-on training methods, students will gain proficiency in the veterinary care of lab animals, and apply their skills and knowledge gained in all previous courses in their veterinary curriculum. Discussions will be challenging and require independent thought and application of concepts to real-world situations. Students will be well-prepared for additional training in laboratory animal medicine as would occur though residency.

**CVM 6312. Veterinary Dental Rotation (SDen).** (2 cr. [max 6 cr.]; A-F only; Every Fall, Spring & Summer) Routine/complex dental problems. Students diagnose and formulate treatment plans.
Hands-on training. Basic periodontal procedures, single/multi-rooted extractions, dental radiographic techniques, instrument/ equipment care, dental charting. prerequisite: DVM 3rd or 4th yr student or instr consent

CVM 6404. Small Animal Dermatology: Advanced Block. (1 cr.; A-F or Audit; Every Spring)
Case-base discussion of common dermatologic conditions and their treatment in dogs/cats. Students work on clinical cases outside of classroom. Cases are discussed in classroom.

CVM 6452. Metabolic Disorders II. (3 cr.; A-F or Audit; Periodic Fall)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocols for metabolic and endocrine based disorders of domestic species. prerequisite: DVM 3rd yr or instr consent

CVM 6482. Small Animal Theriogenology. (1 cr.; max 2 cr.; A-F only; Every Fall)
Normal/abnormal reproduction in dogs/cats. Dystocia management. Diagnosis/treatment of reproductive tract disease. Exotics. prerequisite: 3rd yr DVM or instr consent

CVM 6497. Avian Medicine and Surgery: Advanced Block. (1 cr.; S-N only; Every Spring)

CVM 6500. Veterinary Public Health and Regulatory Medicine. (1 cr.; max 2 cr.; S-N only; Every Fall, Spring & Summer)
Joining with public health, regulatory, and community activities. Roles in food industry, Public/occupational health, environmental problems. Zoonotic disease problems, food/occupational safety, euthanasia, carcass disposal, epidemiologic investigations, animal transportation/control, emergency preparedness, USDA accreditation. Students select clinical case, prepare oral response to hypothetical question, conduct occupational safety/hazard review, present findings. prerequisite: DVM 3rd or 4th yr or grad student or instr consent

CVM 6501. Advanced Veterinary Public Health: Current Topics. (1 cr.; max 2 cr.; S-N only; Every Fall, Spring & Summer)
Systems used to raise livestock/poultry, deliver through markets to slaughter or processing facilities, and deliver to consumers. Methods to assess/mitigate risks. Emphasizes public health/food safety issues. Field trips, problem solving, assignments. prerequisite: DVM or MPH or grad student or instr consent

CVM 6502. Necropsy. (2 cr.; max 40 cr.; S-N only; Every Fall, Spring & Summer)
Students perform necropsies, collect tissues for lab analysis, interpret clinicopathologic findings, prepare reports on animals submitted to Veterinary Diagnostic Lab, apply basic-clinical science to diseases for animals and populations of animals. Students may participate in history taking. Case findings discussed daily. Student groups present case reports at weekly departmental seminar. prerequisite: DVM 3rd or 4th yr or instr consent

CVM 6503. Exotic Animal Necropsy Rotation. (2 cr.; A-F only; Every Fall, Spring & Summer)
Zoo/wildlife pathology service similar to required necropsy rotation (CVM 6502). Perform necropsies of incoming cases of “nontraditional” animals. Write report and after discussion with faculty member chose appropriate additional tests. Perform histologic evaluation of selected organs. Small projects pertaining to exotic animal pathology (and medicine). Present during lab’s Thursday seminar series.

CVM 6504. Remediation course. (0.5-9 cr.; max 27 cr.; S-N or Audit; Periodic Fall, Spring & Summer)
Remediation course.

CVM 6505. Topics course. (0-8 cr. max 160 cr.; S-N only; Every Fall, Spring & Summer)
Topics Course

CVM 6506. Directed Studies in Large Animal Medicine (DistIt). (1-2 cr.; max 40 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct a special project addressing an issue in large animal medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by the College of Veterinary Medicine’s curriculum committee. prerequisite: DVM 4th yr or instr consent

CVM 6507. Directed Studies in Small Animal Medicine (DistIt). (1-2 cr.; max 40 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct specific project addressing an issue in small animal medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM’s curriculum committee. prerequisite: DVM 4th yr or instr consent

CVM 6508. Directed Studies: Pathobiology (DistItB). (1-2 cr.; max 40 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct special project addressing an issue in veterinary pathobiology. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM’s curriculum committee. prerequisite: DVM 4th yr or instr consent

CVM 6509. Directed Studies: Diagnostic Medicine (DistItB). (1-2 cr.; max 40 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct specific project addressing an issue in diagnostic medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by faculty adviser and approval by CVM’s curriculum committee. prerequisite: DVM 4th yr or instr consent

CVM 6510. MPH Project: PHP. (1-3 cr. max 9 cr.; S-N only; Every Fall, Spring & Summer)
Directed field research. Original or secondary analysis of data sets related to public health practice. prerequisite: DVM student or instr consent

CVM 6511. Exotic Animal Medicine Rotation. (2 cr.; A-F only; Every Fall, Spring & Summer)
Develop knowledge/technical skills to manage common exotic pets through case-based examples, lectures, and labs. Two days a week in a field setting of choice from the following (DNR, Raptor Center, Wildlife Rehabilitation Center, Como Zoo, MN Zoo, private practices with an exotic case load).

CVM 6512. Zoo and Wildlife Rounds. (0.5 cr. max 3 cr.; S-N or Audit; Every Fall & Spring)
Zoo, wildlife, and exotic pet conservation. Seminars involving topics of exotic animal conservation, medicine, and pathology encountered at Minnesota, Como, and Lake Superior zoos; Raptor Center; and Minnesota Veterinary Diagnostic Laboratory. Basic biology of the affected animals, clinical aspects, and pathology of encountered diseases. Apply principles of basic-clinical science to address the cause of disease for individual animals as well as populations of & or animals.

CVM 6513. Topics on Climate Change and Agriculture. (1 cr.; A-F only; Every Spring)
Science of climate change, role of agriculture and steps that are being taken to mitigate effects. Readings/discussions on a series of topics including, evidence for climate change, policy actions, carbon credits, soil sequestration, role of livestock, anaerobic digesters, and carbon footprint.

CVM 6514. Directed Studies in Food Animal Medicine (DistItFA). (1-2 cr.; S-N only; Every Fall, Spring & Summer)
Conduct special project addressing issue in food animal medicine under guidance of faculty member. Project proposals include hypothesis, objectives, plan of study, product for evaluation by adviser approval by CVM’s curriculum committee.

CVM 6515. Externship (Extern). (1-2 cr.; S-N or Audit; Every Fall, Spring & Summer)
Students spend two weeks/rotation in a practice or other professional setting. prerequisite: DVM 3rd or 4th yr or instr consent

CVM 6516. Field Experience in Public Health Practice. (0.5-8 cr. max 24 cr.; S-N only; Every Fall, Spring & Summer)
Directed field experience or clinical rotation/practicum in selected community or public health agencies/institutions. Integration of knowledge/skills in population science for public health. prerequisite: DVM student or instr consent

CVM 6519. Wildlife Rehabilitation Center Summer Internship. (0.1 cr. max 0.25 cr.; S-N only; Every Summer)
Six-week summer internship (15 hr/wk) at Wildlife Rehabilitation Center. Hands-on learning in clinical medicine; avian, waterfowl,
and mammal nurseries; wildlife handling and management; and wildlife rehabilitation. Final project. prereq: DVM student

CVM 6520. Small Animal Theriogenology and Pediatrics. (1 cr.; A-F only; Every Fall, Spring & Summer)
On-line rotation consisting of individualized study and directed review of advanced topics in small animal theriogenology.

CVM 6523. Shelter Medicine Rotation at Other Institution. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Shelter Medicine (spay and neuter) at another accredited veterinary college and used to meet a core requirement.

CVM 6524. Ambulatory Medicine Rotation at Other Institution. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Ambulatory Medicine at another accredited veterinary college and used to meet a core requirement.

CVM 6525. Rotation at Other Institution (RAOI). (1-2 cr. [max 40 cr.]; S-N only; Every Fall, Spring & Summer)
Students to spend one-six to six weeks in an organized program at another degree-granting institution, in an area either not offered at the University or in one that complements experience in a clinical rotation at the University. prereq: DVM 4th yr or instr consent

CVM 6526. Dermatology Rotation at Other Institution. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Rotation through which students may take a required dermatology course at another accredited veterinary college. prereq: DVM 3rd or 4th year or instr consent

CVM 6527. Anesthesiology Rotation at Other Institution. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Rotation offered allowing students to fulfill their anesthesiology rotation requirement at another accredited veterinary college. prereq: DVM 3rd or 4th year or instr consent

CVM 6528. Radiology Rotation at Other Institution. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer)
Radiology core rotation taken at another accredited veterinary college and used to meet core requirements. prereq: DVM 3rd or 4th year or instr consent

CVM 6529. Large Animal Surgery Rotation at Other Institution. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Equine Medicine Rotation at another accredited veterinary college and used to meet a core medicine requirement. prereq: DVM 3rd or 4th year or instr consent

CVM 6531. Biosecurity and Biocountainment for Food Animals. (2 cr.; A-F only; Every Spring & Summer)
Rotation. Biocountainment and biocountainment measures and strategies that are being used in the food animal industry (swine, poultry and dairy) to prevent the spread of disease. Hands on experience for students interested in developing biosecurity plans for farms. Pathogen transmission within and between populations, the routes of pathogen dissemination and measures and strategies used to prevent disease dissemination. Hands on biosafety audits/develop recommendations for system improvement.

CVM 6532. Clinical Laboratory Medicine (Labs). (2 cr. [max 4 cr.]; A-F only; Every Fall & Summer)
One-week intensive rotation in veterinary clinical lab medicine. Hematology, cytology, clinical chemistry, endocrinology, microbiology. Sample submission. Lab test methodology. Didactic teaching, small group discussion, case-based/guided self-instruction, microscopy. prereq: DVM 3rd or 4th yr or instr consent

CVM 6540. Advanced Veterinary Toxicology. (2-8 cr. [max 40 cr.]; S-N or Audit; Every Fall, Spring & Summer)
In-depth examination of toxins. Clinical, diagnostic, mechanistic, and therapeutic aspects of biotoxins, organic, and inorganic toxins that affect livestock, poultry, wildlife, and companion animals or that threaten public health. prereq: DVM 3rd or 4th yr or instr consent

CVM 6560. Public Health Issues and Veterinary Medicine Opportunities. (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring)
Public health practice and veterinary medicine. Day-to-day work of public health professionals. Public health principles in context. Veterinary medicine related to public health research/practice. Students interact with advocacy groups, media, lobbyists, legislators, regulatory officials, industry leaders, and public health professionals.

CVM 6601. Small Animal Internal Medicine: (SAM A). (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer)
Primary case responsibility for wide range of clinical diseases. History taking, physical examination, problem definition, diagnostic/therapeutic plans on assigned cases. Cases typically relate to gastroenterology, urology/therapeutic plans, case follow-up. Students present one case, prepare one topic of their choice for presentation during rounds. Daily rounds include discussion of cases, review of behavior-related articles, discussion of problem complexes. prereq: DVM 3rd or 4th yr or grad student or instr consent

CVM 6602. Small Animal Internal Medicine: (SAM B). (2 cr. [max 52 cr.]; Student Option; Every Fall, Spring & Summer)
Problem-solving skills, clinical skills, communication skills, record keeping, ethical issues in referral cases. Methods of knowledge acquisition, including computerized searches and diagnostic programs. Small group rounds discussions. Students assist clinicians in management of referral/emergency cases. Cases typically related to gastroenterology, nephrology, urology, oncology, nutrition, neurology, and cardiology. prereq: [6601, DVM 3rd or 4th yr] or instr consent

CVM 6605. Banfield Elective Clinical Rotation. (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)

CVM 6609. Emergency/Critical Care (ECC). (2 cr. [max 4 cr.]; A-F only; Every Fall, Spring & Summer)
Emergency/critical-care cases in small animal practice or emergency practices. History taking, physical exams. Creating problem lists, proposing diagnostic/therapeutic plans. prereq: Sr

CVM 6630. Behavior. (2 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Students participate in behavior consultations: history taking, diagnosis, outline of treatment protocols, sample collection, demonstration of training techniques, writing of treatment plans, case follow-up. Students present one case, prepare one topic of their choice for presentation during rounds. Small group discussions. prereq: DVM 3rd or 4th yr or instr consent

CVM 6632. Dermatology (Derm). (2 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Routine dermatologic problems in companion animal practice. History taking, clinical diagnosis, patient management, client education. Students participate in all phases of diagnosis/management of cases. Small-group discussions. prereq: DVM 3rd or 4th yr or instr consent

CVM 6634. Ophthalmology. (2 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Entry-level ophthalmology. Diagnosis, treatment. Outside readings, review papers, final essay exam. prereq: DVM 3rd or 4th yr or instr consent

CVM 6636. Cardiology. (2 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Clinical problem solving. Cases of cardiopulmonary disease, including canine/ feline congenital heart disease, acquired valvular/myocardial disease, dirofilaria, arrhythmias, pulmonary disorders. Hands-on experience in conducting physical exams, recording electrocardiograms/ echocardiograms, and reading thoracic radiographs. Group discussions, rounds. prereq: DVM 4th yr or CVM grad or instr consent

CVM 6644. Primary Care. (2 cr. [max 40 cr.]; Student Option; Every Fall, Spring & Summer)
Students manage their own cases including developing diagnostic, treatment, and preventive health maintenance plans for each patient, performing routine medical and surgical procedures, and conducting client communication and education. Wide variety of cases.

CVM 6648. Advanced Clinical Oncology Rotation. (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer)
Case management, self-directed research. Students receive oncology referrals, work with emergency cases and special procedures, assist in treatment decisions and therapeutic options for new cases, and manage ongoing chemotherapy/radiation therapy patients. Emphasizes principles of oncology and patient care. prereq: DVM 3rd or 4th yr or grad student or instr consent

CVM 6651. Small Animal Ultrasound. (2 cr. [max 8 cr.]: A-F only; Every Fall, Spring & Summer) Students practice routine abdominal ultrasound. Principles for interpretation of exam. Learning through use of clinical caseload. Daily practice of particular ultrasound skills. Students scan clinical patients and interpret radiographic procedures as needed. prereq: [3rd or 4th yr] DVM or instr consent

CVM 6661. Neurology. (2 cr. [max 4 cr.]: Student Option; Every Fall, Spring & Summer) Medical/surgical neurology. Providing complete neurological service for clients, patients, and hospital. Integration into all aspects of service, including receiving, work up, surgery, care, communications, and discharges. prereq: 3rd or 4th yr DVM or instr consent

CVM 6662. Comparative Anesthesiology (Anes). (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer) Practical experience in sedating/anesthetizing routine clinical cases. Previously taught lab protocols/techniques are used in healthy normal clinical cases and adapted for high risk cases. Emphasizes problem solving in formulation of anesthetic plans, management of patients under anesthesia, team work, and pain management. prereq: DVM 3rd or 4th yr

CVM 6663. SA Surgery. (2 cr. [max 8 cr.]: Student Option; Every Fall, Spring & Summer) Diagnostic/therapeutic management of surgical patients. History taking, physical examination, communication, problem solving, and surgical techniques. Economic issues. Students work as part of a surgical service team with faculty member, resident, and intern. prereq: DVM 3rd or 4th yr or instr consent

CVM 6664. University of Minnesota: Spay and Neuter (UMSN). (2 cr. [max 10 cr.]: Student Option; Every Fall, Spring & Summer) Electro surgery cases such as ovariohysterectomies, neuter, and declaws for small animals. Two-student teams are responsible for pre-surgical evaluation, anesthesia induction/maintenance, surgical procedure, and post-operative care of animals supplied by Humane Society for Companion Animals. prereq: DVM 3rd or 4th yr or instr consent

CVM 6665. Small Animal Physical Rehabilitation. (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer) Students work closely with veterinary technician and physical therapist who are certified canine rehabilitation practitioners. Evaluating a patient to determine a rehabilitation problem list. Establishing treatment goals. Application of basic physical modalities, proper passive range of motion, beginning therapeutic exercises. Students develop treatment goals and plan for one orthopedic and one neurologic case.

CVM 6666. Special Procedures in Veterinary Radiology. (2 cr.: Student Option; Periodic Fall & Spring) Contrast agents and procedures used to examine various body systems or anatomical areas. prereq: DVM 3rd or 4th yr or grad or instr consent

CVM 6668. Small Animal Radiology (RAD). (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer) Making high quality radiographs. Students practice routine and special procedures. Principles for interpretation. Exposure to CT and MRI. Daily radiographic interpretation in small animal species. Issues related to radiation protection. prereq: DVM 3rd or 4th yr or instr consent

CVM 6669. Radiology: Mixed Animal. (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer) Making high-quality radiographs. Students practice routine and special procedures. Principles for interpretation. Exposure to CT and MRI. Daily radiographic interpretation in small animal species. Issues related to radiation protection. prereq: DVM 3rd or 4th yr or instr consent

CVM 6690. Integrative Medicine. (2 cr. [max 2.5 cr.]: S-N only; Every Fall) History/principles of acupuncture, chiropractic, and other commonly used complementary approaches to care of domestic animals. Training requirements for certification. Lectures, case examples, demonstrations. prereq: 2nd yr DVM student or instr consent

CVM 6691. Veterinary Acupuncture (AcPunct). (2 cr. [max 6 cr.]: Student Option; Every Fall, Spring & Summer) Basic veterinary acupuncture theory, point combination, treatment, diagnosis of diseases, hands-on veterinary acupuncture techniques. prereq: [6690, yr 3 or 4 DVM] or instr consent

CVM 6702. Large Animal Palpation Labs. (1.5 cr. [max 2 cr.]: S-N only; Every Fall) Hands-on clinical experiences in equine, bovine, or large animal reproductive status/disorders. Students select species. prereq: DVM or instr consent

CVM 6704. Reproductive Diseases of Cattle. (2 cr. [max 6 cr.]: A-F or Audit; Every Fall) Common diseases affecting reproductive function in cattle, swine, and small ruminants. prereq: 3rd yr DVM or instr consent

CVM 6711. Large Animal Medicine (LAM). (2 cr. [max 8 cr.]: Student Option; Every Fall, Spring & Summer) Medical diseases of horses, cattle, small ruminants, South American cameldids, and potbellied pigs. History taking, clinical diagnosis, patient management. Assessment of treatment responses. Clinic case material, opportunities to practice common procedures. Small group discussions on clinical diagnosis, treatment, and prevention of common medical disorders. prereq: DVM 3rd or 4th yr or instr consent

CVM 6712. Equine Ambulatory Rotation. (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer) Equine ambulatory rotation meeting for two weeks, performing farm calls, call backs, x-ray development, and restocking the van. Student and practitioner discuss cases as calls are being made.

CVM 6715. Large Animal Surgery and Lameness. (2 cr. [max 10 cr.]: Student Option; Every Fall, Spring & Summer) General surgery, lameness cases. Emphasizes horses. Some cattle, small ruminants/cameldids. Diagnostic/therapeutic management in hospital setting. Cases, rounds, exercises. Students work as part of surgical management or advanced diagnostic/therapeutic techniques available in a referral setting. prereq: 3rd or 4th yr DVM student or instr consent

CVM 6720. Problem Solving in Equine Medicine. (2 cr.: A-F or Audit; Every Spring) Evidence-based medicine and clinical epidemiology concepts are integrated into discussion of cases. Assignments include reading of journal articles, working through case scenarios on Web CT, and answering case-based questions. prereq: DVM 3rd yr or instr consent

CVM 6721. Large Animal Neonatology. (1 cr. [max 2 cr.]: S-N or Audit; Every Fall) Instruction, emergency duty, practical application of principles in evaluating/treating sick equine neonates. Seasonal participation in clinically managing hospitalized foals/periodically reviewing past cases.

CVM 6727. Equine Palpation. (0.5 cr. [max 1 cr.]: S-N only; Every Fall) Hands-on clinical experience in evaluation of equine reproductive status and reproductive disorders. prereq: DVM or instr consent

CVM 6728. Reproductive Diseases of the Horse. (1 cr.: A-F or Audit; Every Fall) Reproduction patterns, breeding practices, management, artificial insemination, economics of reproductive performance, and infertility in horses. prereq: DVM 3rd yr or instr consent

CVM 6732. Equine Dentistry and Preventative Medicine. (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer) Two-week rotation on dental health care and general preventative health care for horses. Field trips, presentations, labs, case studies, clinical cases. prereq: 3rd or 4th yr DVM or instr consent; intended for equine track or mixed track students

CVM 6733. Equine Dentistry and Nutrition. (2 cr. [max 4 cr.]: A-F only; Every Fall & Spring) Equine dentistry and practical abilities for diagnosis/treatment of dental disorders. Equine nutrition and the practical application of common nutrition related health problems. Lectures, hands on activities, group work, and case correlates.

CVM 6736. Equine Lameness and Podiatry. (2 cr. [max 4 cr.]: A-F only; Every Fall, Spring & Summer)
Rotation introduces diagnosis/treatment of equine lameness/hoof disorders. Clinical cases, presentations, case studies, labs. prerequisites: Intended for equine track or mixed track students.

**CVM 6737. Equine Sports Medicine.** (2 cr. ; S-N or Audit; Every Fall) Equine lameness and podiatry. Develop lameness and evaluation skills. Diagnostic principles for identifying lameness. Medical, surgical, and rehabilitation therapies available to treat lameness. Didactic material, labs, and clinical cases. prerequisites: CVM 6736

**CVM 6747. Equine Theriogenology.** (2 cr. ; max 16 cr.; Student Option; Every Fall, Spring & Summer) Techniques in equine reproduction. Handling of stallions and mares. Testing for estrus detection. Rectal palpation, ultrasound exam of reproductive tract. Breeding management, hormone treatments, vaginal examination, uterine culture, cytology and biopsy, semen collection and evaluation, intrauterine therapy, artificial insemination.

**CVM 6748. Equine Theriogenology Advanced (EThA).** (2 cr. ; max 4 cr.; ; Student Option; Every Fall & Spring) Students are in charge of breeding management decisions: select mares from teaching herd, use palpation and ultrasound/pharmacologic aids to ensure timely breeding to frozen semen, which was frozen/assessed by students. Students participate in equine theriogenology cases admitted to Veterinary Medical Center. prerequisites: CVM 6748 3rd or 4th yr or instr consent

**CVM 6750. Equine Sports and Rehabilitation Medicine.** (2 cr. ; max 4 cr.; ; A-F only; Every Fall & Spring) Rotation on equine sports medicine, exercise physiology, and rehabilitation therapy. Common injuries, prevention/management protocols. Principles/practices of athletic conditioning, performance testing, and rehabilitation therapy. Field trips, presentations, labs, case studies, clinical cases. prerequisites: CVM 6750 3rd or 4th yr or instr consent; intended for equine track or mixed track students

**CVM 6789. Fresh Dairy Doe and Newborn Goat Kid Management.** (2 cr. ; max 4 cr.; ; A-F only; Every Spring) Rotation at Poplar Hill Goat Dairy during fresh doe/goat kid season. How to recognize, diagnose, and treat kid illnesses. Health strategies to control Johne’s, canine arthritis, encephalitis virus, coccidiosis, neonatal diarrhea, mastitis, parasitism, and nutritional deficiencies.

**CVM 6792. Small Ruminant Health and Production Rotation (SmRu).** (2 cr. ; max 4 cr.; ; Student Option; Every Fall, Spring & Summer) Sheep, goat, llama, farmed-deer production, medicine, and health. Nutrition/health management, new stock, facility maintenance, husbandry, diagnosis, record keeping, zoonosis, necropsy. Reproductive management. Breeding soundness, body condition, vasectomy, ultrasound, castration, tail docking, disbudding, dehorning, vaccination, parasites, restraint/handling, venipuncture, foot trimming, tuberculin testing. Farm visits. prerequisites: CVM 6736 3rd or 4th yr or instr consent

**CVM 6794. Camelid Medicine, Surgery, Reproduction, and Health Management.** (2 cr. ; max 4 cr.; ; A-F only; Every Spring) Two-week rotation. Approximately 15 farm visits are made to alpaca/llama farms. Approximately 10 alpacas/llamas are evaluated at VMC. Hands-on learning environment. Physical exam, venipuncture, ultrasound. Field surgeries such as castration, dental work, foot trimming, venipuncture, body condition score, preventive herd health management, pharmaceuticals. Common medical/reproductive problems. Interstate health certificates. Tuberculosis testing and necropsy. prerequisites: CVM 6794 3rd or 4th yr or instr consensus

**CVM 6796. Beef Production Systems Medicine: Feedlot A.** (2 cr. ; max 4 cr.; ; A-F only; Every Fall, Spring & Summer) Beef cattle feedlot production, medicine, health management. Production systems. Receiving protocols, economics. Livestock selection/evaluation, health management, facility evaluation. Pre-conditioning, pre-immunization environmental pollution monitoring, transportation/vaccine protocols, nutrition, respiratory diseases, epizootics. Evaluation of small/large feedlot operations. Body condition scoring, castration, dehorning/parasite control. Necropsy, field pathology sampling. prerequisites: CVM 6796 3rd or 4th yr or instr consent

**CVM 6800. Bovine Palpation.** (1 cr.; ; S-N only; Every Fall) Practice in diagnostic evaluation of bovine reproductive tract. prerequisites: CVM 6736 or instr consent

**CVM 6804. Bovine Surgery.** (2 cr. ; max 4 cr.; ; A-F only; Every Fall, Spring & Summer) Technical/theoretical skills in management of individual cow surgical diseases. Emphasizes abdominal/urogenital surgery of dairy cow. Discussion, labs. prerequisites: CVM 6736, CVM 6796, CVM 6800

**CVM 6806. Food Animal Disease and Diagnostics.** (2 cr. ; max 4 cr.; ; Student Option; Every Spring) prerequisites: CVM 6796 3rd or 4th yr or instr consent

**CVM 6811. Dairy Theriogenology and Lameness (DT&L).** (2 cr. ; max 20 cr.; ; Student Option; Every Fall, Spring & Summer) prerequisites: CVM 6796 3rd or 4th yr or instr consent

**CVM 6813. Miracle of Birth.** (1 cr. ; max 4 cr.; ; A-F only; Every Fall & Summer) Delivery of calves, lambs, and piglets at the Minnesota State Fair. Assist in public education about large animal veterinary medicine processes. Birthing and veterinary assistance of the birthing process. Media relations and interviews. prerequisites: CVM 6736, CVM 6796, CVM 6800, CVM 6804, CVM 6806, CVM 6811
veterinarians, FFA students, and instructors in this rotation.

**CVM 6821. Dairy on Farm Clinical.** (2 cr. [max 12 cr.]; A-F only; Every Fall, Spring & Summer)
Typical transition cow management, clinical veterinary care. Students assist in all aspects of day-to-day management of TMF. Fresh cow screening/therapies, calvings, routine animal management. Students live at TMF during rotation. prereq: 3rd or 4th yr DVM student or instr consent

**CVM 6826. Dairy Production Medicine 1.** (2 cr. [max 4 cr.]; Student Option; Every Summer)

**CVM 6827. Dairy Production Medicine 2.** (2 cr. [max 4 cr.]; Student Option; Every Summer)
Rotation expand on topics listed under Dairy Production Medicine 1. prereq: 6818, 6826, 6827, 6828, [3rd or 4th yr DVM or instr consent]

**CVM 6828. Dairy Production Medicine 3.** (2 cr. [max 4 cr.]; Student Option; Every Summer)
Rotation provides additional training following Dairy Production Medicine 2. prereq: 6818, 6826, 6827, [3rd or 4th yr DVM or instr consent]

**CVM 6829. Dairy Production Medicine 4.** (2 cr. [max 4 cr.]; Student Option; Every Summer)
Rotation completes four rotation series in 6826, 6827, and 6828. prereq: [6818, 6826, 6827, 6728, [3rd or 4th yr DVM]] or instr consent

**CVM 6831. Overview of Dairy Production Medicine.** (2 cr. [A-F only; Every Spring)
Dairy production medicine concepts/skills. Reproductive management, mastitis, epidemiology, records, nutrition, youngstock, housing, lameness. Mix of lectures, in-class exercises or laboratory sessions. At least one field trip.

**CVM 6842. Swine Disease Diagnostics, Therapeutics, and Prevention.** (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Major diseases and high-health technologies. Field trips of high-low-health farms, abattoir for slaughter check. Problem solving, discussion of on-farm disease cases. In-clinic diagnostic techniques. prereq: DVM 3rd or 4th yr or instr consent

**CVM 6845. Swine Production Training (SPTrs).** (2 cr. [max 8 cr.]; Student Option; Every Fall, Spring & Summer)
Day-to-day management of modern swine farm. Students assist with all techniques, protocols, and practices encountered daily in swine unit, conduct any necessary necropsies or surgical techniques, investigate production/health problems. On final day of rotation, students lead herd visit, summarize findings with producer and course coordinator, and write a herd report. prereq: 3rd or 4th yr DVM or instr consent

**CVM 6854. Introduction to Swine Health and Production.** (2 cr. [max 12 cr.]; Student Option; Every Summer)
Clinical problem solving based on case examples, first-hand field experiences. Students visit/assess enterprises representing all components of pork chain, from feed milling, to animal production, to slaughter/processing. Roles/responsibilities veterinarians have in food animal production. Problem definition/investigation. Formal follow up, report writing, oral presentation of recommendations.

**CVM 6856. Advanced Swine Health and Production.** (2 cr. [max 12 cr.]; Student Option; Every Summer)
Capstone course. Complex field problems. Student teams take a field case, work it up, and propose steps for farm to resolve problem. Lectures, in-class exercises, field trips.

**CVM 6860. Integrating Laboratory Diagnostics With Field Investigations of Swine Disease.** (2 cr. [max 4 cr.]; Student Option; Every Spring)
Students follow selected swine disease investigations, from farm through diagnostic lab and back, determine impact of specific swine diseases on productivity and cost of production, design a control program, and collect/submit quality samples to diagnostic lab. prereq: DVM 3rd or 4th yr or instr consent

**CVM 6865. Introduction to Swine Production Medicine.** (1 cr. [max 2 cr.]; A-F only; Every Spring)
Contemporary approaches to swine practice. Swine production, disease diagnosis. Control, treatment, eradication, and animal welfare. DVM student or instr consent

**CVM 6882. Companion Birds (ComB).** (2 cr. [max 4 cr.]; Student Option; Every Fall & Spring)
Avian medicine/surgery relating to companion birds. Hands-on experience in local avianaries and breeding facilities. Acquisition of basic avian clinical skills in the Raptor Center. prereq: DVM 3rd or 4th yr or instr consent

**CVM 6883. Raptor.** (2 cr. [max 4 cr.]; Student Option; Every Fall, Spring & Summer)
Students participate in all aspects of raptor medicine, surgery, and rehabilitation and gain avian experience. Conservation medicine. prereq: 6497, DVM 3rd or 4th yr, instr consent

**CVM 6884. Poultry Medicine Clerkship (PMC).** (2 cr. [max 8 cr.]; A-F only; Periodic Fall, Spring & Summer)
Broiler, layer, and turkey industries, performance analysis, disease diagnosis, management techniques for prevention/ control of disease, food safety problems and diagnostic pathology in a laboratory setting. Classroom presentations, discussions, on-farm evaluations.

**CVM 6900. Microscopic Anatomy I.** (2 cr.; A-F only; Every Fall)
Identification, description, and understanding of basic structure and elements of cells and basic tissues. Identify and describe structure and organization of organ systems presented.

**CVM 6901. Physiology I.** (5 cr.; A-F only; Every Fall)

**CVM 6902. Veterinary Biochemistry, Nutrition & Genetics.** (3 cr.; A-F only; Every Fall)
Principles of biochemistry, genetics, nutrition. Background information/how it is used to understand animal health/disease. Examples reinforced with in-class/out-of-class problems.

**CVM 6903. Anatomy I.** (5 cr.; A-F only; Every Fall)
Sequential integration of normal gross/radiographic anatomy of carnivore. Knowledge gained provides solid foundation for current/subsequent courses within veterinary professional curriculum.

**CVM 6904. Clinical Skills I.** (1 cr. [max 2 cr.]; S-N only; Every Fall)
Introduction to small/large animal species. Fundamental clinical skills for small/large animal species. Proper physical exam, safe handling/restraint, behavior/animal safety, frequently used clinical skills procedures. Large animal practicum. prereq: 1st year clinical skills course

**CVM 6905. Professional Development I.** (1 cr.; S-N only; )

**CVM 6906. Critical Scientific Reading.** (1 cr. [max 2 cr.]; S-N only; Every Fall)
Skill development in reading of scientific literature. Papers critiqued for experimental design, statistical analysis, validity of results, contributions to literature, merit of study conclusions. Major aim of the course is to prepare veterinary students to think scientifically, for multiple career pathways, and an increasingly important role for veterinarians in comparative medicine.

**CVM 6907. Professional Development II.** (1.5 cr.; S-N only; Every Spring)
Develop knowledge/proficiency needed to be successful veterinarian in areas such as communication, ethics, clinical decision-making, medical record keeping. Lecture, hands-on experiences, small group/mentor group discussions. The course will provide an overview of One-Health, animal welfare, legislative/current issues, and field trips to visit animal production facilities.

**CVM 6908. Anatomy II.** (3 cr. [max 5 cr.]; A-F only; Every Spring)
Sequential integration of normal gross/radiographic anatomy of ungulates. Knowledge gained will provide solid foundation for current/subsequent courses within veterinary professional curriculum.

CVM 6909. Clinical Skills II. (1 cr. ; S-N only; Every Spring)
Domestic animal behavior. Basic small animal handling/management skills. Introduction to hospital. Small-animal clerk duty is required.

CVM 6910. Physiology II. (5 cr. ; A-F only; Every Spring)
Anatomic strategies adopted by different animal species to achieve same/similar function. Important physiologic processes used by animals to maintain homeostasis. Neural, endocrine, paracrine regulation of organ systems. Intermediary metabolism.

CVM 6911. Immunology. (2 cr. ; A-F only; Every Fall)
This course is structured as an introductory and multidisciplinary unit consisting of a series of lectures to provide a basic understanding of the cells, molecules, and mechanisms of immunity against microbial pathogens and neoplasia, as well as immune-mediated pathologies such as allergies and autoimmunity.

CVM 6912. Basic Pathology. (2 cr. ; A-F only; Every Spring)
Mechanisms in reactions of cells/tissues to injury. Retrogressive changes in cells, cell death, pigments, circulatory disturbances, inflammation, alterations of cell growth (including neoplasia). Applications to evaluation of gross/microscopic tissue alterations.

CVM 6913. Agents of Disease I. (4 cr. ; A-F only; Every Spring)

CVM 6914. Preventive Medicine. (4 cr. ; A-F only; Every Fall & Spring)
Concepts of preventive medicine. Information reinforced in other coursework. Short video lectures/notes on website for access throughout training.

CVM 6915. Clinical Pathology I. (2 cr. ; A-F only; Every Fall)
Normal/abnormal function of hematopoietic system. Pathophysiologic changes underlying serum biochemical abnormalities. Principles/c clinical application of cytology as diagnostic tool. How clinical laboratory data is generated/interpreted.

CVM 6916. Clinical Pathology II. (2 cr. ; A-F only; Every Spring)
Normal/abnormal function of hematopoietic system. Pathophysiologic changes underlying serum biochemical abnormalities. Principles/c clinical application of cytology as diagnostic tool. How clinical laboratory data is generated/interpreted.

CVM 6917. Agents of Disease II. (5 cr. ; A-F only; Every Fall)
This course is the second part of the Agents of Disease series dealing with diseases caused by infectious agents. This course extends the foundational information obtained on viruses, bacteria and parasites in Agents of Disease I, into understanding diseases caused by these agents in species of veterinary importance. In this course we will continue to integrate concepts on pathogenesis, life cycle, host response, diagnostic tests, and transmission of agents of diseases into developing solutions for diagnosis, prevention and control of infectious diseases in animals.

CVM 6918. Pharmacology I. (2 cr. ; A-F only; Every Fall)
Principles of drug action, disposition, and clinical applications in animal patients.
Provide a solid base of general knowledge of pharmacology that will be important for later coursework in veterinary medicine and future successful veterinary practice. Students completing this course should have developed an understanding of how drugs from several medicinal classes are processed by animals and how these drugs exert their beneficial and adverse effects in animals.

CVM 6919. Systemic Pathology. (5 cr. [max 10 cr.] ; A-F only; Every Fall)
Basic mechanisms of disease in various organ systems. Organ response to injury. Describe or interpret lesions in order to formulate morphological diagnoses/differential diagnoses (etiology). Correlate clinical/laboratory findings with clinical signs or lesions that might occur.

CVM 6920. Clinical Pathology II. (2.5 cr. ; A-F only; Every Fall)
Understand/explain normal/abnormal function of hematopoietic system. Principles/c clinical application of cytology as diagnostic tool. How clinical laboratory data is generated/interpreted.

CVM 6921. Clinical Skills III. (2 cr. ; S-N only; Every Fall)
Builds on clinical application of first year clinical skills. Include 2-3 clinical skills labs throughout year. Hands on practical experience with live animals. Other options include VMC mini rotations, Humane Society visits, SIVS, RAVS, Gelding Project, VIDA, VetTouch other student specific proposals.

CVM 6922. Clinical Epidemiology. (1.5 cr. ; [max 2 cr.] ; A-F only; Every Fall)
This course introduces the concepts, principles, and applications of veterinary epidemiology. Veterinary epidemiology is the foundation of health management of animal populations, be they companion animals, livestock or wild populations. Clinical epidemiology provides the basis for medical decision-making in clinical practice.

CVM 6923. Public Health and Community Practice. (2 cr. ; A-F only; Every Fall)
Mixture of didactic classroom lectures/in-class discussions/exercises to provide overview of common zoonotic agents/other veterinary public health issues. Emphasis on case-based public health situations.

CVM 6924. Small Animal Medicine I. (2 cr. ; A-F only; Every Fall)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, management protocol of common/important hematologic, immunologic, infectious diseases of dogs/cats.

CVM 6925. Diagnostic Laboratory. (2 cr. ; A-F only; Every Fall)
Laboratory experiences designed to help veterinary students practice common clinical tests, understand principles of various types of tests, gain better appreciation of test selection/interpretation. Urinalysis, hematology, serology, detection of parasitic/microbial agents of disease. This course represents an effort to collect the relevant clinical laboratory information needed by the practicing veterinarian.

CVM 6926. Small Animal Medicine II. (5 cr. ; A-F only; Every Spring)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options and management protocols, and prognosis of urinary tract, gastrointestinal, dental and endocrine diseases of dogs and cats.

CVM 6927. Small Animal Surgery I. (3 cr. ; A-F only; Every Spring)
Provide students with the basic knowledge and skills needed to evaluate and treat common small animal surgical diseases. Provide students with background knowledge, problem-solving, and technical skills that will be the basis for clinical rotations and initial years in practice.

CVM 6928. Large Animal Medicine I. (2 cr. ; [max 4 cr.] ; A-F only; Every Fall)
This course will address the core medical problems of swine: multisystemic infectious diseases of horses and ruminants; and common medical disorders affecting the hemotologic, immunologic, urinary, and gastrointestinal systems of horses, ruminants, and camelds. It will provide part of the large animal clinical content needed to pass the National Board Examination, as well as foundation knowledge for subsequent large animal elective courses.

CVM 6929. Large Animal Surgery I. (3 cr. ; A-F only; Every Spring)
This class addresses common surgical conditions in large animal species (equine, bovine, camelid and small ruminants) related to wounds, gastrointestinal disorders and musculoskeletal disorders.

CVM 6931. Diseases of Zoo Animals and Exotic Pets. (1 cr. ; S-N or Audit; Periodic Fall)
Diseases of and management procedures for zoo animals and exotic pets. Restraint procedures, medication, diagnosis. prereq: DVM or grad or instr consent

CVM 6932. Introduction to Non-Domestic Veterinary Medicine. (1 cr. ; S-N only; Every Fall)
Professions, including zoo, rehabilitation, wildlife, and conservation medicine. Job activities/availability, preparation to obtain a
CVM 6933. Zoological Medicine (MNZM). (2 cr. [max 20 cr.]; Student Option; Every Fall, Spring & Summer)
Introduction to all aspects of health care of zoo animals. Housing, nutrition, preventative health programs. Students assist zoo veterinarians with immobilizations, examinations, necropsies, laboratory work, records keeping. prereq: DVM 3rd or 4th yr or instr consent

CVM 6934. Selected Topics in Zoo Animal Medicine. (2 cr. [max 10 cr.]; A-F only; Periodic Fall & Spring)
Year-long course. Expertise needed by a zoo veterinarian, applications to specific captive species. Manage an animal problem or animal group problem, develop diagnostic/management/therapeutic recommendations, research three topics on an assigned species, build reference materials for case care, present findings to keepers at a selected zoo, develop an item for public education. prereq: [DVM 1st or 2nd yr] or instr consent

CVM 6935. Veterinary Imaging I. (3 cr.; A-F only; Every Spring)
Introduction to radiographic imaging, foundational principles, imaging modalities, and musculoskeletal, general abdomen and alimentary tract systems. Interpretation of radiographic studies and clinical applications germane to common animal diseases. Lectures and exercises using a body systems approach to imaging of large/small animals.

CVM 6937. Pharmacology II. (4 cr. [max 5 cr.]; A-F only; Every Spring)
This course covers principles and clinical practices of veterinary toxicology. Mechanisms of action, pharmacokinetics and therapeutic uses of drugs affecting various systems and organs. Basic pharmacodynamics and pharmacokinetic aspects of anti-bacterial, anti-fungal, anthelmintic and anti-neoplastic drugs, including drug mechanism and spectrum of action, side effects and toxicity, and modes of drug resistance that diminish clinical efficacy.

CVM 6938. Professional Development III. (1 cr. [max 2 cr.]; S-N only; Every Fall)
Integrates subjects in veterinary professional curriculum. Introduction to/practice of professional skills. Communication, ethics, teamwork, leadership. As a result of taking this course, students will be able to define medical professionalism, understand the concepts, organization, and hierarchy of problem oriented thinking by demonstrating problem definition and problem refinement. Students will identify, list and utilize resources available for answering clinical questions. Students will utilize clinical skills (history and physical exam) to assess individual or populations of animals in order to develop diagnostic and therapeutic plans. Students will effectively communicate problem oriented approach to colleagues in oral and written format. Students will effectively communicate the medical plan, treatment options, prognosis and cost of recommendations to owner.

CVM 6939. Non-Traditional Pet Care. (1 cr.; A-F only; Every Spring)
Introduction to the care and handling of a variety of small animals including reptiles, amphibians, rodents, rabbits and ferrets, seen by veterinarians in primary care practice. This course provides an overview of gross and radiographic anatomy, major infectious diseases and their management, and normal behavior in domestic environments.

CVM 6941. Clinical Skills IV. (2 cr.; S-N only; Every Spring)
Builds on clinical application of first/2nd year fall clinical skills. Includes clinical skills labs throughout year. Hands on practical experience with live animals. Other options include VMC mini rotations, Humane Society visits, SIRVS, RAVS, Gelding Project, VIDA, VetTouch other student specific proposals.

CVM 6942. Veterinary Clinical Pathology II. (3 cr.; A-F only; Every Spring)
Required readings, didactic classroom lectures, on-line tutorials, group discussions, homework to cover veterinary clinical pathology. Integration of all clinical pathology data available for patient with opportunity for students to distinguish diseases with similar clinical or clinic-pathologic findings.

CVM 6943. Avian Core. (1 cr. [max 2 cr.]; A-F only; Every Spring)
This course will present information on birds. Successful completion will provide a firm foundation for more advanced avian studies such as companion bird medicine, poultry health, raptor rehabilitation and avian surgery. Through a blend of didactic lectures, hands-on laboratories, and student-driven inquiry, topics of ornithology, behavior, anatomy, physiology, production, management, diseases and basic clinical procedures will be presented. Fundamentals of flock management and nutrition will be covered along with principles of biosecurity and recognition of diseases will be addressed.

CVM 6944. Small Animal Surgery II & Anesthesia. (3 cr.; A-F only; Every Fall)
This course will introduce the principles of small animal anesthesia, critical care, and will continue the principles of surgery from Surgery I (CVM 6927). The course will consist of lectures laboratories, and a case discussion session.

CVM 6945. Large Animal Medicine II. (4 cr.; A-F only; Every Fall)
Course addresses common medical disorders of the large animal neurological, muscular, cardiovascular, and respiratory systems, as well as core medical problems of swine. It will provide part of the large animal clinical content needed to pass the National Board Examination, as well as foundation knowledge for subsequent large animal elective courses.

CVM 6946. Large Animal Surgery II. (1.5 cr.; A-F only; Every Fall)
Course concentrates on the principles of anesthesia, identifying surgical conditions of the cardiopulmonary and urogenital systems, common urogenital surgeries and miscellaneous conditions of the head and tail. Species discussed include horses, cattle, small ruminants and pot-bellied pigs.

CVM 6947. Veterinary Imaging II. (2 cr.; A-F only; Every Fall)
Imaging of the thorax, urogenital tract, and spine. Emphasis on interpretation of radiographic studies and clinical applications germane to common animal diseases. Lectures and active learning exercises using a body systems approach to imaging (primarily radiographic) of small and large animals.

CVM 6948. Comparative Specialties. (4 cr.; A-F only; Every Fall)
This course will cover three specialties: dermatology, ophthalmology and behavior. To make it easier for you better recognize the differences in course description, objectives, material and schedule the information pertaining to each specialty will be presented separately.

CVM 6949. Comparative Theriogenology. (3 cr.; A-F only; Every Fall)
This course develops a broad clinical knowledge of common reproductive management strategies and clinical conditions associated with reproduction in the major domestic species. It provides information and strategies for the conduct of breeding soundness examination and infertility work-ups in the male; estrous cycle characteristics, diagnostics and control in females; breeding management strategies, pregnancy diagnosis and management of gestation; investigation and control strategies for pregnancy loss; management of parturition and treatment of dystocia; normal post-partum changes and diseases of the peri-partum period and the pathophysiology and treatment of uterine infections. Material is presented in both a comparative and species specific manner.

CVM 6952. Clinical Skills V. (1 cr.; S-N only; Every Fall)
This course aims to build on the clinical application of the first two years clinical skills course including further development of physical examination competence and frequently used clinical skill procedures. The course will incorporate a variety of opportunities to practice clinical skills including 1-2 clinical skills labs in the fall, small and large animal hospital practicum and outside veterinary hospital visits. Other experiences that can be chosen include Humane Society visits, SIRVS, RAVS, Gelding Project, VIDA, VetTouch and other student specific proposals.

CVM 6953. Professional Development IV. (2.5 cr.; S-N only; Every Fall)
This class will prepare students for practice from both a legal and logistical perspective (Practice Management) and provide you with opportunities to hone your communication skills and thereby equip your to build your future relationships with your clients.

CVM 6954. Small Animal Medicine III. (5 cr.; A-F only; Every Fall)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options and management protocols, and prognosis of
cardiopulmonary, neurologic and neoplastic diseases of dogs and cats.

CVM 6956. Small Animal Selective I. (4 cr.; A-F only; Every Spring)
This course is intended to integrate clinical core knowledge for small animal primary care. Included in this course are the entry level competencies for small animal care in the areas of preventive care, anesthesia, emergency medicine, cardiology, surgery, nutrition, dermatology and dentistry. Students will develop the skills and knowledge to maintain health, identify and treat or manage common small animal conditions.

CVM 6957. Small Animal Selective II. (5 cr.; A-F only; Every Spring)
Explore advanced content related to small animal practice. Specialties covered in this course include nutrition, dentistry, cardiology, anesthesia, surgery, oncology, ultrasound, and emergency and critical care. Develop the skills and knowledge to treat a variety of small animal diseases and conditions. Practice advanced dental and surgical skills in a laboratory setting

CVM 6958. Small Animal Problems. (2 cr.; A-F only; Every Spring)
This course uses a mixture of didactic classroom mini-lecture and group discussion and case-based homework to cover a variety of problems encountered in small animal medicine. Problems may be ones listed as presenting complaints by owners of dogs and cats, problems found on physical examination, or laboratory abnormalities encountered in case evaluation. Emphasis will be placed on selection of laboratory tests, interpretation of results, and using results to guide development of a diagnostic and treatment plan for patients. The course will emphasize integration of information introduced in core companion animal systems courses with clinical pathology.

CVM 6959. Orientation to Clinical Rotations. (2.5 cr.; S-N only; Every Spring)
Provides students with an overview and exposure to various topics, issues, and procedures that will be encountered during their senior rotations. The goal of the Orientation to Clinical Rotations course is to facilitate student transition into clinics. The course will include didactic lectures, group exercises, and open discussions. Topics that will be covered include: CVM and VMC policies and procedures, patient flow, SOAPa, discharges, admissions, ICU/wards, patient care, UVIS, client communications, infection control, safety, pharmacy, licensure, and rotation

CVM 6960. Equine Selective I. (2.5 cr.; A-F only; Every Spring)
The primary objective of this elective is to provide the opportunity for third-year students interested in equine practice to expand their knowledge and clinical skills beyond core levels achieved in the preceding curriculum. This course includes content and skills that are considered entry level requirements for students who plan to provide clinical care for horses at any level in their practice after graduation. It is the minimum required for students with an interest in care of horses in a mixed animal practice setting and serves as a foundation for further learning and skill development provided in the Equine Selective II, as well as for the equine rotations for senior students.

CVM 6961. Equine Selective II. (3 cr.; A-F only; Every Spring)
This elective is designed to provide further opportunity for third-year students focused on equine practice to expand their knowledge and skills beyond core levels achieved in the preceding curriculum and Equine Selective I. Content has been chosen to prepare the student for equine work on the large animal rotations and equine or mixed animal practice. Students will study equine disorders, diagnostic testing, anesthesia, and surgical techniques in greater detail through a combination of lectures and labs, and will practice working through clinical cases in a problem-based format. By the end of the course, students will have improved their general knowledge of equine medicine and practice; recognize common medical disorders; select initial diagnostic tests; be able to perform neurologic and urinary tract examinations; be able to perform upper airway endoscopy; be able to perform transrachael wash and bronchoalveolar lavage procedures; and explain therapeutic options for common disorders.

CVM 6962. Equine Problems. (2 cr.; A-F only; Every Spring)
This course is intended for third year students in the veterinary medicine curriculum. Each two-hour class period will include a review of evidence-based medicine concepts integrated into the discussion or one or more cases during the class period. This course is designed to: 1) Enhance student knowledge of diagnosis, pathophysiology and treatment equine diseases; 2) allow students to develop critical clinical thinking and problem solving skills; 3) to demonstrate the use evidence based medicine in solving clinical problems; 4) to give students the tools necessary to become life-long learners and stay current with advances in veterinary medicine after completion of veterinary school. Students will have the opportunity to create differential diagnosis lists for several common equine presenting complaints, review pertinent literature, and work through several real life cases throughout the semester. By the end of the semester students will be comfortable with the process of case work-up and will be prepared to implement this process during their clinical year.

CVM 6963. Food and Fiber Selective I. (2 cr.; S-N only; Every Spring)
This course will provide a platform for integrating knowledge by faculty with expertise in different food/fiber producing species (including poultry). The focus of the course will be subjects that are common across multiple livestock species, including therapeutic principles and vaccinology; animal housing and welfare, diagnostic approaches for populations; and biosecurity. Generic information on these subjects will be supplemented by contrasting of species specific approaches. The course should provide more holistic appreciation of major issues in animal health and production and better prepare students for food animal rotations in the senior year.

CVM 6964. Food & Fiber Bovine Selective I. (3 cr.; A-F only; Every Spring)
This course will provide students interested in bovine practice with practical, hands-on introductory experience in bovine surgical and hoof care procedures that are commonly encountered in bovine and mixed animal practice. The course will also introduce concepts and practices in bovine production medicine.

CVM 6965. Food and Fiber II: Swine. (1 cr.; A-F only; Every Spring)
This course will build on general knowledge obtained in Food Animal Selective One to provide swine specific skill and knowledge in priority on priority topics that are essential to providing veterinary services to contemporary swine producers. The course should provide a detailed understanding of general principles of swine health and production, analytical skills applied to production records, and therapeutic decision making for prevalent clinical diseases and syndromes in U.S. swine. Students taking this elective will be better prepared to participate and learn in food animal rotations in the senior year.

CVM 6966. Food and Fiber Animal Problems. (1 cr.; A-F only; Every Spring)
This course uses a mixture of classroom group discussion and case-based assignments to cover a variety of problems encountered in food animal production medicine. Problems may be ones listed as presenting complaints by owners/producers of food animals (e.g. cattle, swine, small ruminants) problems found on physical examination/herd visits, or abnormalities encountered in case/records evaluation. Emphasis will be placed on applying an epidemiological approach for herd investigations, including records analysis, selection of laboratory tests and interpretation of results. Following diagnosis, students will formulate a plan for treating individual affected animals and develop a preventative health management plan for the herd, as applicable. The course will emphasize integration of information introduced in core food animal systems courses with clinical pathology.

CVM 6968. Obstetrics Lab. (0.5 cr.; S-N only; Every Spring)
This is a practical laboratory in which students will have the opportunity to practice obstetric procedures, including a full fetotomy, that were described in lecture during the fall semester Comparative Theriogenology course. Students will be grouped and each group will have two labs occurring on consecutive days; one for correction of dystocia and the second concentrating on fetotomy technique. Within each group, students will work in pairs. The lab uses late term fetuses, obtained from the slaughterhouse, that are placed in dummy cows. While late term fetuses removed from the uterus have less disease risk than dead
calves, students are required to wear protective clothing at all times; including gloves (OB sleeves and latex), boots, and coveralls. Face shield will be provided if needed. Students MUST be careful with hygiene during and after the labs (e.g. avoid touching the mouth with dirty hands during the lab and WASH HANDS AFTER THE LAB).

VMED 6969. Large Animal Medicine III. (4.5 cr. ; A-F only; Every Fall) Course addresses common medical disorders of the large animal neurological, muscular, cardiovascular, and respiratory systems, as well as core medical problems of swine. It will provide part of the large animal clinical content needed to pass the National Board Examination, as well as foundation knowledge for subsequent large animal elective courses.

VMED 6972. Ophthalmology. (1.5 cr. ; A-F only; Every Fall) Common procedures for evaluation, diagnosis, and treatment of eye disorders in domestic species.

VMED 6973. Behavior. (1 cr. ; S-N only; Every Spring) Introduction to abnormal and undesired animal behavior, diagnostic procedures, and behavioral and pharmacological modifications.

VMED 6981. Clinical Correlations I. (1 cr. ; S-N only; Every Spring) This course design follows principles of research in learning; prepares students for clinical work as well and what will be expected of them in senior year and, for most, in their career; and prepares students for life-long learning by requiring them to find resources.

VMED 6982. Clinical Correlations II. (1 cr. ; S-N only; Every Spring) This course design follows principles of research in learning; prepares students for clinical work as well and what will be expected of them in senior year and, for most, in their career; and prepares students for life-long learning by requiring them to find resources.

VMED 6983. Study Strategies for Success. (1 cr. ; S-N only; Every Fall) This elective course will provide students with information about how learning works and with training in the skills of metacognition to best permit them to develop successful study strategies. Specific skills addressed will include those for study preparation (time management, creating a study space, the role of external factors such as distractions, exercise, and sleep), reading to ensure understanding, review of writing skills, taking notes from readings and in lecture, active review to enhance retention, and test-taking strategies. The course will conclude with information about problem-solving and specific strategies for learning in a clinical environment.

VMED 6999. Directed Study for Out of Sync Student. (0 cr. ; No Grade Associated; Every Fall, Spring & Summer) Directed study.

VMED 5080. Problems in Veterinary Epidemiology and Public Health. (1-3 cr.; A-F or Audit; Every Fall & Spring) Individual study on problem of interest to epidemiology or public health student.

VMED 5082. Diagnostic Epidemiology of Infectious Diseases. (2 cr.; A-F only; Every Spring) Theoretical principles, practical applications of diagnostic testing in populations. Examples related to infectious diseases in veterinary/human health. Basis of test performance, limitations, interpretations. prereq: Statistics course or instr consent

VMED 5090. Seminar: Veterinary Epidemiology. (1 cr.; [max 3 cr.]; S-N or Audit; Every Fall & Spring) Each student leads at least one seminar. Reviews of current research, literature reviews, and technique development. Students and participating faculty participate in presentation, discussion, and administration of the seminars. prereq: Veterinary Medicine grad student

VMED 5101. Molecular and Cellular Basis of Nanoparticle Toxicity. (3 cr.; [max 6 cr.]; A-F or Audit; Every Fall) Use of nanotechnology in scientific research. Impact of nanomaterials on biological systems.

VMED 5165. Surveillance of Foodborne Diseases and Food Safety Hazards. (2 cr.; Student Option; Every Spring) Principles/methods for surveillance of foodborne diseases. Investigation of outbreaks. Assessment of food safety hazards. Focuses on integration of epidemiologic/lab methods. prereq: [PUBH 5330, [professional school or grad student]] or instr consent

VMED 5180. Ecology of Infectious Disease. (3 cr.; Student Option; Every Fall) How host, agent, environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/ control, evolution of virulence. Use of analytical/molecular tools.

VMED 5181. Spatial Analysis in Infectious Disease Epidemiology. (3 cr.; Student Option No Audit; Every Spring) Spatial distribution of disease events. Exposures/outcomes. Factors that determine where diseases occur. Analyzing spatial disease data in public health, geography, epidemiology. Focuses on human/animal health related examples. prereq: Intro to epidemiology, statistics.

VMED 5190. Seminar and Presentation Development. (2 cr.; S-N only; Every Fall) Skills needed to research, organize, develop, and deliver an oral scientific presentation or to assist in finding, compiling, and organizing information for presentations, theses, or papers suitable for publication. prereq: Grad student

VMED 5193. Dairy Decision Making in a Financial Context for Veterinarians. (3 cr.; A-F only; Every Fall) Concepts/tools of economic analysis needed to support decision making on dairy farms, particularly as those decisions relate to health, disease impact, nutrition, general

VMED 5196. Dairy Production Medicine. (4 cr.; A-F only; Every Fall) Intense eight week course designed to develop advanced knowledge/skills in dairy production medicine. Mixture of lectures, wetlabs, farm investigations, presentations. Held at Dairy Education Center at New Sweden Dairy. prereq: DVM degree, instr consent

VMED 5210. Advanced Large Animal Physiology I. (1-3 cr.; [max 6 cr.]; Student Option; Every Fall) Review of large animal physiology at level needed for specially board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

VMED 5211. Advanced Large Animal Physiology II. (1 cr.; A-F or Audit; Every Spring) Large animal physiology for specially board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles. prereq: instr consent; 5210 recommended

VMED 5232. Comparative Clinical Veterinary Dermatologic Pathology. (3 cr.; [max 2 cr.]; S-N only; Every Fall & Spring) Microscopic pathology of basic dermatologic reactions and of variable disease states. prereq: DVM degree or foreign equiv

VMED 5240. Advanced Small Animal Pathobiology I. (1 cr.; A-F only; Fall Even Year) Biology, physiology, pathophysiology, and medicine of disciplines relevant to companion animals. Pathogenesis/treatment of diseases. Developing hypotheses that can be translated into clinical research. Prereq CVM grad student, [DVM or foreign equiv] degree.

VMED 5241. Advanced Small Animal Pathobiology II. (1 cr.; A-F only; Spring Even Year) Overview of biology, physiology, pathophysiology, and medicine of disciplines. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research. Prereq CVM grad student, [DVM or foreign equiv] degree.

VMED 5242. Advanced Small Animal Pathobiology III. (1 cr.; A-F only; Fall Odd Year) Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research. Prereq CVM grad student, [DVM or foreign equivalent] degree.

VMED 5243. Advanced Small Animal Pathobiology IV. (1 cr.; A-F only; Spring Odd Year) Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of
etiology, transmission, and control of infectious diseases important to animal and public health. Theoretical/practical aspects of molecular biology methods in context of epidemiological studies of infectious diseases, including bacterial/viral infections of veterinary/zoonotic significance. Population and evolutionary genetics of pathogenic microorganisms. Data analysis/interpretation. Design of descriptive/hypothesis-driven epidemiological studies involving molecular techniques. prereq: Basic course in microbiology

VMED 5430. HIV/AIDS: Pathogenesis, Treatment, and Prevention. (1 cr.; Student Option; Every Fall) Exposure to pathogenesis, treatment, and prevention of HIV/AIDS from clinical faculty who are dealing with AIDS patients. Developing new questions and design experiments that have greatest chance of translating to clinical setting. prereq: Grad student

VMED 5440. Microbial Risk Assessment of Foods. (3 cr.; Student Option No Audit; Every Spring) Risk analysis process as part of science-based decision-making. Conduct microbial risk assessment by different steps of hazard identification, hazard characterization, exposure assessment/risk characterization. Qualitative/quantitative tools. prereq: Intro course in microbiology, [basics algebra, calculus, probability theory, probability distributions] or instr consent

VMED 5442. Quantitative Methods for Analysis of Food Animal Disease Data. (4 cr.; A-F only; Every Spring) Principles and application of advanced methods for analysis of food animal disease data. Analytical techniques taught include risk assessment, spatial analysis, disease modeling and disease economics. The goal is to promote critical thinking applied to the solution of problems. prereq: basic statistics (PUBH6450 or equivalent) and basic epidemiology (CVM6922 or PUBH6341 or equivalent)

VMED 5496. Training in Swine Production and Management. (4 cr.; S-N only; Every Fall & Spring) Production module introduces techniques/protocols for swine production system operation. Research module covers applied research trials for viral/bacterial pathogens in pigs. prereq: VMED grad student or instr consent

VMED 5594. Research in Veterinary Medicine. (1-4 cr.; max 8 cr.; Student Option; Every Fall, Spring & Summer) Independent study as determined by instructor. Usually activity includes conducting research in instructor's lab, though research in field may also be included. prereq: Jr, instr consent

VMED 5596. Swine Diseases and Diagnostics. (2-3 cr.; max 2 cr.; Student Option; Every Fall & Spring) Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.

VMED 5621. Principles of Veterinary Anesthesia. (2 cr.; A-F only; Every Spring) In-depth training in principles of veterinary anesthesia. Lectures, anesthesia labs, presentations by students. prereq: VMED grad student, [DVM degree or foreign equiv], instr consent

VMED 5670. Bovine Surgery Practicum. (2 cr.; S-N only; Every Fall & Spring) Intensive training in ruminant surgery and evaluation of food animal surgery principles, hands-on laboratory components. prereq: VMED grad student, [DVM or equiv foreign degree] or instr consent


VMED 5920. Food Defense: Prepare, Respond, Recover. (3 cr.; A-F only; Every Fall) Basic principles of preparedness/emergency response. Instructor may substitute topics if timelier topic arises. prereq: Grad or professional student or instr consent

VMED 5921. Seminar in Food Protection and Defense. (1 cr.; Student Option; Every Fall & Spring) Complexities of our food systems. Natural/intentional threats to food security within various industry sectors. Which agencies are responsible for regulating food chains, monitoring food safety, responding to contamination events.

VMED 5994. Advanced Clinical Epidemiology. (1 cr.; A-F only; Every Fall) An in-depth focus on infectious disease epidemiology, with opportunities to apply epidemiologic principles to control infectious diseases in animal populations.

VMED 8090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans. (3 cr.; A-F or Audit; Every Fall & Spring) Major human zoonotic diseases, methods of transmission, diagnosis, control, and prevention. prereq: Epidemiology and infectious disease course or instr consent

VMED 8134. Ethical Conduct of Animal Research. (3 cr.; Student Option; Every Fall) Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

VMED 8192. Dairy Health Management: Critical Thinking. (1 cr.; max 2 cr.; S-N only; Every Fall & Spring) Group discussions surrounding critical evaluations of scientific journal articles and...
dairy-related scientific presentations. Facilitated by both students and faculty.

**VMED 8193. Welfare of Farmed Animals.** (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
This course covers topics on the evaluation and assessment of the welfare of farmed animals. Literature review, discussions, and analyses are used to increase skills needed to evaluate methods for improving the welfare of farmed animals in various situations.

**VMED 8220. Advanced Nephrology/Urology Clinics.** (1-3 cr.; Student Option; Every Fall & Spring)
Clinical investigation of naturally occurring urinary diseases in patients admitted to Veterinary Medical Center. prereq: instr consent

**VMED 8230. Medical Conference.** (1 cr. [max 2 cr.]; Student Option; Every Fall & Spring)
Participation in weekly conferences about internal medical disorders. prereq: instr consent

**VMED 8250. Problems in Acid-base, Electrolyte, and Fluid Metabolism.** (2-4 cr.; A-F or Audit; Every Fall & Spring)
Clinical problems and physiology of acid-base, electrolyte, and fluid disorders of dogs and cats. prereq: instr consent

**VMED 8292. Journal Club: Large Animal Internal Medicine.** (1 cr. [max 3 cr.]; A-F or Audit; Periodic Fall & Spring)
Students/faculty keep abreast of current literature in large animal internal medicine. Students critically evaluate the literature. prereq: instr consent

**VMED 8293. Advanced Studies in Nephrology and Urology.** (1-3 cr.; A-F or Audit; Every Fall & Spring)
Studies of urinary tract disease with goals of generating new knowledge. prereq: instr consent

**VMED 8333. FTE: Master’s.** (1 cr. [max 2 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

**VMED 8360. Evidence-based Medicine.** (2 cr.; A-F or Audit; Periodic Spring)
Concepts of evidence-based medicine with emphasis on veterinary clinical evidence will be presented. Clinical questions, development of study designs, identification of literature and assessment of the impact of the literature on clinical decisions. prereq: instr consent

**VMED 8394. Research in Veterinary Medicine.** (1-3 cr.; Student Option; Every Fall & Spring)
Research problems relating to any aspect of internal medicine or to the various systems in animals. prereq: instr consent

**VMED 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

**VMED 8492. Seminar: Infectious Diseases and Swine Medicine.** (1 cr. [max 2 cr.]; Student Option; Every Fall & Spring)
Students, faculty, and guest speakers present seminars on current research in diagnosis, control, and treatment of infectious diseases.

**VMED 8520. Advanced Immunology.** (2 cr.; Student Option; Every Spring)
Lectures and case presentations.

**VMED 8550. Veterinary Medicine Seminar.** (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
Seminar. Exposure to research activities of CMB and VMED students and faculty. Students prepare/present a 20-minute seminar on their original research. prereq: Grad student

**VMED 8560. Research and Literature Reports in Veterinary Medicine.** (1 cr. [max 2 cr.]; S-N only; Every Fall & Spring)
A combination of literature review, group discussions and analyses are utilized to improve participants’ capacity to critically evaluate scientific journal articles. Scientific research presentations will be led by students or faculty.

**VMED 8592. Infectious Disease Journals: Critical Thinking.** (1 cr. [max 2 cr.]; A-F only; Every Fall & Spring)
This course is intended to discuss published papers, experimental methods, approaches, diseases and animal health problems with the goal of promoting critical thinking. Students will be responsible for identifying, reviewing and sharing relevant material as well as leading discussion of their assigned class meeting.

**VMED 8593. Advanced Veterinary Virology and Serology.** (3 cr.; Student Option; Every Fall & Spring)
Discussion and laboratory practice.

**VMED 8666. Doctoral Pre-Thesis Credits.** (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**VMED 8682. Advanced Large Animal Surgery.** (2 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring)
Surgery of various systems in large animals, with preoperative and postoperative evaluation and management. prereq: DVM or equiv degree, instr consent

**VMED 8684. Surgical Physiology.** (1-3 cr.; Student Option; Periodic Fall & Spring)
Discussions on pathophysiology of surgical diseases in dogs and cats.

**VMED 8685. Neurosurgery.** (2-3 cr.; A-F or Audit; Every Fall & Spring)
Advanced neurosurgical diseases of small animals amenable to surgical treatment.

**VMED 8686. Thoracic and Cardiovascular Surgery.** (2-4 cr.; A-F or Audit; Every Fall & Spring)
Advanced thoracic and cardiovascular diseases of small animals amenable to surgical treatment.

**VMED 8693. Seminar: Large Animal Surgery.** (1 cr. [max 6 cr.]; A-F or Audit; Every Fall & Spring)
Discussion of current literature and surgery board preparation. prereq: DVM or equiv degree, instr consent

**VMED 8696. Research in Critical Care/Emergency Medicine.** (1-3 cr.; Student Option; Every Fall & Spring)
Special problems course. Controlled study; prospective and retrospective models of evaluation are defined, critiqued, and used for experimental design and data collection to validate research methods. prereq: DVM or equiv degree

**VMED 8777. Thesis Credits: Master's.** (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**VMED 8780. Advanced Avian Critical Care: Principles and Procedures.** (2 cr.; A-F or Audit; Every Spring)
Procedures and protocols for managing avian medical emergencies such as starvation, toxicities, respiratory failure, and massive trauma. prereq: Course each in vet pathology, physiology, pharmacology, anatomy, small animal anesthesia and critical care

**VMED 8781. Seminar: Advanced Veterinary Anesthesiology.** (1-3 cr.; A-F or Audit; Every Fall)
Active interaction around topics of advanced anesthesiology in veterinary species. prereq: [CVM 6321, CVM 6322] or equiv, grad student

**VMED 8788. Seminar: Veterinary Critical Care/Emergency Medicine.** (1 cr.; A-F or Audit; Every Fall & Spring)
Current topics. prereq: DVM or equiv degree

**VMED 8793. Seminar: Veterinary Anesthesiology.** (1-2 cr. [max 4 cr.]; A-F or Audit; Every Fall & Spring)
Discussion and presentations; for veterinary anesthesiology and surgery residents and graduate students. prereq: [CVM 6321 or equiv], DVM degree

**VMED 8796. Avian Anesthesia and Orthopedic Surgery.** (1-3 cr.; A-F or Audit; Every Fall & Spring)
Current methods for anesthetizing raptors, psittacine birds, and waterfowl. Lecture and lab on current methods for avian fracture bone fixation. prereq: courses in vet anesthesia, vet small animal orthopedics

**VMED 8888. Thesis Credit: Doctoral.** (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

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**Veterinary Population Medicine (VPM)**

Courses listed in this catalog are current as of November 20, 2016. For up-to-date information, visit www.catalogs.umn.edu.
PVM 1550. Introduction to the horse including care, handling, and recognizing behaviors. (1 cr.; Student Option; Every Fall, Spring & Summer)

Horse breeds, colors, behaviors. Basic care/handling. Online course, but includes three labs working with live horses.

PVM 1560. Introduction to Horseback Riding and Horsemanship. (2 cr.; Student Option; Every Fall, Spring & Summer)

Basic motor skills/commands necessary to ride horse. Focus on interaction of human body with horse's body to create movement. Basic horse care skills, grooming, taking temperature, using hoof tester, etc.

PVM 1905. Freshman Seminar. (2 cr.; A-F only; Every Fall & Spring)

Freshman seminar.

PVM 1906W. Garbage, Government and the Globe. (ENVIWI; 3 cr.; A-F only; Every Fall) Freshman Seminar

PVM 2400. Managed Captive Wildlife. (3 cr.; A-F or Audit; Every Fall)

This course is an introduction to key issues at the interface of humans and managed captive wildlife. Topics include: the role of managed captive wildlife species in conservation, education, exhibition, agriculture, and research; biodiversity, urban wildlife, bioscience, ethics, and animal welfare; and an introduction to the principles and techniques of the care and management of wildlife species in captive settings.

PVM 2500. Equine Breeding and Genetics. (2 cr.; A-F or Audit; Every Spring)

This course is designed to improve knowledge of principles and concepts underlying genetic improvement of horses, and develop applied skill in breeding stock selection and mating decisions.

PVM 3101. Animal Toxicology and the Environment. (3 cr.; A-F only; Every Spring)

Different aspects of Animal Toxicology/its relationship to environment.

PVM 3102. Aquatic-Sediment Ecological Toxicology. (3 cr.; A-F or Audit; Every Fall)

The fate, toxicity and risk assessment will be discussed for aquatic and terrestrial organisms exposed to various toxins. Students will devise strategies for toxicity testing and environmental bioremediation.

PVM 3550. Introduction to Equine Exercise Physiology. (2 cr.; A-F or Audit; Every Fall, Spring & Summer)

PVM 3550 is an introduction to equine exercise physiology. Students must have successfully completed a physiology or anatomy course prior to taking this course. The course will include lecture, in class work, and work with live horses. All class materials will be found on the Moodle course website. Work assignments and tests will be either in class or through the Moodle site. Grades will be based on assignment completion, tests and demonstration of active participation in class assignments. Students must demonstrate an understanding of equine physiology as it relates to the horse as an athlete and the effect of exercise on the cardiovascular system, the respiratory system and the musculoskeletal system.

PVM 3700. Equine Reproduction and Breeding Management. (2 cr.; A-F only; Every Spring)


PVM 4131. Immunology. (3 cr.; Student Option; Every Spring)


Vienna Executive MBA (VMBA)

VMBA 5700. Managerial Accounting. (4 cr.; A-F or Audit; Every Spring)


VMBA 5701. Data Analysis and Decision Making. (4 cr.; A-F or Audit; Every Spring & Summer)

Exploratory data analysis, basic inferential procedures, statistical process control, regression analysis, decision models.

VMBA 5702. Financial Management. (4 cr.; A-F or Audit; Every Spring & Summer)

Theory/practice of finance from an analytical approach. Students apply concepts of risk, return, valuation to decisions that a corporate financial officer or person engaged in small business must make about sources/uses of funds during changing financial markets.

VMBA 5703. Marketing Management. (4 cr.; A-F or Audit; Every Spring & Summer)

Developing/implementing most appropriate combination of variables to carry out a firm's strategy in its target markets. Analytic perspectives, concepts, decision tools of marketing for product offering decisions, distribution channel decisions, pricing decisions, communication program decisions.

VMBA 5704. Managing People and Organizations. (4 cr.; A-F or Audit; Every Spring)

Theories/frameworks for analyzing behavior of individuals, groups, organization itself. Emphasizes making decisions, developing action plans. Concepts/principles associated with function of human resource management (e.g., personnel selection, reward/compensation, collective bargaining).

VMBA 5705. Operations Management. (4 cr.; A-F or Audit; Every Fall)

Operations management function in different types of organizations. Emphasizes productive, innovative, competitive operations. Concepts/principles related to management of quality/innovation within service/manufacturing organizations.

VMBA 5706. Business, Government, and Macroeconomics. (4 cr.; A-F or Audit; Every Fall)

Roles of government/business in society. Alternative systems of economics, political values. Social, political, economic, cultural conflicts affecting business sector.

VMBA 5707. Economics in Transition. (4 cr.; A-F or Audit; Every Fall)

Technological, political, and ethical forces that are shaping the competitive environment. Theoretical considerations. Business responses to specific issues. Projects/cases for companies in East Central Europe.

VMBA 5709. Info Tech Mgmt. (4 cr.; A-F or Audit; Every Spring)

Various information technologies, their applications. Competitive advantages associated with information technology, organizational/managerial implications.

VMBA 5710. Advanced Financial Management for Global Markets. (4 cr.; A-F or Audit; Every Spring)

Advanced financial concepts for corporate financial decisions at executive level. Investment, firm financing, global markets.

VMBA 5711. Managing Globalization (Guangzhou). (4 cr.; A-F or Audit; Every Spring & Summer)


VMBA 5712. Strategies for a Global Company: an Integrative Perspective. (6 cr.; A-F or Audit; Every Spring)

Multi-disciplinary perspectives from strategic marketing, corporate strategy, operations management. Involvement of faculty/corporate executives. Site visits to global companies, student projects. Capstone course.

VMBA 5713. Negotiations and Conflict Management. (4 cr.; A-F or Audit; Every Spring)

Typical challenges faced when negotiating. Strategies for managing challenges and improving skills as a negotiator and conflict manager.

VMBA 5714. Financial Accounting. (4 cr.; A-F or Audit; Every Spring)

External accounting system used by firms to measure economic performance/financial

**Vietnamese (VIET)**

**VIET 1012. Beginning Vietnamese II.** (3 cr. [max 5 cr.]; A-F only; Periodic Fall & Spring) Listening, speaking, reading, writing. Vietnamese. Development of communicative competence.

**Water Resources Science (WRS)**

**WRS 5050. Special Topics in Water Resources Science.** (1-3 cr.; A-F or Audit; Periodic Fall & Spring) Practical topics for local water resource management. Policy and institutions, watershed science, civic engagement, assessment, communication, implementation practices, and administration. Requires working with a mentor in local water resource management. Online only.

**WRS 5101. Water Policy.** (3 cr.; Student Option; Every Spring) Socio-cultural, legal, and economic forces that affect use of water resources by individuals/institutions. Historical trends in water policy, resulting water laws in the United States. Institutional structures whereby water resources are managed at federal, state, and local levels. prereq: Grad student or instr consent

**WRS 5241. Ecological Risk Assessment.** (3 cr.; Student Option; Every Spring) Evaluating current/potential impact of physical, chemical, and biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction papers, final exam, small-group project. prereq: instr consent

**WRS 8050. Special Topics in Water Resources Science.** (1-3 cr.; max 6 cr.); A-F or Audit; Every Fall & Spring) Special topics in water resources science.

**WRS 8060. Directed Studies in Water Resources Science.** (1-3 cr.; max 6 cr.); A-F or Audit; Every Fall & Spring) Directed studies in water resources science. prereq: instr consent

**WRS 8095. Plan B Project.** (3 cr.; S-N or Audit; Every Fall & Spring) Optional course for M.S. Plan B students. Can be taken once for up to 3 credits, and may count towards credit minimum.

**WRS 8100. Interdisciplinary Seminar in Water Resources.** (0.5-3 cr.; Student Option; Every Fall & Spring) Interdisciplinary Seminar in Water Resources

**WRS 8333. FTE: Master’s.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master’s student, adviser and DGS consent

**WRS 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, adviser and DGS consent

**WRS 8581. Research and Professional Ethics in Water Resources and Environmental Science.** (0.5 cr.; S-N or Audit; Every Spring) Ethics of water resources science and environmental engineering research/practice. Societal responsibility, plagiarism, recording, keeping, authorship, confidentiality, conflicts of interest, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester. prereq: Environmental engineering or water resources science] grad student or instr consent

**WRS 8666. Doctoral Pre-Thesis Credits.** (1-6 cr.; max 12 cr.; No Grade Associated; Every Fall, Spring & Summer) TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

**WRS 8777. Thesis Credits: Master’s.** (1-18 cr.; max 50 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

**WRS 8868. Thesis Credit: Doctoral.** (1-24 cr.; max 100 cr.; No Grade Associated; Every Fall, Spring & Summer) Thesis credit: doctoral. prereq: [Max 18 cr per semester or summer], 24 cr required

**Writing Studies (WRIT)**


**WRIT 1301. University Writing.** (4 cr.; A-F only; Every Fall, Spring & Summer) Drafting, revising, editing. Academic genres. Critical reading, rhetorical analysis for principles of audience, purpose, and argumentative strategies. Emphasizes electronic/print library. Critical analysis, annotated bibliography, research paper. prereq: Placement in Writt 1301

**WRIT 1401. Writing and Academic Inquiry.** (4 cr.; A-F only; Every Fall, Spring & Summer) How writing works in varying contexts/genres, how it presents complex arguments. Students read/analyze increasingly challenging texts. Concepts of audience, purpose, and context. Library research, guided revision. prereq: Placement in Writt 1401

**WRIT 1908W. Freshman Seminar.** (CIV, WI; 3 cr.; Student Option; Every Fall) Topics specified in Class Schedule.

**WRIT 1910W. Freshman Seminar.** (WI; 3 cr.; Student Option; Every Fall) Topics vary.

**WRIT 3001. Introduction to Technical Writing and Communication.** (3 cr.; A-F only; Every Fall) Research origins/history. Technical communication. Audience, purpose, ethics, global communication, collaboration, usability, digital writing technologies. Journal articles, student/professional organizations, guest presentations, interviews, digital portfolio. Oral presentations, research paper. Technical Writing concurrent registration is required (or allowed) in Communication Major or instr consent

**WRIT 3029W. Business and Professional Writing.** (WI; 3 cr.; Student Option; Every Fall & Spring) Practice writing for various professional purposes/audiences, using appropriate styles, tones, and organizational elements. Potential genres include proposals, reports, web content, email, executive summaries, job search portfolios. Attention to workplace collaboration and broader issues of professional literacy.

**WRIT 3101W. Writing Arguments.** (WI; 3 cr.; A-F or Audit; Every Fall & Spring) Students learn about argument, drawn from a number of theories of argument. This goal is pragmatic: those theories provide a vocabulary for talking about argument and for developing and refining students’ own written arguments. Students get regular practice, coaching, and feedback on their writing skills, primarily as these concern argumentative writing. Students also learn how to analyze argumentative texts, drawn from popular culture, academic fields, and the public realm. prereq: Soph or Jr or Sr

**WRIT 3102W. Public Writing.** (CIV, WI; 3 cr.; A-F only; Every Fall) Practice and study of public writing beyond the academy or professions. Examine public documents and apply critical/rhetorical analysis regarding audience, purpose, message, power, and context. Students conduct research/write documents for public audiences on contemporary issues of interest. prereq: Soph or Jr or Sr

**WRIT 3152W. Writing on Issues of Science and Technology.** (WI; 4 cr.; A-F or Audit; Every Fall & Spring) Read books/articles, discuss, and write about major issues in science/technology. Possible topics: DNA and human genome. Animal/human interaction. Global warming; Alternative energies; Animal/human cloning and stem-cell research. Vaccines from Smallpox to AIDS. Why civilizations collapse.

**WRIT 3221W. Communication Modes and Methods.** (WI; 4 cr.; A-F only; Every Fall & Spring) Theories/practices of interpersonal, small group, organizational, and scientific and technical communication. Lecture, discussion,

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WRIT 3257. Technical and Professional Presentations. (3 cr.; Student Option No Audit; Every Fall & Spring)
Oral presentation skills for technical or professional topics. Visual communication, audience analysis, organizing presentation, presenting complex material. Emphasizes use of computers. prereq: COMM 1101 or instr consent

WRIT 3270. Special Topics. (1-3 cr.; Student Option; Periodic Fall & Spring)
See Class Schedule.

WRIT 3291. Technical Communication Certificate Capstone Project. (1 cr.; A-F only; Every Fall, Spring & Summer)
The capstone project is taken in conjunction with a concurrent WRIT course for the Technical Communication Certificate. The project extends an assignment in the selected WRIT course to further explore an aspect of technical communication. Students develop their project in consultation with the instructor of the selected course. Project formats include a paper, report, podcast, video, scientific poster, or electronic presentation. prereq: instr consent

WRIT 3315. Writing on Issues of Land and the Environment. (AH,DSJ; 3 cr.; A-F or Audit; Every Spring)
Land in America as idea and as actual space. History of cultural values and the meanings land holds for us. Contrasting views of land, especially those of certain Native American peoples. Rise of the conservation movement and the urbanization of U.S. space.

WRIT 3361. Literature of Social Movements in the United States: 1950 to Present. (CIV,LITR; 3 cr.; A-F or Audit; Every Spring)
Literature (fictional, nonfictional) of social movements in United States in last half of 20th century. Artistic truth in relation to historical truth. Roles/obligations of citizens to protest/ change social structures. prereq: Soph or jr or sr or instr consent

WRIT 3371W. Technology, Self, and Society. (TS,WI; 3 cr.; A-F only; Every Fall)
Cultural history of American technology. Social values that technology represents in shifts from handicraft to mass production/consumption, in modern transportation, communication, bioengineering. Ethical issues in power, work, identity, our relation to nature.

WRIT 3381W. Writing and Modern Cultural Movements. (AH,WI; 3 cr.; A-F or Audit; Every Fall)
How written texts contribute to movements in art and culture. How such texts are written with particular audiences, purposes, styles, and forms. Readings, lectures, discussions, analysis of texts.

WRIT 3405W. Humanistic Healthcare and Communication. (AH,WI; 3 cr.; Student Option; Every Spring)
Relationships in art between communication, humanism in healthcare, empathy.

WRIT 3441. Editing, Critique, and Style. (3 cr.; A-F only; Every Fall & Spring)
Editing for style, correctness, and content. Grammar/punctuation, Copyediting/proofreading. Working with a writer to develop, organize, write, and polish a document. Editing technical/scientific information. Paper/electronic assignments. prereq: Soph or jr or sr

WRIT 3562V. Honors: Technical and Professional Writing. (WI; 4 cr.; A-F only; Every Fall)
Written and oral communication in professional settings, gathering research, analyzing audience, assessing and practicing multiple genres. Draft, test, revise present findings in oral presentation. Honors section includes discussion on scholarly readings in technical and professional writing as well as a final project that must be addressed to a real-world audience.

WRIT 3562W. Technical and Professional Writing. (WI; 4 cr.; A-F only; Every Fall, Spring & Summer)
Written/oral communication in professional settings, gathering research, analyzing audience, assessing/practicing multiple genres. Draft, test, revise present findings in oral presentation. prereq: [Jr or sr or instr consent], 1301 or 1401 or equiv

WRIT 3577W. Rhetoric, Technology, and the Internet. (TS,WI; 3 cr.; A-F only; Every Fall & Spring)
How persuasive communication is tailored to the Internet; how Internet technologies enable/limit persuasion; how to adapt rhetorical theory to 21st century digital writing; ethical issues, including free speech, copyright, fair use, privacy; rhetorics of social networks. prereq: Soph or jr or sr or instr consent

WRIT 3671. Visual Rhetoric and Document Design. (3 cr.; A-F only; Every Fall & Spring)
Rhetorical principles applied to visual displays of information/data in print/online documents. Analyze/create examples of visual communication/design for selected documents combined with various writing strategies.

WRIT 3672W. Project Design and Development. (WI; 3 cr.; A-F or Audit; Every Spring)
Students study, plan, research, design, and develop technical communication print documents, including documentation, brochures, and newsletters. Workplace project processes. Develop production-quality documents. prereq: Jr or sr

WRIT 3701W. Rhetorical Theory for Writing Studies. (WI; 4 cr.; A-F only; Every Spring)
Principles/history of rhetorical theory/criticism. Classical theories. Aristotle's Rhetoric applied to examples of contemporary communication. Relationship of classical theory to scientific discourse, technical communication, prerequisite: TWC or S or concurrent registration is required (or allowed) in TC Major, Soph or jr or sr or instr consent

WRIT 3751W. Seminar: Theory and Practice of Writing Consultancy. (WI; 3 cr.; Student Option; Every Fall)
How writers learn to write, how writing is taught in the academy, and how rhetorical conventions vary across disciplines. prereq: Currently working in a University writing center, instr consent

WRIT 3993. Directed Study. (1-4 cr.; max 8 cr.; Student Option; Every Fall, Spring & Summer)
Supervised reading/research on topics not covered in regularly scheduled offerings. Intended primarily for upper division undergraduate students. prereq: instr consent, dept consent, college consent

WRIT 4196. Internship in Technical Writing and Communication. (3 cr.; A-F only; Every Fall, Spring & Summer)
Internships sites may include University, industry, or government agencies. Internship proposal, progress report, internship journal (optional), final report with letter from internship supervisor. prereq: 3562W, 24 cr in Technical Writing concurrent registration is required (or allowed) in Communication major

WRIT 4431W. Science, Technology, and the Law. (CIV,WI; 3 cr.; A-F only; Every Fall)
How issues in science/technology affect 21st century practice of law. Ownership, access, ethics, information, technology used to frame topics. Intellectual property, privacy, health law, research practice. prereq: Jr or sr or grad student or instr consent

WRIT 4501. Usability and Human Factors in Technical Communication. (3 cr.; A-F only; Every Spring)
Principles/concepts of human factors/usability testing. Developing objectives, criteria, and measures. Conducting tests in lab, field, and virtual environments. Using software programs to analyze qualitative/quantitative data. prereq: [TWC or concurrent registration is required (or allowed) in TC Major; Jr or sr or grad student]] or instr consent

WRIT 4562. International Professional Communication. (3 cr.; A-F only; Every Spring)
The increasingly global nature of communication presents new challenges and opportunities as communicators develop content for and with clients and colleagues from other cultures. Moreover, professionals increasingly perform their work as part of global virtual teams using multiple synchronous and asynchronous technologies. Thus, this course includes resources and experiences designed to increase a student's skill at communicating with multicultural audiences, working as a
member of international teams, and using multiple technologies as part of this work. 

**WRIT 4573W. Writing Proposals and Grant Management.** (WI; 3 cr.; A-F or Audit; Every Fall) Research funding sources. Interpreting RFP or program announcement. Letters of intent. Grant preparation, following guidelines of RFP or program announcement. Proposals for nonprofits or research/business.

**WRIT 4662W. Writing With Digital Technologies.** (WI; 3 cr.; A-F only; Every Fall) WRIT 4662W is an advanced level Writing Studies course that explores various digital writing technologies and provides multiple opportunities to assess writing situations and make appropriate decisions about digital form and production. Students will learn the basic building blocks of writing in Internet environments (text, sound, images, video) as well as the vocabularies, functionalities, and organizing structures of Web 2.0 environments, how these impact understanding and use of information, and how to produce these environments (i.e., multimedia internet documents) for interactivity and use. This course includes design projects and practice with apps, markup language, content management systems, video, and social media. prereq: Jr or sr or grad student or instr consent

**WRIT 4664W. Science Writing for Popular Audiences.** (WI; 3 cr.; A-F or Audit; Every Spring) How science is translated for popular audiences. Rhetorical theory to critique popularized articles. Developing heuristic for writing articles. Controversial issues in moving from science as science to science as popular. prereq: 3562 or instr consent

**WRIT 4995. Senior Project.** (1 cr.; A-F only; Every Fall, Spring & Summer) Senior project addressing topical issues in Writing Studies related to WRIT course. Must be done in conjunction with current 3xxx or 4xxx level course in Writing Studies that student is taking. Instructor permission required for registration. prereq: Sr, TWC or S concurrent registration is required (or allowed) in TC major, instr consent

**WRIT 5001. Introduction to Graduate Studies in Scientific and Technical Communication.** (3 cr.; A-F only; Every Fall) History of technical communication. Different audiences, purposes, genres, and emerging trends. Interaction of technological, cultural, and social issues. Students participate within a community of technical communication professionals. prereq: Grad student or instr consent

**WRIT 5051. Graduate Research Writing Practice for Non-native Speakers of English.** (3 cr.; Student Option; Every Fall, Spring & Summer) Graduate-level writing techniques/formats for summaries, critiques, research, and abstracts. Persuasion, documentation, structure, grammar, vocabulary, field-specific requirements. Writing through several drafts, using mentor in specific field of study. Revising/editing to meet graduate standards. Discussions. prereq: Grad student

**WRIT 5052. Graduate Research Presentations and Conference Writing for Non-Native Speakers of English.** (3 cr.; Student Option; Every Fall & Spring) Practice in writing/presenting graduate-level research for conferences or professional seminars. Delivery of professional academic presentations to U.S. audiences. Conference abstract, paper, and poster presentation. Communication in research process. Students select topics from their own research/studies. Format, style, transitions, topic narrowing, non-verbal presentation skills. prereq: [Grad student, non-native speaker of English] or instr consent

**WRIT 5112. Information Design: Theory and Practice.** (3 cr.; A-F or Audit; Periodic Spring) Political, economic, social, and technical aspects of media selection and message design. Media analyses, scripts, budgets, treatments, project-design plans, interactive screens. Online design project. prereq: Grad student or instr consent

**WRIT 5196. Internship in Scientific and Technical Communication.** (3-6 cr.; S-N or Audit; Every Fall, Spring & Summer) Internship sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor are required. prereq: STC grad or instr consent

**WRIT 5270. Special Topics.** (WI; 3 cr. [max 9 cr.]; Student Option; Periodic Fall & Spring) Topics specified in Class Schedule.

**WRIT 5291. Independent Study, Reading, and Research.** (1-3 cr.; Student Option; Every Fall, Spring & Summer) Supervised reading/research on advanced projects not covered in regularly scheduled offerings. prereq: instr consent, dept consent

**WRIT 5531. Introduction to Writing Theory and Pedagogy.** (3 cr.; A-F or Audit; Every Fall) Pedagogical philosophy/methodology in composition, primarily first-year writing. Design of classroom and learning environment. Pedagogical theory/research. prereq: Grad student

**WRIT 5532. Writing Pedagogy Practicum.** (1 cr. [max 3 cr.]; S-N only; Every Spring) Discussion/activities that support development of sound pedagogical practices. Pedagogical theory and practice. Pedagogy, role and role of the educator in education. Pedagogical theory/research. Pre: Grad student

**WRIT 5561. Editing and Style for Technical Communicators.** (3 cr.; A-F only; Every Spring & Summer) Proofreading, copy-editing, comprehensive editing. Students primarily use electronic editing methods. Editor's responsibilities, relationship to writers, roles within an organization, style guides, ethical choices. Editing in global setting. Editing/style for visual design and online documents. prereq: [Grad student, knowledge of grammar/punctuation rules] or instr consent

**WRIT 5570. Minnesota Writing Project Directed Studies.** (1-3 cr. [max 9 cr.]; A-F or Audit; Every Summer) Guided individual research into current theories/practices of writing and writing pedagogy.

**WRIT 5571. Visual Rhetoric.** (3 cr.; A-F only; Every Spring) Range/development of visuals, especially those in science/technology. Vocabulary for commenting on, criticizing, and creating visuals. prereq: Jr or sr or grad student

**WRIT 5775. The Rhetorical Tradition: Classical Period.** (3 cr.; A-F only; Every Fall) Rhetoric in the Classical world and recurring themes that constitute "the rhetorical tradition." Epistemological/ethical status and sociopolitical importance of ancient rhetorical training and discourse. Works by Isocrates, Plato, Aristotle, Cicero, Quintilian, and others. Prepares students for preliminary examinations/seminars in rhetoric.

**WRIT 5776. The Rhetorical Tradition: Modern Era.** (3 cr.; A-F or Audit; Periodic Spring) Core works in modern/contemporary rhetorical theory. Twentieth-century revivals and challenges to the Aristotelian rhetorical tradition. Units devoted to Enlightenment rhetoric; the New Rhetorics of I. A. Richards, Kenneth Burke, and Chaim Perelman; feminist rhetorical theory, historiography, and critique; deconstruction/post-structuralism. Prepares students for preliminary examinations/seminars in rhetoric.

**WRIT 8011. Research Methods in Writing Studies and Technical Communication.** (3 cr.; A-F or Audit; Periodic Fall) Survey of quantitative/qualitative research methods. Theoretical perspectives that demonstrate/test analytical approaches to scientific/technological rhetoric. prereq: STC/RSTC grad student or instr consent

**WRIT 8012. Applied Research Methods in Writing Studies and Technical Communication.** (3 cr.; A-F or Audit; Every Fall & Spring) Introduction to one or two quantitative or qualitative research methods in scientific/technical communication or rhetoric (e.g., ethnography, case studies, discourse analysis). prereq: [8011, grad student] or instr consent

**WRIT 8333. FTE: Master's.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Master's student, advisor and DGS consent

**WRIT 8444. FTE: Doctoral.** (1 cr.; No Grade Associated; Every Fall, Spring & Summer) (No description) prereq: Doctoral student, advisor and DGS consent

**WRIT 8505. Professional Practice.** (3 cr.; S-N only; Every Fall, Spring & Summer) Extended problem-solving situation in business, government, or industry. Student
acts as consultant to explore problem, identify possible solutions, introduce solution, apply it. prior req: Grad student

WRIT 8510. Seminar in Rhetoric. (3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Topics may include theories, history, criticism, major figures, movements, visual or material rhetoric. Topics vary. See the Class Schedule.

WRIT 8520. Seminar in Scientific and Technical Communication. (3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Topics may include theories, landmark studies, history, gender, ethics. Topics vary. See the Class Schedule.

WRIT 8540. Seminar in Technical Communication and Composition Pedagogies. (3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Topics may include theories of pedagogy or research studies that inform the classroom or workplace, social and ethical concerns, landmark studies, current controversies. Topics vary. See the Class Schedule.

WRIT 8550. Seminar in Technology, Culture, and Communication. (3 cr. [max 12 cr.]; A-F or Audit; Periodic Fall & Spring) Topics may include computer-mediated communication, democracy/technology, controversies over digital communication, privacy/ethical issues, feminist theory and interactions of gender with science and technology, communication in legal or medical settings. Topics vary. See the Class Schedule.

WRIT 8560. Seminar in Writing Studies. (3 cr. [max 12 cr.]; A-F only; Every Fall & Spring) Topics may include literacy, genre, history of writing, narrative theory and practice, writing as textual practice. Topics vary. See the Class Schedule. prior req: Grad student

WRIT 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.]; No Grade Associated; Every Fall, Spring & Summer) Doctoral Pre-Thesis Credits prior req: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.

WRIT 8777. Thesis Credits: Master’s. (1-18 cr. [max 50 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prior req: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

WRIT 8792. Independent Study, Reading, and Research. (1-4 cr. [max 12 cr.]; S-N only; Every Fall, Spring & Summer) Supervised study, reading, or research on projects not covered in regularly scheduled offerings. prior req: instr consent

WRIT 8794. Directed Research. (1-4 cr. [max 12 cr.]; S-N only; Every Fall, Spring & Summer) Supervised research project. prior req: instr consent

WRIT 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.]; No Grade Associated; Every Fall, Spring & Summer) (No description) prior req: Max 18 cr per semester or summer; 24 cr required

YOST 1001. Seeing Youth, Thinking Youth: Media, Popular Media, and Scholarship. (3 cr.; Student Option; Every Fall & Spring) Use of life-experience, news and popular media to explore everyday realities of being a young person, as it varies by age social class, race/ethnicity, geography, time period, sexual orientation, and capacity.

YOST 1366. Stories of Resistance & Change: Youth, Race, Power & Privilege in the U.S.. (DSJ,LITR; 3 cr.; Student Option; Every Fall & Spring) Young people in their everyday lives often experience themselves as invisible, or as trouble, troubled, or in trouble with adult authority. This course will use literature as an opportunity to complement social sciences understandings of youth, to help those who work with children and adolescents to better understand their lived experiences. This course will use classic and contemporary literary texts that respond to the needs, wants, and existential questions that surround young people’s lives, and makes them visible to learners in the class who want to better understand children and adolescents in diverse settings across the United States.

YOST 1368W. Youth Global Perspectives: Stories from the Arab, Islamic, and Middle Eastern Worlds. (GP,WI,LITR; 4 cr.; Student Option; Every Fall & Spring) This course helps students build a critical understanding of our current moment, including Islamophobia, conflicts with Iran, and the U.S. role in the relationship between Israel and Palestinians. We accomplish this through: a youth studies perspective by reading stories that invite questions. Reading plays, stories, novels, and essays from young Muslim-American, Egyptian, Palestinian, Israeli, Persian, and Yemeni authors, we consider the role of storytelling inclucing social media?in youth-led social movements. Students practice skills of literary analysis through an interactive and collaborative classroom designed to support diverse learning styles. Through literary works, students gain insight into the forces that shape social interactions and social change on small and large scales in a global context. We work within a social justice framework that aims to understand the complex power dynamics that have shaped the modern Middle East and Western perspectives towards Arabs and Muslims.

YOST 2101. Urban Youth and Youth Issues. (DSJ; 4 cr.; Student Option; Every Fall & Spring) What it is like to be a young person in a city, in the United States and worldwide. prior req: 1001 or instr consent

YOST 2241. Experiential Learning. (4 cr.; Student Option; Every Fall & Spring) History/theory of experiential learning, its application in youthwork. Observation, reflection, program design, and evaluation skills grounded in experiential learning theory. 15 hours of field observation required. prior req: [1001, 2001] or instr consent

YOST 3001. Introduction to History & Philosophy of Youthwork. (4 cr.; Student Option; Every Fall & Spring) Foundations of youthwork. Where contemporary American youthwork stands, particularly in comparison with international perspectives on youth/youthwork. prior req: 2xxx or instr consent

YOST 3032. Adolescent and Youth Development for Youthworkers. (4 cr.; Student Option; Every Fall & Spring) Application of theory/research about children/adolescents. How findings can be used. How theories facilitate understanding of behavior. prior req: 1001 or 2002W or 2101, [any Psych or CPsy course]

YOST 3101. Youthwork: Orientations and Approaches. (4 cr.; Student Option; Every Spring) Historical/contemporary approaches to youthwork, diverse settings in which it is done, importance of worker’s life experience in crafting ethical, effective practice. At least 15 hours of field experience. prior req: One gen psy course, one gen soc course

YOST 3234. Youth Agencies, Organizations, and Youth Service Systems. (3 cr.; Student Option; Every Spring) Communities/governmental responses to young people as potential problems through agencies, programs, and other organizational forms. Purpose, structure, and activities of such forms. How the forms are/are not integrated into youth service systems. prior req: [Two soc/anth courses, work experience in youth [agency or org]] or instr consent

YOST 3235. Community Building, Civic Engagement, and Civic Youthwork. (4 cr.; Student Option; Every Spring) Reciprocity between youth development and community development brought about by young people’s civic engagement. Individual, social, and political change by/for young people and their community. prior req: [2001, One basic course in Pol, one basic course in Soc] or instr consent

YOST 3240. Special Topics in Youth Studies. (2-8 cr. [max 10 cr.]; Student Option; Every Fall, Spring & Summer) In-depth investigation of one area of youth studies. Teaching procedure/approach
YOST 3291. Independent Study in Youth Studies. (1-9 cr.; max 18 cr.; Student Option; Every Fall, Spring & Summer) Independent reading or research under faculty supervision. prereq: instr consent

YOST 3325V. Honors: Project-Based Writing For Education and Human Development Majors. (WI; 4 cr.; A-F only; Every Fall & Spring) Writing project focused on problem or issue in field of study. Propose project, identify audience, gather information through primary/secondary research. Create product tailored to audience needs. Collaborative activities/assignments.

YOST 3325W. Project-Based Writing For Education and Human Development Majors. (WI; 4 cr.; Student Option; Every Fall & Spring) Writing project focused on problem or issue in field of study. Propose project, identify audience, gather information through primary/secondary research. Create product tailored to audience needs. Collaborative activities/assignments. prereq: 60+ undergraduate credits, declared major

YOST 4196. Youthwork Internship. (4 cr.; Student Option; Every Fall & Spring) Supervised field learning in school/community-based organizations/ agencies. Emphasizes youthwork practice. prereq: Declaration of youth studies major, instr consent

YOST 4301. Communicating With Adolescents About Sexuality. (3 cr.; Student Option; Every Summer) How to communicate sensitively/effectively with adolescents and their concerns about sexuality in everyday life. Focuses on healthy sexual development (physical, emotional, ethical) and sexual diversities. Adolescent sexual issues: gender, body image, disease, sexual violence, intimacy, sex in cyberspace. prereq: 1001 or 2002W or instr consent

YOST 4319. Understanding Youth Subcultures. (3 cr.; Student Option; Every Summer) Young people’s participation in and understanding of subcultures, life-styles, and event cultures. Place of these in young people’s identity, friendship, and life chances. prereq: [1001, one basic course in [ANTH or SOC]] or instr consent

YOST 4321. Work with Youth: Individual. (2 cr.; Student Option; Every Fall) Assumptions underlying individual work with youth. Issues/concerns of adolescents and of persons who work with them in one-to-one interactions. prereq: 1001 or 2101 or instr consent

YOST 4322. Work with Youth: Families. (2 cr.; Student Option; Every Fall) Theories and techniques of working with youth and their families. Emphasizes practical methods of structural change, developing effective communication, decision-making and problem-solving systems, winning the family’s cooperation. Role of professional in influencing healthy family development. prereq: 1001 or 2002W or instr consent

YOST 4323. Work with Youth: Groups. (2 cr.; A-F only; Every Fall) Social group work, adolescent group needs/associations. Group process. Working with diverse groups of youth in community, in group living situations, and in group therapy. prereq: [1001 or 2002W], 4321 or instr consent

YOST 4325. Improving Everyday Youthwork: Practical Program Evaluation. (3 cr.; Student Option; Every Fall) Purpose, methods, and uses of program evaluation. How young people can develop/ enhance programs and secure funding. Evaluation as political/moral imperative. prereq: [1001 or 2101], 3234 or instr consent

YOST 4401W. Young People’s Spirituality and Youthwork: An Introduction. (WI; 4 cr.; Student Option; Spring Odd Year) Adolescent spirituality, its relation to working with young people. Faith/spirituality as necessary for healthy youth development. Knowledge, attitudes, and skills to recognize spirituality in cultural, social, economic, and political worlds. prereq: 1001 or 2002W or instr consent

YOST 4402. Youth Policy: Enhancing Healthy Development in Everyday Life. (4 cr.; Student Option; Every Spring) Youth policy as formulated in response to youth issues, problems, and community/public concerns. Policy as political response to youth panics, as indirect youthwork, and as a community’s moral compact with its young people. Perspectives explored are specific to student interests. prereq: [1001, 2002W] or instr consent

YOST 4411. Youth Research and Youth Program Evaluation. (4 cr.; Student Option; Every Spring) Field research practicum. Basic social science approaches to the study of youth. Evaluating youth programs. Students complete a simple youth research/evaluation study. prereq: Basic research methods course or instr consent

YOST 5031. International Youthwork. (3 cr.; Student Option; Every Fall) Lives of young people living outside the United States and of immigrants/refugees now resident in this country. Working with and on behalf of such groups. Socio-political analysis of globalization. Its impact on young people, youthwork, and youth policy worldwide. prereq: 2xxx or instr consent

YOST 5032. Adolescent and Youth Development for Workworkers. (4 cr.; Student Option; Every Fall & Spring) Application of theory/research about children/adolescents. How findings/theories facilitate understanding of behavior. prereq: [1001 or 2001 or 2002W or 2101], [any Psych or CPsy course]

YOST 5234. Youth Agencies, Organizations, and Youth Service System. (3 cr.; Student Option; Every Spring) Communities and governmental responses to young people as potential problems through agencies and programs and other organizational forms. Purpose, structure, and activities of such forms. How forms are/are not integrated into youth service systems. prereq: [Two soc/anth courses, work experience in youth agency or org] or instr consent

YOST 5235. Community Building, Civic Engagement, and Civic Youthwork. (4 cr.; Student Option; Every Spring) Reciprocity between youth development and community development brought about by young people’s civic engagement. Individual, social, and political change by/for young people and their community. prereq: [2001, one basic course in Pol, one basic course in Soc] or instr consent

YOST 5240. Special Topics in Youth Studies. (2-8 cr.; max 40 cr.; Student Option; Every Fall, Spring & Summer) In-depth investigation of one area of youth studies. Teaching procedure and approach determined by specific topic and student needs. Topic announced in advance. prereq: Two social sci courses, exp work with youth or instr consent

YOST 5291. Independent Study in Youth Studies. (1-8 cr.; max 16 cr.; Student Option; Every Fall, Spring & Summer) Independent reading and/or research under faculty supervision.

YOST 5301. Communicating With Adolescents About Sexuality. (3 cr.; Student Option; Every Summer)
How to communicate sensitively/effectively with adolescents and their concerned persons about sexuality in everyday life. Healthy sexual development (physical, emotional, ethical), sexual diversities. Gender/body image, disease, sexual violence, intimacy, sex in cyberspace. Prereq: [Upper div AdPy course, exper working with youth] or instructor consent

YOST 5314. Theatre Activities in Youthwork and Education. (2 cr.; Student Option; Every Spring)

Using experiential learning and theater activities to enhance creativity and imagination of youth workers and educators. Approaches to working with youth in school and agency settings. Application of experiential learning and improvisational theater theory/praxis. Prereq: 1001 or 2101

YOST 5315. Youthwork in Schools. (2 cr.; Student Option; Every Fall & Spring)

Craft of youthwork as a framework to understand life-worlds of young people and a practice to enhance healthy development. How young people often make artificially/harmfully divide their lives into “school” and “not school.” Prereq: Introductory course in education or instructor consent

YOST 5316. Media & Youth: Learning, Teaching, and Doing. (2 cr.; Student Option; Every Spring)

Youth are targets, producers, and consumers of a variety of media. This course is about understanding and learning to use a variety of these sources with young people to enhance their development and civic engagement. Prereq: 1001 or 2101 or instructor consent

YOST 5319. Understanding Youth Subcultures. (3 cr.; Student Option; Every Summer)

Young people's participation in and understanding of subcultures, life-styles, and event cultures. Place of these in young people’s identity, friendship, and life chances. Prereq: 2001 or one course each in [Anth, Soc] or instructor consent

YOST 5321. Work With Youth: Individual. (2 cr.; Student Option; Every Fall, Spring & Summer)

Basic assumptions underlying individual work with youth. Special issues and concerns of adolescents and of persons who work with them, especially those who work with youth in one-to-one interactions. Prereq: 1001 or 2002W or instructor consent

YOST 5322. Work With Youth: Families. (2 cr.; Student Option; Every Fall, Spring & Summer)

Theories and techniques of working with youth and their families. Practical methods of structural change. Developing effective communication. Decision-making and problem-solving systems. Winning the family’s cooperation. Role of professional in influencing healthy family development. Prereq: 1001 or 2002W or instructor consent

YOST 5323. Work with Youth: Groups. (2 cr.; Student Option; Every Fall & Summer)

Social group work. Adolescent group needs and associations. Group process. Working with diverse groups of youth in community, in group living situations, and in group therapy. Prereq: 1001 or 2002W or instructor consent

YOST 5401. Young People's Spirituality and Youthwork: an Introduction. (4 cr.; A-F or Audit; Every Spring)

Adolescent spirituality, its relation to working with young people. Faith/spirituality as actual/necessary aspects of healthy youth development. Research, active community-based programs. Knowledge, attitudes, and skills to meet adolescent needs/wants. Prereq: [2001, one course each in [Anth, Soc, CPsy]] or instructor consent

YOST 5402. Youth Policy: Enhancing Healthy Development in Everyday Life. (4 cr.; Student Option; Every Spring)

Youth policy as formulated in response to youth issues, problems, and community and public concerns. Policy as political response to youth panics, as indirect youthwork, and as a community’s moral compact with its young people. Perspectives are explored specific to student interests. Prereq: [2001, one course each in [PSos, PSoc, Soc]] or instructor consent

YOST 5952. Everyday Lives of Youth. (3 cr.; A-F or Audit; Every Fall)

Youth as idea/lived-reality in scholarship, public discourse, and professional practice. Building practice of work with or on behalf of youth.

YOST 5954. Experiential Learning: Pedagogy for Community and Classroom. (3 cr.; Student Option; Every Fall & Spring)

Relationship between experience and learning in community and school settings. Emphasizes intentional application of experiential learning theories/practice to educational program development.

YOST 5955. Organizational Approaches to Youth Development. (3 cr.; A-F or Audit; Every Fall)

Historical contexts, theoretical frameworks, organizational practices, and public policies that shape nonformal educational experiences of youth in community-based or school-linked settings.

YOST 5958. Community: Context for Youth Development Leadership. (3 cr.; A-F or Audit; Every Spring)

Issues/policies in family, school, and community that drive the professional practice of community-based youth work. Practical projects explore what it means to be local, to build social capital for youth, and to involve youth in community change.

YOST 5960. Seminar in Youth Development Leadership. (1-4 cr.; S-N or Audit; Every Fall, Spring & Summer)

Group study of topics/issues. Course proposal, educational program development. Students participate in co-created learning experience with a group of peers. Four-course sequence. Prereq: YDL student or instructor consent

YOST 5962. Leadership Field Experience: Youth Development. (4 cr.; S-N only; Every Fall, Spring & Summer)

Demonstration of leadership in practice. Project on youth, experiential pedagogy, and community/program settings. Focuses on public policy, advocacy, evaluation, pedagogical issues, program design, curriculum development, or applied research. Prereq: YDL student

YOST 5972. Education in the Community. (3 cr.; Student Option; Every Fall)

Models of community/education, their intersections. Twentieth century practice of education in the community in the U.S. Examples from other cultures/times.

YOST 5974. The Democratic Learning Community. (3 cr.; Student Option; Periodic Spring)

Historical/theoretical development of how leading thinkers have conceptualized education centered in the community. Colonial, Native American, transcendentalist, progressive, experiential, critical, and feminist perspectives.
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ADMINISTRATIVE POLICY

Academic Calendars: Twin Cities, Crookston, Morris, Rochester

Responsible University Officer: Executive Vice President and Provost

Policy Owner: Vice Provost and Dean of Undergraduate Education

Vice Provost and Dean of Graduate Education

Policy Contact: Stacey Tidball

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

Academic calendars will be established at least four years in advance so that students may plan their schedules and University units may plan events. Revisions to approved calendars must be made no less than two years before the date the calendar goes into effect.

A. Fall and Spring Semesters

1. There will be two semesters, each of which will include a minimum of 70 days of instructions, a maximum of 75 days of instruction, and approximately one week of final examinations (including Saturdays but not Sundays).
2. For the fall semester, the exam period will end no later than December 23.
3. Colleges and campuses may authorize courses shorter or longer than the semester, subject to the approval of appropriate college or academic unit curriculum review committees.
4. Professional schools are permitted to have calendars that vary from the requirements of this policy.

B. Summer Term

1. Departments may schedule a three-week May session following the end of the spring semester and before the summer session. No department will be obligated to offer courses or academic work during this three-week session.
2. There will be a standard eight-week summer session. No department will be obligated to offer courses or academic work during this eight-week session. Departments and programs may deliver courses over either shorter or longer periods of time and with starting and ending dates that differ from the standard eight-week and May sessions.

C. Revisions of Calendars

All calendars and any subsequent revisions or exceptions must be approved by the Faculty Senate.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Establishing an academic calendar at least four years in advance allows students to plan their degree programs and enables University units to schedule events at times that do not conflict with other key activities.

PROCEDURES

There are no procedures associated with this policy.
FREQUENTLY ASKED QUESTIONS

1. Can each of the campus set its own academic calendar?
   Yes, each campus is responsible for setting its own academic calendar. The Faculty Senate approves the University of Minnesota, Morris and University of Minnesota, Twin Cities calendars. The University of Minnesota, Duluth and University of Minnesota, Crookston calendars are transmitted to the University Senate for information only. ***The process for the University of Minnesota, Rochester is yet to be determined.

2. Can instructors assign work to students prior to the beginning of the academic term?
   No. Instructors cannot assign work until the term starts.

3. Does the University of Minnesota hold regularly scheduled classes the day before a holiday?
   Yes, scheduled classes, including evening classes, are held the day before a holiday. For example, classes are held the Wednesday evening before the Thanksgiving holiday. Refer to the current academic calendar for University holidays.

ADDITIONAL CONTACTS

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<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Stacey Tidball</td>
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<td><a href="mailto:kmyers@crk.umn.edu">kmyers@crk.umn.edu</a></td>
</tr>
<tr>
<td>Duluth Campus</td>
<td>Vickery French</td>
<td>218-726-7104</td>
<td><a href="mailto:vfrench@d.umn.edu">vfrench@d.umn.edu</a></td>
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<tr>
<td>Morris Campus</td>
<td>Darla Peterson</td>
<td>320-589-6015</td>
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</tr>
<tr>
<td>Rochester Campus</td>
<td>Laura Walker</td>
<td>507-258-8008</td>
<td><a href="mailto:ljwalker@r.umn.edu">ljwalker@r.umn.edu</a></td>
</tr>
</tbody>
</table>

DEFINITIONS

There are no definitions related to this policy.

RESPONSIBILITIES

Office of the Registrar
Submits the academic calendar proposal annually to the Faculty Senate.

Faculty Senate
Reviews and approves final University calendar.

RELATED INFORMATION

* Current Academic Calendar
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
Establishing and changing academic plan requirements

1. Academic units (departments, colleges, and campuses) have the authority to establish their curricula and the requirements, including prerequisite courses, for academic plans, subject to the final authority of the Board of Regents. Academic plans include:
   - undergraduate degrees,
   - graduate degrees;
   - professional degrees;
   - majors;
   - minors;
   - undergraduate certificates; and
   - post-baccalaureate certificates.

2. Academic units have the authority to add to or remove courses, including prerequisite courses, from academic plans. The additions or deletions of courses from the academic plan requirements must be in accordance with Board of Regents policies and in compliance with rules established by the college and campus.

3. Changes to academic plans must have an effective date, based on the start of an academic term (e.g., fall semester 2018). Changes to requirements may not be made in the middle of an academic term. Changes to academic plans should be announced far enough in advance so that students, including continuing students and prospective first-year and prospective transfer students, can plan accordingly.

4. Students must follow the requirements of the academic plan in effect during the term in which they entered the plan. Academic units may offer the choice of moving to the new requirements to currently enrolled students who have already been admitted to an existing academic plan. However, the academic unit cannot mandate a new requirement of students who are currently enrolled in the plan without having sought and received prior approval of the dean of the college or the appropriate official on a campus.

5. Academic units must clearly communicate their policies and decisions regarding new or revised requirements for academic plans to prospective and current students. This includes changes to a major, minor, or certificate program, including changes in required prerequisites.

Expiration of old credits

To ensure that students receiving a degree or certificate will be up-to-date in the discipline, an academic unit (a department or comparable unit) may decide not to accept course work towards satisfying requirements for the major, minor, or certificate if the course was taken too long ago.

Students returning from an approved leave of absence are subject to the specific conditions/requirements identified in Administrative Policy: Leave of Absence and Readmission for Undergraduates: Twin Cities, Crookston, Morris, Rochester.
Exclusions
This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Departments, colleges and campuses are best suited to determine curricula and requirements for majors and minors, for graduate and professional degrees, and to add or remove course offerings. It is in students’ best interests if changes in requirements do not occur frequently or arbitrarily, and students are provided with advance notice of such changes.

This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.

PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

1. What is a change in major requirements?
   The academic department(s) responsible for a major may add, delete, or modify the published degree requirements for a major in that department. As examples, required courses may be added or deleted, or changed; admissions requirements for a major may be changed.

2. What are some examples of the levels of academic unit authority?
   A department, or a group of departments working collaboratively, has the authority to establish the course requirements for a major, minor, or certificate program, including prerequisite requirements; for example, the particular courses required to receive an M.A. degree in History.

   A college has the authority to establish college-wide requirements for particular types of academic programs, for example, a second language requirement for a B.A. degree granted within that college.

   A campus has the authority to establish campus-wide requirements for groups of academic programs. Some examples are a first-year writing requirement for all undergraduate degrees, the minimum number of credits required for a baccalaureate degree, and a minimum GPA requirement for graduation.

3. How does expiration of old credits show on a student’s transcript?
   "Expiration of old credit" refers to coursework a student has completed too long ago for that subject matter to be current in the discipline. The academic unit may determine that the student must take additional, current coursework in that subject matter in order to fulfill the requirements for an academic program. The prior credits are not removed from the student’s transcript; however, they do not count toward satisfying requirements for the particular major, minor, or certificate.

ADDITIONAL CONTACTS
DEFINITIONS

Academic Program
Undergraduate, graduate, and professional degrees, majors, minors, and certificates that appear on official University transcripts.

Academic Major
A student's main field of specialization during his or her undergraduate or graduate studies. The major is recorded on the student's transcript.

Academic Minor
A student's declared secondary field of study or specialization during his or her undergraduate or graduate studies. A minor typically consists of a set of courses that meet specified guidelines and is designed to allow a sub-major concentration in an academic discipline or in a specific area in or across disciplines. The minor is recorded on the student's transcript.

Certificate
A particular set of courses or coursework that typically addresses new knowledge or practice areas emerging from technological, social, or economic changes to which particular professions or occupations must adjust. The certificate is recorded on the student's transcript.

Curriculum
The set of courses offered by a unit.

RESPONSIBILITIES

Academic Department(s) Responsible for the Academic Program
- Maintain complete, up-to-date descriptions of the requirements for its academic programs, including all prerequisite courses
- Determine requirements for admission to particular academic programs/plans.
- Maintain up-to-date curricular offerings, regularly scheduled, in order to allow students to make timely progress toward completing an academic program.
- Provide full and timely information regarding course content and scheduling.
- Clear students for graduation, certifying that they have met the requirements for the major, minor, or certificate.
- Review and provide final approval for requests for waivers of particular requirements for the major, minor, or certificate.

College/Campus
- Maintain up-to-date descriptions of the collegiate and campus requirements for academic programs within that college and campus.
- Review and provide final approval for requests for waivers of particular academic program requirements at the college/campus level.

Executive Vice President and Provost
- Review and recommend approval of academic proposals for Board of Regents consideration and final action.

Board of Regents
- Review and provide final approval of proposals for new, changed, or discontinued academic programs/plans.

RELATED INFORMATION

- Administrative Policy: Adding, Changing or Discontinuing Academic Plans
- Administrative Policy: Leave of Absence and Readmission for Undergraduates: Twin Cities, Crookston, Morris, Rochester
- Higher Learning Commission, Criteria and Requirements for Accreditation

HISTORY
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
Addressing Student Academic Complaints

POLICY STATEMENT

Each campus will develop and maintain processes for the good faith review and resolution of student academic complaints that will:

- encourage informal resolution of alleged violations at the lowest unit level;
- allow for a formal resolution mechanism if not resolved informally; and
- provide for appeal to a final decision maker.

The final decision following appeal is not appealable further within the University.

Scope

Student academic complaints are brought by students regarding the University's provision of education and academic services affecting their role as students and must be based on a claimed violation of a University rule, policy, or established practice.

Student academic complaints do not include student complaints regarding:

- their University employment
- disciplinary action under Board of Regents Policy: Student Conduct Code
- grades
- University admission decisions

Relief Available

Resolution of complaints under this policy may include student reinstatement or other corrective action for the benefit of the student, including refunds, but may not award monetary damages, or direct disciplinary action against any employee of the University.

This policy does not limit the University's right to change rules, policies, or practices related to the provision of academic services and education.

REASON FOR POLICY

To implement Board of Regents Policy: Conflict Resolution Process for Student Academic Complaints, and to comply with law, including Title IX. This policy provides a framework for resolving student academic complaints that is simple and fair and allows for both informal and formal resolution of conflicts. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.

PROCEDURES

- Conflict Resolution Process for Student Academic Complaints: Twin Cities
- UMC Student Academic Grievance Procedures

FORMS/INSTRUCTIONS
FREQUENTLY ASKED QUESTIONS

1. I am a student with a complaint, and I don’t know where to direct it. Where can I get information and advice?

   The University of Minnesota takes student complaints and grievances seriously and has processes in place to ensure that complaints and addressed appropriately and in a timely manner. Helpful resources and information about the channels for student complaints are provided on the One Stop student services web site at http://onestop.umn.edu/contact_us/complaints_and_grievances.html.

2. I don’t agree with the grade I received from my instructor. Is there anything I can do?

   While grades are not subject to complaint, you are entitled to an explanation for the grade assigned. If you are not able to get an explanation for the grade from your instructor, consult the appropriate director for undergraduate students or department chair. Students also may wish to seek assistance from the Student Conflict Resolution Office. An instructor's judgment is assigning a grade is not a subject for a formal hearing, and can only be reviewed through these informal processes.

3. I have been dismissed by my college for academic reasons. What steps can I take to challenge the dismissal? What is my enrollment status while the dispute is pending?

   If your college or program has an appeal process for dismissals, you must follow that process before filing a student academic complaint. Your enrollment continues while the appeal is pending. If your appeal is denied, your enrollment ends and you may file a student academic complaint at that point. If your academic complaint is successful, you then would be reinstated as a student.

4. A student has a complaint about sexual harassment by a University employee. Where should the student go?

   A student with a complaint of sexual harassment by a University employee (1) can seek assistance from the campus equal opportunity office (see Administrative Policy: Sexual Harassment) or (2) can bring a student academic complaint under this policy and procedure, where applicable. If the student chooses the latter, the University will provide training for resolving the complaint under this procedure to all administrators and other staff who are authorized to investigate or resolve student complaints of sexual harassment. Colleges can contact the Office of General Counsel (612-624-4100) or the campus's equal opportunity office to arrange the training.

ADDITIONAL CONTACTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
</tr>
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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Jennifer Reckner</td>
<td>612-624-3970</td>
<td><a href="mailto:reckn001@umn.edu">reckn001@umn.edu</a></td>
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<td></td>
<td>(undergraduate)</td>
<td>612-625-2815</td>
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</tr>
<tr>
<td></td>
<td>Karen Starry (graduate)</td>
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<tr>
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<td>Rochester</td>
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<td><a href="mailto:lcarrell@r.umn.edu">lcarrell@r.umn.edu</a></td>
</tr>
</tbody>
</table>

DEFINITIONS

Student Academic Complaint
Complaints brought by students regarding the University's provision of academic services and education affecting their role as students.
Sexual Harassment
Unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature when (1) submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic advancement in any University activity or program; (2) submission to or rejection of such conduct by an individual is used as the basis of employment or academic decisions affecting this individual in any University activity or program; or (3) such conduct has the purpose or effect of unreasonably interfering with an individual's work or academic performance or creating an intimidating, hostile, or offensive work or academic environment in any University activity of program.

RESPONSIBILITIES

Academic Complaint Officer
Comply with the Conflict Resolution Process for Student Academic Complaints procedures.

Chancellor
Ensure that campus has processes consistent with policy.

College
Schedule a hearing should the Academic Complaint Officer refer the matter to a College Hearing Panel.

Office of the General Counsel
Provide legal advice to the University and provide legal representation to the University respondent when the student is represented by a lawyer.

Executive Vice President and Provost
Ensure that campus has processes consistent with policy.

RELATED INFORMATION

- Board of Regents Policy: Conflict Resolution Process for Student Academic Complaints
- Higher Learning Commission, Criteria and Requirements for Accreditation

HISTORY

Amended:
August 2014 - Comprehensive Review. Minor Revision. Edits were made to clarify existing procedures and action steps.

Amended:
April 2009 - Added question and answer to FAQ about what to do when Students have a complaint about sexual harrassment by University Employees.

Effective:
November 2008
POLICY STATEMENT

The University establishes minimum admission requirements for master's and doctoral degrees. Colleges and graduate programs may set additional or more stringent requirements (e.g., an undergraduate GPA standard). Colleges and graduate programs must publish and maintain their admission requirements.

Graduate programs make all admission decisions. Colleges issue the official confirmation of admission decisions to applicants.

I. General Admission Requirements for Degree Seeking Students
   a. Applicants must hold a bachelor’s degree from a regionally accredited U.S. college or university or a comparable degree from a recognized college or university in another country.
      i. Students from any University undergraduate program may be admitted and may matriculate in a graduate program while simultaneously completing their baccalaureate work, with the program’s permission, if they have no more than seven semester credits or two courses remaining to complete their bachelor’s degree (including liberal education and distribution requirements).
         If the student does not complete the work for the baccalaureate degree by the end of the second term of enrollment in the graduate program, a hold is placed on the student's graduate registration until the graduate program determines that the student has completed the baccalaureate degree.
      ii. Current University students in officially approved integrated bachelor's/master’s degree programs may be admitted to the master’s program prior to the award of the bachelor’s degree if allowed under the admission requirements of the integrated program.
   b. International applicants must meet English language proficiency requirements specified by each program and college. Colleges and programs must publish and maintain their requirements.
      International applicants who have completed 24 quarter credits/16 semester credits within the past 24 months in residence as a full-time student at an accredited U.S. college or university or University-approved foreign country or institution are exempt from demonstrating language proficiency or meeting proficiency standards.
   c. Applicants must provide unofficial transcripts from all post-secondary institutions attended. If they are admitted, applicants must provide official transcripts before they register and enroll at the University.

II. Conditional Admission

Applications may be admitted contingent upon satisfying specific requirements (conditional admission). Graduate programs that choose to admit applicants conditionally must ensure that these requirements are communicated in the notification of admission. A timeframe for satisfying the requirements must be specified. If the specified requirements are not satisfied before the expiration of the timeframe, admission is revoked.

III. Admission for Graduate Professional Development

Colleges and graduate programs may offer admission for graduate professional development to applicants who wish to enroll in a graduate program but who may not wish to complete a graduate degree. Applicants for graduate professional development must apply and be admitted to the college and program in which they plan to pursue coursework. Applicants for graduate professional development must meet the admission requirements specified in I.a., b. and c.

IV. Concurrent or Sequential Graduate Degrees

Applications who wish to pursue degrees concurrently in different graduate programs and/or different colleges must apply and be admitted to each college and program in which they plan to pursue a degree.
Applicants who have already been awarded a University graduate degree or a post-baccalaureate certificate and are seeking to obtain an additional degree must apply and meet the admissions criteria for their new graduate program and/or degree objective.

V. Deferred Admission
Admitted applicants may request, from the graduate program, a deferral of their admission to graduate study for up to one full academic year without re-applying. If the deferral is approved and matriculation does not occur within the one-year period, the applicant must re-apply.

VI. Acceptance of Financial Support
In the event that a college or graduate program offers an applicant financial support, the student may not be compelled by the college or graduate program to accept the financial support offer prior to April 15 of the year of admission. [Council of Graduate Schools’ Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants]

VII. University Employees
In order to protect against potential conflict of interest, University employees holding academic appointments above the rank of instructor or research fellow must obtain permission from their college and supervisor or department chair to accept an offer of admission to pursue a University master’s or doctoral degree in the same field, or a closely related field, in which they are also employed.

VIII. Exceptions
a. Graduate programs may request exceptions to I.a. from their collegiate dean, or the unit’s chief academic officer (or designee).
b. This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

REASON FOR POLICY
The University’s admission standards are highly selective and competitive, and reflect the institution’s identity as a leading public and land grant research university. Decisions on admission should ensure that students admitted to a program have appropriate preparation for graduate work in a particular discipline and at the intended degree level.

PROCEDURES

- Use of the Central Graduate Admissions Application System

FORMS/INSTRUCTIONS

- UM 1770 - Request for Exception: Admitting Students Who Do Not Hold a U.S. Bachelor’s or Comparable Degree
- UM 1768 - Request for Exception: Use of the University’s Central Graduate Admission Application System for Admission, Readmission and Changes to Master’s or Doctoral Degree Objectives
- University of Minnesota Central Graduate Admission Application System

APPENDICES

- Template Form: Request for Academic Employee to Accept Admission to a University Master’s or Doctoral Program

FREQUENTLY ASKED QUESTIONS

- Admission for Master’s and Doctoral Degrees FAQ

ADDITIONAL CONTACTS
DEFINITIONS

Recognized college or university
A college or university in another country that is comparable to a regionally accredited U.S. college or university. This information is published and updated by organizations such as NAFSA (National Association for Foreign Student Affairs) and AACRAO (American Association of Collegiate Registrars and Admissions Officers) and is available through the University’s graduate admissions office.

RESPONSIBILITIES

Colleges

- Publish and maintain admission requirements.
- Issue the official confirmation of admission.
- Ensure that all information relevant to enrollment (e.g., legal, terms of financial support, if awarded) is communicated to the student in the collegiate confirmation of admission.
- Review letters generated by the University’s central graduate admission application system and letters sent by graduate programs to ensure conformity with collegiate policy and University policy governing financial support.
- Request exceptions from the Executive Vice President and Provost (or designee) to the requirement to use the University’s central graduate admission application system for reasons such as accreditation requirements or national admissions practices.

Programs

- Publish and maintain admission requirements.
- Provide timely communication with applicants throughout the admissions process.
- Request exceptions from their collegiate dean, or the unit’s chief academic officer (or designee) to the requirement that applicants hold a bachelor’s degree from an accredited U.S. college or university or an equivalent degree from a recognized college or university in another country.

RELATED INFORMATION

- AACRAO (American Association of Collegiate Registrars and Admissions Officers)
- Council of Graduate Schools’ Resolution Regarding Graduate Scholars, Fellows, Trainees, and Assistants
- List of English-speaking countries and universities exempted from English proficiency testing.
- NAFSA (National Association of International Educators)
- Office of Human Resources Academic Job Codes and Titles

HISTORY

Effective:
May 2012 - New Policy, Comprehensive Review.
POLICY STATEMENT

The proposed revision of this policy has completed its 30-day review and the policy owner is currently considering the feedback received to determine what changes should be made to the proposed version.

This policy governs the application of graduate credit to satisfy the requirements for the following degrees:

- Master’s Plan A degrees
- Master’s Plan B degrees
- Master’s Plan C degrees
- Doctoral degrees

1. Applying credits from a baccalaureate degree

Graduate credits taken before the award of a baccalaureate degree may not be counted toward a graduate degree.

2. Credits-in-common between University graduate degrees

   a. A maximum of eight graduate course credits may be counted in common between two University master's degrees.
   b. Approved graduate course credits may be counted in common between a University doctoral and master’s degree in the same program.
   c. Plan A thesis (xxxx8777) and doctoral degree thesis (xxxx8888) credits in the same program:
      - Can be counted toward either the Plan A master’s or the doctoral degree thesis credit requirement, but not both.
      - may be used to meet the Plan B master's project credit requirement.
   d. Plan B Project credits may count only toward the Plan B master's degree requirements.

3. Transferring graduate course credits from outside the University

Graduate course credits earned at other accredited institutions may be transferred to master's or doctoral degree plans subject to approval by the University graduate program and the limits described below. In the case of a transfer from a non-United States institution, graduate course credits to be transferred must have been earned in a program judged by the University graduate program to be comparable to a graduate degree program of a regionally accredited institution in the United States. Transfer of thesis credits is not allowed.

   - For master’s degrees – A minimum of 60% of total course credits (not including thesis credits) required for a specific master’s degree must be taken at the University. Transferred credits can include a maximum of 12 graduate course credits taken as non-degree seeking or non-admitted status. Transfer of thesis credits is not allowed.
   - For doctoral degrees – Individual programs may determine, on a case-by-case basis, how many transfer course credits doctoral students may apply toward their degree requirement. However, doctoral students must take a minimum of 12 course credits at the University. Transferred credits can include a maximum of 12 graduate course credits taken as non-degree seeking or non-admitted status. Transfer of thesis credits is not allowed.

4. Applying graduate credits across University graduate programs

   a. Graduate course credits earned while enrolled in one University graduate program may be applied to another University graduate
The number of graduate course credits applied is determined by the graduate program to which the student is applying.

- Earned master's thesis credits (8777) and doctorate thesis credits (8888) in one University graduate program cannot be applied toward the thesis credit requirement for another University graduate program.

- A maximum of 12 graduate course credits from other University registration categories, such as non-degree seeking or non-admitted students, may be considered for transfer once the student is admitted and enrolled in a graduate program.

- Graduate programs may accept University 4000-level course credits as graduate courses. A maximum of nine 4000-level course credits may be used to satisfy the doctoral or master's course credit requirement, but graduate programs may impose a lower maximum.

**Exceptions**

For approved joint or dual degree programs, items 1, 2a, and 2b do not apply. Such programs may formulate more specific requirements to regulate instances of courses-in-common arising as a result of the special nature of joint/dual degree curricula.

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**Reason for Policy**

This policy provides the framework for applying graduate credits toward degree requirements under various scenarios. Graduate programs have the authority to accept or reject any graduate course credits that can be applied to a student's current degree plan.

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**Procedures**

There are no procedures associated with this policy.

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**Forms/Instructions**

To apply graduate credits from another college or university to a University graduate degree, use the form and follow the procedures specified by your college. For students in programs formerly in the Graduate School, use the [Degree Program Form](#) and follow the instructions included on the form.

*(Note: The development of automated procedures to replace the Graduate School Degree Program Form is ongoing. Until students, faculty, and staff are notified that any new procedures are in place, students will continue to use the existing form.)*

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**Appendices**

There are no appendices associated with this policy.

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**Frequently Asked Questions**

- [Application of Graduate Credits to Degree Requirements FAQ](#)

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**Additional Contacts**

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<tr>
<th>Subject</th>
<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Karen Starry</td>
<td>612-625-2815</td>
<td><a href="mailto:starry@umn.edu">starry@umn.edu</a></td>
</tr>
<tr>
<td>University of Minnesota - Duluth Questions</td>
<td>Erik Brown</td>
<td>218-726-8891</td>
<td><a href="mailto:etbrown@umn.edu">etbrown@umn.edu</a></td>
</tr>
</tbody>
</table>
DEFINITIONS

**Master's Plan A**
Master's degree programs that require a thesis for degree completion

**Master's Plan B**
Master's degree programs that substitute additional coursework and special projects for the thesis

**Master's Plan C**
Master's degree programs that are coursework only which provide an alternative structure for degree completion, such as a culminating experience in the form of a capstone course and/or paper

**Plan B Project Credits**
Credits taken by the students in relation to their Plan B project as part of the degree requirements

RESPONSIBILITIES

There are no specified responsibilities associated with this policy.

RELATED INFORMATION

There is no related information associated with this policy.

HISTORY

Effective:
September 2011 - New Policy. Comprehensive Review. Addresses the handling of credit transfers and credits-in-common. Specifies that graduate programs may allow up to a maximum of nine 4000-level course credits, unless the specific graduate program imposes a lower maximum. Allows for Plan A thesis credits to count toward the doctoral degree in the same field if the thesis credits were not applied to the master's degree. Continues to limit the number of credits for the master's and doctoral degrees that may be taken as a non-degree or non-admitted student. Stipulates a minimum number of course credits that doctoral students must take at the University.
POLICY STATEMENT

1. Every graduate program must have a Director of Graduate Studies, appointed by the collegiate dean on the Twin Cities campus or chief academic officer (or designee) on a system campus after consultation with program faculty. For All-University programs, a Director of Graduate Studies must be provided on each campus on which a program is offered.

2. A tenured or tenure-track faculty member with an earned doctorate or designated equivalent in an appropriate field from an accredited institution is eligible to serve as Director of Graduate Studies or co-Director of Graduate Studies.
   a. Collegiate deans/chief academic officers or their designated representatives at the collegiate level may, with the approval of the Provost, assign the role of Director of Graduate Studies (or co-Director of Graduate Studies) to an individual who is not otherwise eligible under this standard. The Provost may delegate the approval responsibility to the Vice Provost and Dean of Graduate Education.

3. Collegiate units may develop additional criteria consistent with this policy.

4. Each college must have a set of publicly available written statements regarding the position of Director of Graduate Studies, which will include:
   a. a description of the director’s responsibilities and reporting lines;
   b. the standards for selection and evaluation of the director;
   c. the process for selecting the director and approving his or her appointment, including effective involvement of program faculty; and
   d. the process for removing a director, including consultation with program faculty where appropriate.

5. All programs not housed within a single collegiate unit must specify in the program's Memorandum of Understanding which collegiate dean will appoint the Director of Graduate Studies (or co-Director of Graduate Studies) and what process will be used to nominate program faculty for the position.

Exceptions


REASON FOR POLICY

A faculty Director of Graduate Studies represents the program to faculty governance bodies, takes a leadership role in maintaining program quality and effectiveness, and communicates with collegiate deans and/or the Graduate School about the program's larger concerns.

PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS
APPENDICES

- Director of Graduate Studies Handbook: Suggested Components
- Typical Roles and Responsibilities of the Director of Graduate Studies

FREQUENTLY ASKED QUESTIONS

1. Is a faculty member who earned a Ph.D. degree at a non-U.S. university that is judged to be equivalent to an accredited institution in the U.S. eligible to serve as a DGS?
   Yes.

2. Do minor-only programs require a DGS?
   Yes. The requirements for DGS pertain to both degree-granting programs and free-standing minors.

ADDITIONAL CONTACTS

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<td>612-625-2815</td>
<td><a href="mailto:starry@umn.edu">starry@umn.edu</a></td>
</tr>
</tbody>
</table>

DEFINITIONS

All-University Programs
Programs that have been approved by the Board of Regents for joint offering by two or more campuses. Such programs have substantial involvement from all participating campuses in such matters as oversight and administration, recruitment and admission of students, course development and course offering, faculty and student participation, commitment of financial resources, student funding opportunities and related student support, and other aspects of the academic program operation.

RESPONSIBILITIES

Collegiate Units
Provide orientation for new Directors of Graduate Studies, where possible. Develop a set of publicly available written statements regarding the position of the Director of Graduate Studies as outlined in policy item 4. Develop a plan to ensure that the responsibilities of Directors of Graduate Studies are being covered for the entire calendar year.

Collegiate Deans
Appoint Director of Graduate Studies after consultation with program faculty. Appoint an acting DGS, in consultation with program faculty, to cover an absence or temporary vacancy.

Director of Graduate Studies (DGS)
Serves as the coordinator of graduate studies within a program. Together with the graduate program faculty and department and collegiate leadership, the DGS shares responsibility for guiding and improving graduate education within the program(s) under his or her jurisdiction. The DGS is the liaison among the graduate students, program faculty, and the college and Graduate School administrations. DGS is also responsible for understanding and complying with University and collegiate policies that govern or have an impact on the graduate program and its students.

RELATED INFORMATION

There is no related information associated with this policy.
Amended:
February 2016 - Comprehensive Review, Minor Revision. Specifies that the provost may delegate approval responsibility. Expanded on the responsibilities for the collegiate units. Minor clarifications to the policy.

Amended:
April 2012 - Policy now applies University Wide (there is no longer an exclusion for the Duluth campus).

Effective:
September 2011 - New Policy, Comprehensive Review. Requires every graduate program to have a director of graduate studies (DGS). Continues the requirement that only tenured or tenure-track faculty are eligible to serve as a DGS, unless an exception by the Provost or designate has been granted.

University Policy Program
350-2 McNamara Alumni Center, Minneapolis, MN 55455 - P: 612-624-8081, policy@umn.edu

Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

This policy governs appointments to the following graduate examination committees:

- Master's Final Examination Committees
- Doctoral Preliminary Oral Examination Committees
- Doctoral Final Oral Examination Committees

Collegiate deans or their designated representatives at the collegiate level must review the final graduate examination committee list for approval and record all graduate examination committee assignments.

I. Eligibility to Serve on Master's Final Examination Committees

a. Any University of Minnesota (University) tenured or tenure-track faculty member who holds an earned doctorate or designated equivalent in an appropriate field from an accredited institution may serve in any role on master’s final examination committees, including advisor.

b. i. Other University faculty (including adjunct faculty) or staff who hold an earned doctorate or designated equivalent in an appropriate field from an accredited institution but who do not hold a tenured or tenure-track appointment may serve on master’s final examination committees, including serving as advisor.
   ii. All such appointments must be reviewed individually at the collegiate level according to a review process and criteria specified by the collegiate unit.

c. Emeritus faculty and tenured or non-tenured faculty who have left the University may continue with master’s final examination committee assignments that were active at the time of their departure, including serving as advisor, if the faculty member and the student both agree to the continuation in writing.

d. Experts outside of the University, whether or not they hold faculty appointments elsewhere, may serve on master’s final examination committees in any role except as advisor. All such appointments must be reviewed individually at the collegiate level according to a review process and criteria specified by the collegiate unit.

e. Individuals having a nonacademic relationship with the candidate may not serve on that candidate’s master’s final examination committee, as it would create a conflict of interest.

f. Individuals working toward a graduate degree at the University (including faculty working toward an additional degree) may not serve on a master’s final examination committee unless an exception has been granted by the Vice Provost and Dean of Graduate Education.

g. Collegiate deans or their designated representatives must review for approval all assignments as advisor.

II. Eligibility to Serve on Doctoral Preliminary Oral Examination Committees

a. Any University tenured or tenure-track faculty member who holds an earned doctorate or designated equivalent in an appropriate field from an accredited institution may serve in any role on doctoral preliminary oral examination committees, including advisor.

b. Other University faculty (including adjunct faculty) or staff who hold an earned doctorate or designated equivalent in an appropriate field from an accredited institution may serve on doctoral preliminary oral examination committees. All such appointments must be reviewed individually at the collegiate level according to a review process and criteria specified by the collegiate unit.

c. Only University faculty members (including adjunct faculty) may serve as advisors. Collegiate deans or their designated representatives must review for approval all assignments as advisor.
d. Emeritus faculty and tenured or non-tenured faculty who have left the University may continue with doctoral preliminary oral examination committee assignments that were active at the time of their departure, including serving as advisor, if the faculty member and the student both agree to the continuation in writing.

e. Experts outside of the University, with or without faculty appointments elsewhere, may serve on doctoral preliminary oral examination committees. All such appointments must be reviewed individually at the collegiate level according to a review process and criteria specified by the collegiate unit.

f. Individuals having a nonacademic relationship with the candidate may not serve on that candidate's doctoral preliminary oral examination committee, as it creates a conflict of interest.

g. Individuals working toward a graduate degree at the University (including faculty working toward an additional degree) may not serve on a doctoral preliminary oral examination committee unless an exception has been granted by the Vice Provost and Dean of Graduate Education.

III. Eligibility to Serve on Doctoral Final Oral Examination Committees

a. Any University tenured or tenure-track faculty member who holds an earned doctorate or designated equivalent in an appropriate field from an accredited institution may serve in any role on doctoral final oral examination committees, including advisor.

b. The chair of the doctoral final oral examination committee may not be the candidate's advisor or co-advisor. Collegiate deans or their designated representatives must review for approval all assignments as chair of the doctoral final oral examination committee.

c. Every doctoral final oral examination committee must include at least two tenure-track or tenured University faculty members who hold earned doctorates or designated equivalents in appropriate fields from an accredited institution. At least one of the faculty members must be tenured. There are no exceptions to this requirement.

d. Other University faculty (including adjunct faculty) or staff who hold an earned doctorate or designated equivalent in an appropriate field from an accredited institution may serve on doctoral final oral examination committees. All such appointments must be reviewed individually at the collegiate level according to a review process and criteria specified by the collegiate unit.

e. Only University faculty members (including adjunct faculty) may serve as advisors. Collegiate deans or their designated representatives must review for approval all assignments as advisor.

f. Emeritus faculty and tenured or non-tenured faculty who have left the University may continue with doctoral final oral examination committee assignments that were active at the time of their departure, including serving as advisor, if the faculty member and the student both agree to the continuation in writing.

g. Experts outside of the University, with or without faculty appointments elsewhere, may serve on doctoral final oral examination committees in any role except as advisor or chair. All such appointments must be reviewed individually at the collegiate level according to a review process and criteria specified by the collegiate unit.

h. Individuals having a nonacademic relationship with the candidate may not serve on that candidate's doctoral final oral examination committee, as it creates a conflict of interest.

i. Individuals working toward a graduate degree at the University (including faculty working toward an additional degree) may not serve on a doctoral final oral examination committee unless an exception has been granted by the Vice Provost and Dean of Graduate Education.

IV. Exceptions

Collegiate deans or their designated representatives at the collegiate level may authorize assignments to master's and doctoral committees that do not fully conform to policy statements Ia, Ibi, Ic, IIa, IIb, IIc, IIId, IIIa, IIIId, IIIe, and IIIff. An exception request, as well as the decision to grant it or deny it, must be in writing.

V. Documentation

Each college must have a set of publicly available standards, processes, and forms for appointments to all roles on graduate examining committees, with special attention to requirements for advisors and for chairs of the doctoral final oral examination committee.

VI. Local Policies

Collegiate units may develop more specific local policies so long as they conform to the policy statements listed above.

REASON FOR POLICY

To ensure quality, consistency, and fairness in standards and practices for final examinations of master's candidates and preliminary and final examinations of doctoral candidates.
ADMINISTRATIVE POLICY

Awarding Posthumous Degrees

Responsible University Officer: Executive Vice President and Provost

Policy Owner: Director, Office of the Registrar

Policy Contact: Stacey Tidball

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

The University may grant undergraduate, graduate and professional degrees posthumously. If a college determines that a deceased student has completed sufficient coursework to be awarded a degree, the college (Twin Cities only) or chief academic officer (or designee) on each system campus has the authority to grant the degree posthumously. Graduate students must have completed enough work toward the thesis or dissertation, if required for the degree.

REASON FOR POLICY

To recognize the academic achievement of students who have died, and to empower colleges and Vice Chancellors to award degrees posthumously where the student has completed enough of the planned degree program.

PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

There are no FAQs associated with this policy.

ADDITIONAL CONTACTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
</tr>
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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Stacey Tidball</td>
<td>612-626-0075</td>
<td><a href="mailto:tidball@umn.edu">tidball@umn.edu</a></td>
</tr>
<tr>
<td>Policy Information</td>
<td>Susan Van Voorhis</td>
<td>612-625-8098</td>
<td>612-626-1754 (fax)</td>
</tr>
</tbody>
</table>
DEFINITIONS

Posthumous:
Following or occurring after one's death.

RESPONSIBILITIES

Registrar
- Notify departments and colleges of this policy.
- Establish individual campus procedures for recording the posthumous degree.
- Post the degree to the student's record.
- Work with the department or college to facilitate appropriate presentation of the degree at the next commencement ceremony or presentation to the student's family in an appropriate setting.

College (Twin Cities)
- In consultation with the academic department of the degree, determine if posthumous degree should be awarded.
- Notify the Office of the Registrar of posthumous degree granting for diploma. Send a copy of the request and approval to the Registrar, and place a copy in the student's file.
- Contact the Office of the Registrar to determine the correct information for posting the degree and issuing the diploma.
- Facilitate appropriate presentation of the degree
- As a courtesy, notify the Executive Vice President and Provost of the awarding of the posthumous degree.

Collegiate Office, (Crookston, Duluth, Morris & Rochester)
- In consultation with the academic department of the degree, make a request of the campus Chief Academic Officer that the degree be awarded.

Chief Academic Officer (Crookston, Duluth, Morris & Rochester)
- In consultation with the college requesting the posthumous degree, determine if posthumous degree should be awarded.
- Notify the Office of the Registrar of posthumous degree granting for diploma. Send a copy of the request and approval to the Registrar, and place a copy in the student's file.
- Contact the Office of the Registrar to determine the correct information for posting the degree and issuing the diploma.

<table>
<thead>
<tr>
<th>Region</th>
<th>Academic Officer</th>
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</thead>
<tbody>
<tr>
<td>Crookston</td>
<td>Vice Chancellor for Academic Affairs</td>
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<tr>
<td>Duluth</td>
<td>Executive Vice Chancellor for Academic Affairs</td>
</tr>
<tr>
<td>Morris</td>
<td>Vice Chancellor for Academic Affairs</td>
</tr>
<tr>
<td>Rochester</td>
<td>Vice Chancellor for Academic Affairs and Student Development</td>
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</tbody>
</table>

RELATED INFORMATION

There is no related information associated with this policy.
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

Each campus is responsible for establishing a standard class schedule and class period in order to maximize classroom utilization and student access to courses. These standards apply to courses that are scheduled during an academic term. Academic terms are defined by the academic calendars set for each campus.

A. Standards for Class Schedules

1. Each campus of the University must adopt a standard class schedule with an appropriate change period between classes. Although the practice is discouraged, start times and/or class periods that vary from the standard schedule are permitted, subject to campus procedures for approval of such variances.

2. Departments are encouraged to schedule classes so that classroom space is used to the maximum extent practicable while ensuring that students have reasonable access to courses.

3. Classes may not be held on official University holidays except with the approval of the appropriate dean.

4. Class schedules, and information on non-conforming classes, will be reported annually to the Senate Committee on Educational Policy by the office on the campus responsible for class scheduling.

B. Twin Cities Campus Standard Schedule and Class Periods

1. Monday - Friday Standard Class Periods

   There are three standard class periods, described below and set out in the table following:

   a. The standard "A" class is 50 minutes, with a 15-minute change period between classes. The first class of the day starts at 08:00 on the Minneapolis campus and at 08:30 on the St. Paul campus. Classes meeting for two or more periods (such as labs), must start and end according to this schedule.
   
   b. The standard "B" class is 75 minutes, with a 15-minute change period between classes. The first class of the day starts at 08:15 on the Minneapolis campus and at 08:45 on the St. Paul campus. Such classes will be scheduled only on Tuesdays and Thursdays.
   
   c. The standard "C" class is 75 minutes, with a 15-minute change period between classes. The first class of the day starts at 08:15 on the Minneapolis campus and at 08:45 on the St. Paul campus. Such classes will only be scheduled Monday/Wednesday, Wednesday/Friday, or Monday/Friday.

2. Classes designed exclusively for graduate and/or post-baccalaureate professional students on the Twin Cities campus are exempt from the scheduling requirements in this policy, if held in a room under the control of the department. Clinically based Academic Health Center (AHC) courses in AHC rooms may be scheduled at non-standard times on the Twin Cities campus. Departments should schedule classes so that students have reasonable access to courses inside and outside the department.

3. Distribution of meeting times

   Colleges must distribute classes evenly throughout the day. Non-compliant colleges must change class meeting times to meet distribution requirements.

4. Distribution of meeting patterns

   Colleges are permitted to schedule a maximum of 50% of their classes using a Tuesday/Thursday meeting pattern, with the remaining classes using a combination of Monday/Wednesday/Friday meeting patterns. Non-compliant colleges must change class meeting times to meet distribution requirements.
5. **Distribution of enrollments**

Colleges must distribute enrollments throughout the day (i.e., across class hours) and throughout the week (i.e., day patterns).

6. **Distribution calculations**

Distributions are calculated by summing the number of minutes for each meeting pattern occurring in a standard "A" class meeting time on each weekday, Monday through Friday.

Colleges are permitted to schedule up to 3% of departmental classes during any individual time period (e.g., period VII on Thursday or period II on Monday) on any given weekday. Meeting patterns for combined sections are calculated once and are attributed to the parent section’s department.

7. **Standard Class Meeting Times**

<table>
<thead>
<tr>
<th>Period</th>
<th>Minneapolis Campus</th>
<th>St. Paul Campus</th>
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<tbody>
<tr>
<td></td>
<td>A Times (M T W Th F)</td>
<td>B Times (T Th only)</td>
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<tr>
<td>I</td>
<td>08:00 - 08:50</td>
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<td>II</td>
<td>09:05 - 09:55</td>
<td>09:45 - 11:00</td>
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<td>VI</td>
<td>13:25 - 14:15</td>
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<td>VII</td>
<td>14:30 - 15:20</td>
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<tr>
<td>VIII</td>
<td>15:35 - 16:25</td>
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<tr>
<td>IX</td>
<td>16:40 - 17:30</td>
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</tbody>
</table>

8. Colleges are permitted to request classes during non-standard times. These requests must be approved by the college associate dean and the Office of Classroom Management; in case of a disagreement, final authority to grant a variance rests with the Executive Vice President and Provost's office.

9. **Standard Scheduling Rules for Classes Carrying 1-5 Credits.**

The following rules do not apply to the length of labs, film classes, performing arts classes, or specialized class components, but such classes must begin according to the schedule in Section 1.

Neither these rules nor those in Section 1 apply to courses administered online or directed study, directed readings, or directed research courses, but these courses must comply with Administrative Policy: Expected Student Academic Work per Credit.

**One Credit Classes**

- Meet for one standard hour per week, begin at a standard "A" class meeting time, and meet for one class period.
- Meet twice per week, and follow the rules for two-credit classes; or
- Meet three times per week, and follow the rules for three-credit classes.
Two Credit Classes

- Meet twice per week, begin at a standard "A" class meeting time, and meet for one class period, or
- Meet once per week, begin at a standard "A" class meeting time, and last two class periods.

Three Credit Classes

- Meet three times per week on MWF, begin at a standard "A" class meeting time, and meet for one class period; or
- Meet twice per week, use the standard "B" class meeting times, and meet on Tuesdays and Thursdays only; or
- Meet twice per week, use the "C" class meeting times, and meet on MW, WF, MF only; or
- Meet once per week, use the standard "A" start time, and meet on F.

Four Credit Classes

- Meet four times per week, begin at a standard "A" class meeting time, or
- Meet twice per week for two hours, begin at a standard "A" time, and last two class periods; or
- For lecture/laboratory or lecture/discussion courses with three hours of lecture time, the lecture component follows the schedule for three-credit courses and the discussion component follows the schedule for one-credit classes.

Five Credit Classes

- Meet five times per week, begin at a standard "A" class meeting time, meet for one class period, and meet MTWThF.
- For lecture/laboratory or lecture/discussion courses with three hours of lecture time, the lecture component follows the schedule for three-credit courses. For lecture/laboratory or lecture/discussion courses with four hours of lecture time, the lecture component follows the schedule for four-credit courses and the discussion component follows the corresponding one- or two-credit schedule.

Summer Term (May session plus first and second summer session).

Classes may meet during the May session, first or second summer session, or may extend across two or all three sessions. Class period duration in the May and summer sessions is at the discretion of the department offering the class, in consultation with the Office of Classroom Management. The first class hour will begin at 08:00 on the Minneapolis campus and at 08:30 on the St. Paul campus.

**REASON FOR POLICY**

Standard class scheduling allows for maximum access to class offerings for students and facilitates the most efficient use of classrooms.

**PROCEDURES**

There are no procedures related to this policy.

**FORMS/INSTRUCTIONS**

There are no forms associated with this policy.

**APPENDICES**

There are no appendices related to this policy.

**FREQUENTLY ASKED QUESTIONS**

1. Are campuses allowed to set their own class schedule and passing times?
   Yes, each campus of the University (e.g. University of Minnesota, Crookston; University of Minnesota, Morris; University of Minnesota, Rochester; University of Minnesota, Twin Cities) is permitted to set the appropriate class schedule and passing times for its institution.
2. What is a centrally-scheduled classroom versus a departmentally-controlled classroom (Twin Cities)?

Centrally-scheduled classrooms at the University of Minnesota, Twin Cities are operated, maintained and scheduled through the Office of Classroom Management. Departmentally-scheduled classrooms are operated, maintained and scheduled through the individual departments that control them.

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<th>ADDITIONAL CONTACTS</th>
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<tr>
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<tr>
<td>Morris Campus</td>
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<tr>
<td>Rochester Campus</td>
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</tbody>
</table>

| DEFINITIONS |

**First and Second Summer Session**
The University of Minnesota academic calendar includes Fall Semester, Spring Semester, May Session and Summer Session. Summer Session is typically divided into two time periods, although some classes may span both summer sessions. Classes are offered each of these terms although the duration of the term can vary. See the Academic Calendar of the appropriate campus for exact dates of the terms in a particular calendar year.

**May Session**
The University of Minnesota academic calendar includes Fall Semester, Spring Semester, May Session and Summer Session. May session classes occur between the end of spring semester and the beginning of summer session.

| RESPONSIBILITIES |

**Departments (Twin Cities)**
- Follow the established campus standard schedule and class periods.
- Distribute meeting times and patterns, and enrollment.

**Office of Classroom Management (Twin Cities)**
- Establish campus standard schedule and class period times.
- Monitor and report use of time distributions and variations from standard schedule.

**Office of the Executive Vice President and Provost**
Considers a request for variance from the standard class schedule when it is necessary, and if agreement about scheduling has not been reached at a lower level.

| RELATED INFORMATION |

- Educational Policy: [Instructional Time per Course Credit](#)
- Educational Policy: [Expected Student Academic Work per Credit: Twin Cities, Morris, Rochester](#)
- Educational Policy: [Teaching and Learning: Instructor and Unit Responsibilities: Twin Cities, Morris, Rochester](#)
- [University of Minnesota, Twin Cities Academic Calendar](#)

| HISTORY |


Amended
May 2011 - Comprehensive Review: Requires colleges to distribute classes evenly throughout the day; Requires colleges to distribute enrollment, as well as classes, throughout the day and throughout the week; Eliminates the 60/40 guidelines of not scheduling more than 60% of the classes during peak hours. Adds two new meeting patterns to the standard class times.

Amended
April 2010 - Added an additional approval step if a faculty member wants to schedule a class on an official University Holiday.

Amended:
December 2009 - This policy now applies to Crookston.

Effective:
April 2009
POLICY STATEMENT

1. Enrollment limits for course sections
   Departments or programs may set minimum and maximum enrollment limits for any course or any section of a course. Enrollment limits are subject to review by the dean.

2. Cancellation of low-enrollment courses
   a. Each campus and college must maintain a policy regarding the cancellation of low-enrollment courses or sections. These policies may differ across colleges and may allow variations by department. Any such policy must, at a minimum, take into account (1) the effect of cancellation of a course or courses on student academic progress and graduation, (2) the need for a course to contribute to appropriate program breadth and curriculum, and (3) commitments made to instructors that a course would be offered.
   b. Courses may not be cancelled after the fifth day of classes for that term.

Exclusions
This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Maximum efficiency and optimal learning occurs within an enrollment range: it is not feasible or educationally sound to teach certain courses if enrollments are either too small or too large. Departments must be able to cancel a course if it is too under-prescribed to warrant offering it, as well as to limit the enrollment to maximize learning. Students need adequate time to select a replacement course if a course is cancelled.

PROCEDURES

There are no procedures related to this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices related to this policy.
FREQUENTLY ASKED QUESTIONS

Where can college guidelines on canceling low enrollment courses be found?
Each college of the University of Minnesota, Twin Cities should have its guidelines for canceling low enrollment courses on its website. Policies for the University of Minnesota, Morris and the University of Minnesota, Rochester can be obtained in the Office of the Vice Chancellor for Academic Affairs.

ADDITIONAL CONTACTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
</tr>
</thead>
</table>
| Primary Contact(s)     | Stacey Tidball (undergraduate)  
                        | Karen Starry (graduate)     | 612-626-0075  
                        |                           | 612-625-2815  
                        |                           | tidball@umn.edu  
                        |                           | starry@umn.edu          |
| Twin Cities Campus     | Sue Van Voorhis           | 612-625-8098    | vanvo002@umn.edu            |
| Crookston Campus       | Ken Myers                 | 218-281-8200    | kmyers@crk.umn.edu          |
| Morris Campus          | Judy Korn                 | 320-589-6011    | kornjr@morris.umn.edu       |
| Rochester Campus       | Laura Walker              | 507-258-8008    | ljwalker@r.umn.edu          |

DEFINITIONS

Enrollment limits (maximum or minimum)
The minimum or maximum number of students allowed in a course; the minimum informs when a course may be cancelled and the maximum informs when a course is considered closed to additional enrollments.

RESPONSIBILITIES

Departments (Twin Cities)
- Establish minimum and maximum course limits.
- Proactively monitor course enrollments so as to cancel courses as early as possible so students can still register for additional course(s) without needed permission to do so.

RELATED INFORMATION

There is no related information for this policy.

HISTORY

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009
POLICY STATEMENT

The primary purpose of the course numbering system is to help students select and sequence courses. Consistent use of the course numbering system also helps those who view a student's transcript identify the level of courses that appear on the transcript.

1. Departments and colleges must use 4-digit course numbers using the system in the Appendix to this policy.
2. Students should use the course numbering system to assist in selecting courses to advance them toward their degree.
3. Use of 4xxx Courses in Graduate Programs: Graduate programs may accept University 4xxx-level course credits as graduate courses. A maximum of nine credits of 4xxx-level course work may be used to satisfy the doctoral or master's course credit requirement, but individual graduate programs may impose a lower maximum. A graduate program may restrict the use of 4xxx courses in the program (e.g., by stipulating that only certain 4xxx courses may be counted). A graduate program has the authority to establish its curricula and the requirements for its academic programs.
4. 6xxx and 7xxx Courses: 6xxx and 7xxx courses are to be used primarily for post-baccalaureate professional programs (e.g., D.D.S., J.D.). It is at the discretion of a graduate program whether it will accept University 6xxx- and 7xxx-level course credits as satisfying degree requirements. Similarly, it is at the discretion of a professional program whether it will accept University 5xxx- and 8xxx-level course credits as satisfying degree requirements. Those departments or programs offering courses for degrees that span graduate and professional education may determine how to best number courses in their curriculum.
5. Alphabetic Suffixes: No alphabetic suffixes other than those already in place at the time this policy is adopted (April 2009) may be used (see the FAQ).
6. Graduate programs must use the standard numbering conventions for all thesis credit courses (see Appendix).
7. Graduate programs will use the all-University numbering conventions for other kinds of courses (see Appendix for xx91 – xx98 courses).
8. Thesis credit courses (see Appendix) and xx91 – xx98 are examples of courses that students may repeat for credit (e.g., "topics" courses).

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Minnesota law requires the University to have a course numbering convention to distinguish remedial, lower division, upper division, and graduate level coursework. Consistent use of the course numbering system helps students select and sequence their courses and helps those who view a student's transcript to identify the level of courses that appear on the transcript.

PROCEDURES

There are no procedures related to this policy.
FREQUENTLY ASKED QUESTIONS

What are suffixes and how can they be used?
Suffixes help identify certain characteristics of courses. Currently three suffixes are used: W (for writing intensive courses); H (for honors courses); and V (for courses that are both honors and writing intensive).

DEFINITIONS

Directed Research
An opportunity in which a student designs and carries out a research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.

Directed Study
A course in which a student designs and carries out an independent project under the direction of a faculty member. Directed study courses may be taken for variable credit and special permission is needed for enrollment.

Independent Study
A course in which a student enrolls in an established course but studies independently under an instructor’s guidance rather than attending class. Independent study courses may be taken for variable credit and special permission is needed for enrollment.

Remedial
Remedial courses are intended to correct or improve deficient skills and knowledge in a specific subject. 0xxx courses are remedial courses that do not carry credit.

RELATED INFORMATION

- Administrative Policy: Academic Unit Authority over the Curriculum and Major
- Administrative Policy: Application of Graduate Credits to Degree Requirements
HISTORY

Amended:
May 2016 - Comprehensive Review. Minor Revision. Language now aligns with Administrative Policy: Application of Graduate Credits to Degree Requirements. Removes language that pertained to the old Graduate School structure.

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009

University Policy Program
350-2 McNamara Alumni Center, Minneapolis, MN 55455 - P: 612-624-8081, policy@umn.edu

Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
Credit Requirements for Master's and Doctoral Degrees

Responsible University Officer: Executive Vice President and Provost

Policy Owner: Vice Provost and Dean of Graduate Education

Policy Contact: Karen Starry

POLICY STATEMENT

This policy governs the credit requirements for the following degrees:

- Master's Plan A degrees
- Master's Plan B degrees
- Master's Plan C degrees
- Doctoral degrees

Credit requirements for master’s degrees

1. Master’s degrees must consist of the following minimum credits:
   a. Plan A degrees: 10 master’s thesis credits (xxxx8777) and a minimum of 20 graduate-level course credits.
   b. Plan B degrees: a minimum of 30 graduate-level course credits, including Plan B Project credits as defined by each program and approved by the college.
   c. Plan C degrees: a minimum of 30 graduate-level course credits.

2. No collegiate unit or program may require more than:
   a. 36 credits with a combination of course and thesis for a master’s Plan A
   b. 36 credits with a combination of course and Plan B project credits for a master’s Plan B, and
   c. 48 course credits for a master’s Plan C.

3. Master’s thesis credits (xxxx8777) may be taken for the master’s Plan A at any time during a student’s degree program.

4. A minimum of 6 graduate-level course credits is required for a master’s level minor.

Credit requirements for doctoral degrees

1. Doctoral degrees must consist of a minimum of 48 credits: a minimum of 24 graduate-level course credits and a minimum of 24 doctoral thesis credits (xxxx8888).

2. No collegiate unit or program may require more than 72 credits with a combination of course and doctoral thesis credits (xxxx8888) for the completion of the doctoral degree.

3. Programs have the discretion, with college approval, to determine when it is academically appropriate for students to take doctoral thesis credits (xxxx8888).

4. A minimum of 12 graduate-level course credits is required for a doctoral level minor.

Exceptions

Collegiate deans or the appropriate campus Vice Chancellor may request exceptions from the Executive Vice President and Provost to items 1b and 2b based on accreditation requirements, national standards of the field, interdisciplinary nature of the program or similar arguments. Collegiate deans or the appropriate campus Vice Chancellor may petition the Provost for an exception to the 24 doctoral thesis-credit (xxxx8888) minimum in item 2a on behalf of doctoral programs that do not require dissertations. The petition should show that the exception conforms to national standards in the field and that appropriate additional credits (course credits, internships, project credits, etc.) will replace the 24 doctoral thesis credits (xxxx8888).
This policy establishes the minimum and maximum credit requirements for Master’s Plan A, B, and C degrees and for Doctoral degrees. It provides a framework for curriculum development that balances coursework, research training, and independent scholarly work.

PROCEDURES

- Early Doctoral Thesis Credit Registration Option

FORMS/INSTRUCTIONS

- UM 1760 - Request for Exception to the Maximum Requirements for Master's and Doctoral Degrees

APPENDICES

- Implementation of Doctoral Thesis Credit Policy

FREQUENTLY ASKED QUESTIONS

- Credit Requirements for Master's and Doctoral Degrees FAQ

ADDITIONAL CONTACTS

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DEFINITIONS

**Graduate-level Course Credits**  
Graduate-level course credits That are primarily numbered as 5xxx or above, excluding thesis credits. Graduate programs may choose to allow 4xxx-level course credits to be applied toward a graduate degree, up to the limit specified in Administrative Policy: Application of Graduate Credits to Degree Requirements.

**Plan B Project Credits**  
Credits taken by the students in relation to their Plan B project as part of the degree requirements

**Thesis Credits**  
Credits taken by students in relation to their research work as part of the degree requirements. These include: xxxx-8777 (master’s thesis credits) and xxxx-888 (doctoral thesis credits).

RESPONSIBILITIES

**Colleges and Programs**  
Restructure program requirements to conform to this policy by the effective date. Request exceptions from the Executive Vice President and Provost to items 1b and 2b based on accreditation requirements, national standards of the field, interdisciplinary nature of the program or similar arguments.
RELATED INFORMATION

There is no Related Information associated with this policy.

HISTORY

Amended:
June 2015 - Comprehensive Review, Minor Revision: The changes provide greater clarity around the specific type of credits. Removed the effective date of the policy statement, which was inserted when this policy was first created.

Effective:
September 2011 - New Policy, Comprehensive Review. Establishes the minimum and maximum credit requirements for Master's Plan A, B, and C degrees and for Doctoral degrees. Provides a framework for curriculum development that balances coursework, research training, and independent scholarly work. Eliminates the requirement for outside coursework in view of the trend towards interdisciplinary curricula within many programs. Programs are given the option to require a minor or supporting program where warranted by educational objectives. Outlines a process by which collegiate deans may request exceptions.
POLICY STATEMENT

Directed study, directed readings, and directed research courses are opportunities for students to work individually with a faculty member and to earn credit for individually designed content.

1. Departments, colleges and campuses who wish to offer these types of courses must specify:
   a. the levels for these directed courses within their curricula;
   b. the criteria for registration for these courses; and
   c. the criteria that are used to determine who is eligible to teach these courses.

2. Colleges and campuses must establish and publish procedures for registration in directed study, directed research, and directed readings courses.

3. The instructor of a course and the student must have a written contract in place that specifies the student's responsibilities for the courses and the name of the instructor who is responsible for turning in the student's grade for the course, as part of the enrollment in the course. Instructors must provide a copy of the contract to the academic department in which the registration for the course occurs.

4. These courses do not require a syllabus.

5. The instructor must set the number of credits for these courses in accordance with the provisions of Administrative Policy: Expected Student Academic Work per Credit: Twin Cities, Crookston, Morris, Rochester so that the academic workload requirements are in conformance (generally 3 hours of work per week per credit for undergraduate students and more than that for graduate and professional students).

6. Programs may limit the number of directed study, directed readings, and directed studies courses a student may take per term.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Uniformity of expectations across directed study, readings and research opportunities is in the best interest of students, faculty and staff.

PROCEDURES

There are no procedures related to this policy.
There are no forms associated with this policy.

APPENDICES

There are no appendices related to this policy.

FREQUENTLY ASKED QUESTIONS

There is no FAQ related to this policy.

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DEFINITIONS

Directed Research
An opportunity in which a student designs and carries out a research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.

Directed Study
A course in which a student designs and carries out an independent project under the direction of a faculty member. Directed study courses may be taken for variable credit and special permission is needed for enrollment.

Directed Readings
A course in which a student designs an area of study under the direction of a faculty member. Directed readings may be taken for variable credit and special permission is needed for enrollment.

RESPONSIBILITIES

Instructor
- Review and approve the contract a student has created for a course. Work with the student to revise the contract, as needed, before approval.
- Supervise the student's work in such a course.
- Submit final grade at the end of the course.

Student
- Obtain permission to enroll in the course and register for the course.
- Complete the responsibilities of the course, as specified in the contract.
- Maintain regular contact with the instructor.

Academic Unit
- Maintain records of such courses, including the individual contracts for each occurrence.
• Maintain oversight of curriculum and instructor workload.

RELATED INFORMATION

• Administrative Policy: Expected Student Academic Work per Credit: Twin Cities, Crookston, Morris, Rochester
• Administrative Policy: Academic Unit Authority Over the Curriculum and the Major: Twin Cities, Crookston, Morris, Rochester

HISTORY

Amended: October 2015 - Comprehensive Review, Major Revision. 1. Requires instructors to file a copy of the contract associated with these courses, to be on file in the academic department offering the course. 2. Requires departments, colleges, and campuses to specify the criteria for both eligibility and registration into these courses. 3. Allows departments to establish limits to the number of these types of courses that a student may take. 4. Specifies the responsibilities for the instructor, student, and academic unit.

Amended: December 2009 - Policy now applies to Crookston.

Effective: April 2009

Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

Students are responsible for meeting all requirements for completing the doctoral degree, including dissertation defense and submission.

I. The Doctoral Final Oral Examination
   a. The doctoral final oral committee must consist of at least four members, including the advisor(s). All members of the committee and the candidate must participate in the final oral examination. Committee members and/or the student may participate remotely as long as all conditions for remote participation in the examination are met.
      i. At least three members (including the advisor) must be from the student's major field.
      ii. At least one member must represent a field outside the major. (If the student has declared a minor, the outside member, or one of the outside members, must represent the minor field.)
      iii. Members cannot satisfy the requirement with respect to more than one field.
   b. Thesis Reviewers for final oral examination:
      i. A minimum of 2 major field reviewers and 1 minor/outside reviewer are required. In the case of multiple minors, there must be a reviewer for each minor.
      ii. Advisor(s) must serve as reviewers.
      iii. Students must provide reviewers with a copy of the dissertation at least 14 days before the scheduled date of the doctoral final oral examination.
      iv. Every designated reviewer on the doctoral dissertation reviewer’s report must certify that the dissertation is ready for defense before the doctoral final oral examination may take place.
   c. The doctoral final oral examination must include:
      i. A public presentation of the candidate's dissertation to the doctoral final oral examination committee and the invited scholarly community.
      ii. A closed session (open only to the doctoral final oral examination committee and the candidate) immediately following the public presentation.
   d. To be recommended for the award of the doctoral degree, all committee members, or all committee members save one, must certify that the student has passed the doctoral final oral examination.
   e. Students are not allowed to retake the final oral examination.

II. Submission of final copy of the doctoral dissertation
   All students who complete a doctoral dissertation must file a digital copy of the dissertation with the University in accordance with University standards. Students may request that the University embargo publication of the dissertation for a limited period of time.

III. Reactivation in order to graduate
   A student who is currently inactive may be reactivated for the purpose of awarding the degree if the student has completed all requirements for the degree, including submission of the approved copy of the doctoral dissertation.

Exceptions

Doctoral programs with approved completion requirements that do not include a final oral examination are exempt from I.

Doctoral programs with approved completion requirements that do not include a doctoral dissertation are exempt from II.

Effective Date

This policy applies to all students admitted after January 1, 2013. Students who matriculated before January 1, 2013 may choose to continue under the policies in effect when they initially matriculated in their graduate program.
This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

**REASON FOR POLICY**

This policy establishes uniform standards for the doctoral final oral examination; defines timely submission of copies of the dissertation for University archives, and supports Board of Regents Policy: *Openness in Research* which covers public dissemination of University-sponsored research.

**PROCEDURES**

- Canceling or Recessing the Doctoral Preliminary and/or Master's or Doctoral Final Oral Examination
- Degree Completion Procedures

**FORMS/INSTRUCTIONS**

- Doctoral Graduation Packet Request
- Thesis or Dissertation Hold Request

**APPENDICES**

- Degree Completion Steps: Doctor of Audiology
- Degree Completion Steps: Doctor of Musical Arts
- Degree Completion Steps: Doctor of Philosophy, Doctor of Education
- Mutual Roles and Responsibilities for Faculty and Graduate Students: Guidelines
- Required Conditions and Best Practices for Remote Participation in Graduate Examinations
- Thesis Formatting and Submission Guidelines

**FREQUENTLY ASKED QUESTIONS**

- Doctoral Degree: Completion FAQ

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**DEFINITIONS**

There are no definitions associated with this policy.
RESPONSIBILITIES

Graduate School
- Provide guidelines for formatting and submitting the dissertation, to include not only current instructions for electronic formatting and filing but also guidelines governing the use of already published material in the dissertation. Guidelines should take account of possible copyright issues.

Collegiate Units
- Approve and archive in the system of record committee membership (including any subsequent changes to an approved committee). Changes in committee membership must also be approved by the program DGS.
- Approve and record the specific procedures used by programs for administering and grading the doctoral preliminary and final examinations.
- Maintain and publish any additional collegiate-level publishing standards or guidelines (e.g., stylistic conventions based on discipline, language of the thesis).

Programs
- Provide program-specific information in the graduate handbook
- Maintain and publish any additional program-level publishing standards or guidelines (e.g., stylistic conventions based on discipline, language of the thesis).
- Review and approve any changes in committee membership; route program-approved requests to the collegiate unit for approval and archiving.

RELATED INFORMATION

- Administrative Policy: Appointments to Graduate Examination Committees
- Administrative Policy: Doctoral Degree: Performance Standards and Progress
- Administrative Policy: Admission for Master's and Doctoral Degrees
- Administrative Policy: Readmission or Changes to Master's or Doctoral Degree Objectives

HISTORY

Effective:
July 2012 - New Policy, Comprehensive Review. 1. Establishes guidelines for remote participation in graduate milestone examination. 2. Specifies the University as the digital archive of record for deposit of dissertations. 3. Facilitates reactivation of students who have completed all other degree requirements so that their degree may be conferred. 4. Extends applicability of policy requirements to programs not formerly under the aegis of the Graduate School.
POLICY STATEMENT

Students are responsible for knowing all program requirements of their doctoral program when they matriculate. If program requirements change, students may elect to continue under the requirements in effect when they matriculated, provided they have remained in good standing.

The advisor and the Director of Graduate Studies (DGS) for the program are jointly responsible for helping each student plan and appropriately complete the requirements in a timely fashion. The DGS is also responsible for ensuring that each student receives training appropriate to the discipline in the responsible conduct of research and ethical teaching and scholarship.

Programs and collegiate units may have additional and/or more stringent requirements.

I. Pre-Matriculation Requirements for Programs

Programs must, before students begin their first term of study:

- Provide each student a current graduate program handbook, specifying the program's requirements and policies governing successful degree completion
- Assign each student a temporary advisor.

II. Progress Review

a. Annual Review Programs must review the progress of each doctoral student at least once a year and must provide the results to the student in writing.

b. Degree Plan Doctoral students must have an approved degree plan on file with their collegiate unit prior to taking the preliminary oral exam.

   i. If a student intends to complete a minor, the minor must be declared on the degree plan prior to taking this exam. The degree plan must be centrally archived in the system of record.

   ii. It is recommended that the degree plan be filed, at minimum, three months prior to the exam date.

III. Performance Standards

a. Continuous Enrollment Students are required to enroll every semester (fall and spring) from the time of matriculation until degree conferral.

b. Time Limit for Earning the Doctoral Degree All requirements for the doctoral degree must be completed and the degree awarded within the shorter of eight calendar years after initial enrollment to the graduate program or the more restrictive time frame specified by the program.

Students who are unable to complete the degree within the time limits described above may petition the program and collegiate unit for one extension of up to 24 months. Students must obtain the approval of their advisor(s) and program DGS and submit the petition for an extension at least six months prior to the end of the time limit.

   i. If a petition is approved, the student is notified in writing of the expectations for progress and of the month/year of degree conferral.

   ii. If the petition is denied, the student is notified in writing that he or she will be terminated from doctoral candidacy and from the graduate program upon expiration of the time limit.

   c. Under extraordinary circumstances, students may file a second petition for an additional 24 month extension after the first 24
months have expired; however such petitions after the initial extension must be reviewed and approved by the advisor/s, program DGS, and Vice Provost and Dean of Graduate Education.

d. Students who have been terminated under such circumstances may apply for readmission to the program; however, readmission is not guaranteed.

e. **Minimum Grade Requirements** To remain in good academic standing students should meet the minimum GPA requirement specified by the graduate program or 3.000 (on a 4.000 scale), whichever is higher. Students who have filed a doctoral degree plan should maintain a 3.000 GPA for courses included on the degree plan. Only courses with grades of A, B, C (including C-) and S may be counted toward the degree. Students who have not yet filed a degree plan should maintain an overall GPA of 3.000. Students who fall below the program's minimum GPA requirement may be terminated from the program.

f. **S/N grades for courses** A minimum of 2/3 of the course credits included on a degree plan must be taken A/F.

### IV. Doctoral Preliminary Written and Oral Examinations

a. Each doctoral candidate must pass a written examination in the major field.
   
i. The doctoral preliminary written examination will be graded either pass, pass with reservations, or fail in accordance with program standards.
   
ii. For students who pass with reservations, conditions to be met must be given in writing to the student within ten working days, including a timeline for completion.

b. Every doctoral student must pass a preliminary oral examination in the major field in programs where such an examination is a degree requirement. The preliminary oral examination is conducted as a closed examination, attended by only the student and the examining committee.
   
i. The oral examination may not take place before examiners have certified that the candidate received a passing grade on the preliminary written examination and that any reservations have been removed.
   
ii. The doctoral preliminary oral examination will be graded either pass, pass with reservations, or fail.
   
iii. If a student fails the exam, he or she may retake the examination once. All committee members, or all committee members save one must approve this option.
   
iv. The second attempt to pass the preliminary oral examination must use the same committee members unless an emergency situation necessitates a substitution.
   
v. If the committee does not approve a retake, or if the student fails the second attempt, the student will be terminated from the program.

c. The doctoral preliminary oral committee must consist of at least four members, including the advisor/s. All members of the committee and the candidate must participate in the preliminary oral examination. Committee members and/or the student may participate remotely as long as all conditions for remote participation in the examination are met.
   
i. At least three members (including the advisor) must be from the student's major field.
   
ii. At least one member must represent a field outside the major. (If the student has declared a minor, the outside member, or one of the outside members, must represent the minor field.)
   
iii. Members cannot satisfy the requirement with respect to more than one field.

### Exceptions

Programs with a distinctive student population or approved joint-degree programs may request a program-wide exception to the eight-year time limit for earning the doctoral degree.

Doctoral programs with approved degree performance standards and progress requirements that do not require preliminary written and oral examinations are exempt from IV.

### Effective Date

This policy applies to all students admitted after January 1, 2013. Students who matriculated before January 1, 2013 may choose to continue under the policies in effect when they initially matriculated in their graduate program.

This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

### REASON FOR POLICY

This policy creates the framework for communications to students about degree requirements and the student's progress; sets minimum standards for satisfactory progress in doctoral programs; establishes clear standards and procedures for administering and grading doctoral written and oral preliminary examinations. This policy establishes uniform and procedures for doctoral preliminary examinations.

The policy also assists the student and advisor in planning for timely completion of program requirements, provides timely evaluations to students as they proceed through program; alerts student and advisors to problems, and provides opportunity to develop best approach for
addressing those problems; and creates a clear record in cases where program decides to terminate student.

PROCEDURES

- Canceling or Recessing the Doctoral Preliminary and/or Master's or Doctoral Final Oral Examination

FORMS/INSTRUCTIONS

- UM 1776 - Doctoral Degree: Program-Wide Exception to the Maximum Time Limit
- UM 1777 - Doctoral Degree: Request for Extension to the Maximum Time Limit
- OTR 198 - Graduate Degree Plan

APPENDICES

- Academic Freedom and Responsibility
- Annual Graduate Student Reviews: Guidelines
- Graduate Program Student Handbook: Guidelines
- Mutual Roles and Responsibilities for Faculty and Graduate Students: Guidelines
- Required Conditions and Best Practices for Remote Participation in Graduate Examinations
- Responsible Conduct of Research and Ethical Teaching and Scholarship
- Voting Requirements: Doctoral Preliminary Oral Examination

FREQUENTLY ASKED QUESTIONS

- Doctoral Degree: Performance Standards and Progress FAQ

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DEFINITIONS

Good standing/good academic standing
Students remain in good standing if they: (a) make timely progress towards degree completion as required by the program and by this policy; (b) maintain a GPA at or above the minimum set by the program and by this policy; and (c) pass all appropriate examinations within the time frame specified by the program.

RESPONSIBILITIES

Collegiate Units
Ensure appropriate review of coursework on the degree plan (including any subsequent changes to an approved degree plan); archive the degree plan in the system of record.

Approve and archive in the system of record committee membership (including any subsequent changes to an approved committee). Changes in committee membership must also be approved by the program DGS.

Approve and record the specific procedures used by programs for administering and grading the doctoral preliminary and final examinations.

Review and approve program-wide requests for exceptions to the time limit for completing the doctoral degree, archive requests in the system of record.

Review and approve requests for extensions to the time limit for completing the doctoral degree; archive petitions in the system of record.

### Departments/Programs

- Clearly state the program requirements for maintaining good standing in the Graduate Program Handbook, even if they are identical to the requirements in this policy.
- Review and approve the degree plan (including any subsequent changes to an approved degree plan).
- Review and approve any changes in committee membership; route program-approved requests to the collegiate unit for approval and archiving.
- Review and approve requests for extensions to the time limit for completing the doctoral degree; notify students in writing of the decision and subsequent actions (i.e., expectations for progress and for the month/year of degree conferral or termination from the program upon expiration of the limit).

### Students

- Must obtain the required approvals and file the degree plan with the collegiate unit.
- Must initiate the request for an extension to the maximum time limit for completing the doctoral degree, obtain the approval of their advisor/s and program DGS, and submit their request by the deadline.

### RELATED INFORMATION

- Administrative Policy: [Admission for Master's and Doctoral Degrees](#)
- Administrative Policy: [Appointments to Graduate Examination Committees](#)
- Administrative Policy: [Doctoral Degree: Completion](#)
- Administrative Policy: [Leave of Absence and Reinstatement from a Leave: Graduate Students](#)
- Administrative Policy: [Readmission or Changes to Master's or Doctoral Degree Objectives](#)

### HISTORY

**Effective:**
July 2012 - New Policy, Comprehensive Review. 1. Changes the beginning and ending points for calculating time to degree. Time is currently measured from the conclusion of the oral prelims, to defense of the thesis. This policy measures time to degree from enrollment in the doctoral program to the point at which the degree is awarded. 2. Establishes a minimum GPA for students to remain in good standing (3.0 for doctoral students.) 3. Extends applicability of policy requirements to programs not formerly under the aegis of the Graduate School.
### POLICY STATEMENT

#### General Provisions

The principal criterion for the choice of any required materials for a course or program should be that the materials are the most appropriate for the purpose. The instructor who has been assigned responsibility for the course or program, in most cases, identifies what materials are required for the course. The process for selecting course materials must avoid conflict of interest or the appearance of conflict of interest.

Generally, no member of the instructional staff of the University may personally profit from the assignment of materials, or assignment of the venue of purchase of materials, to students in classes or any other instructional setting at the University. If the faculty member responsible for a course or program judges that the best materials available for use with the course are materials whose sale will provide them personal income, the faculty member must receive approval from the head of the academic unit.

#### Review and Approval

The instructional staff member must justify the requirement to use the materials in the course in their request for approval to the head of the academic unit.

The head of the academic unit should judge the request solely on the academic merit of the materials. The decision to approve the request should typically include a consultative step with faculty peers knowledgeable about the use of the materials. If the head of the academic unit is also involved in the use of these materials, the dean of the college must give the written approval.

The approval, if given, will apply to all offerings of the course for which the affected individual is responsible during the twelve-month period following the approval date.

If the individual wishes to assign the same materials, or other materials created by that individual for courses occurring after the twelve-month period lapses, a new request for approval must be submitted to the head of the academic unit.

#### Documentation

The unit must retain the request and the subsequent decision, as well as file a copy of the record of the approval with the dean of the college.

#### Exclusions

This policy is not applicable to the Duluth campus.

### REASON FOR POLICY

To manage conflict of interest concerns, the person teaching a course may not by himself/herself make the decision to assign course materials for which he/she could personally earn a profit. Requiring approval from a higher level provides appropriate internal controls.
There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

1. What is meant by ‘materials’?
   Materials refers to anything that may have been developed by or be the intellectual property of an instructor, including but not limited to textbooks, reading packets or materials, models, computer programs, artwork, etc.

ADDITIONAL CONTACTS

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</tr>
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DEFINITIONS

Instructional Staff
Faculty, including adjunct faculty; graduate teaching assistants; and all other individuals assigned to provide instruction in a course.

RESPONSIBILITIES

Instructional staff
Identify materials required for the course.
Submit a formal request to the department head, requesting permission use any materials in the course from which the individual will personally profit. Provide justification for the selection of those materials as part of the request.

Academic Unit Head
- Review the academic merit of the materials, and consult with faculty peers.
- Provide a formal response to the request.
- Retain a copy of the record of the decision in the academic unit files.
- File a copy of the decision with the collegiate dean’s office.
- Monitor compliance and provide information about this policy to instructional staff.

Academic Dean
Review and render decisions on requests, if the individual providing the instruction in the course is an academic department head.

RELATED INFORMATION
Amended:  
February 2016 - Comprehensive Review. Minor Revision. Changes clarifies the documentation expectations when approval is given to use materials in a course that were created by that instructor, and specifies that a one-up approval is required when the head of the administrative unit is involved in the use of the materials.

Amended:  
December 2009 - Policy now applies to Crookston.

Effective:  
April 2009
ADMINISTRATIVE POLICY

Enrolling in Overlapping or Back-to-back Classes: Twin Cities, Crookston, Morris, Rochester

Responsible University Officer: Executive Vice President and Provost

Policy Owner: Vice Provost and Dean of Undergraduate Education

Policy Contact: Susan Van Voorhis

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

Enrolling in overlapping classes is prohibited so students can actually attend the classes in which they enroll. For Twin Cities campus students, back-to-back classes with insufficient travel time may lead them to consistently arrive late or to depart early, which can disrupt a class and cause the student to miss instruction. Students are responsible for planning a schedule that allows enough time for travel between classes. Instructors may accommodate student-scheduling problems but are not required to do so.

1. Overlapping class times
   a. Classes that have any common meeting time are considered to be overlapping.
   b. Students are not permitted to register for classes that overlap unless they successfully petition for permission to do so.
   c. Petitions for overrides for such conflicts require the approval of all instructors involved. The decision to approve or disapprove such a petition for override is discretionary with each instructor involved, but petitions should be granted only under extenuating circumstances.

2. Enrollment in back-to-back classes [Twin Cities only]
   a. Students should not enroll in back-to-back classes when (1) the amount of time available for travel is less than 15 minutes (when both are on either the Minneapolis or St. Paul campus), or (2) the amount of time available to travel between two classes (when one is on the Minneapolis campus and the other on the St. Paul campus) is less than 30 minutes.
   b. Petitions for protection from penalties for such conflicts require the approval of all instructors involved and will be approved only under extenuating circumstances. The decision to approve or disapprove such a petition for override is discretionary with each instructor involved.
   c. If the student's petition has not been approved, instructors have the authority to penalize students who consistently arrive late or depart early from a class.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Students consistently arriving late for a class or departing early can disrupt the teaching and learning process. Instructors must understand that they may accommodate student-scheduling problems but are not required to do so.

PROCEDURES

There are no procedures associated with this policy.
FORMS/INSTRUCTIONS

- OTR024 - Class Time Conflict Approval
- Online Class Time Approval

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

1. How do students obtain permission to enroll in back-to-back courses?

Students who wish to enroll in back-to-back courses (or those with overlapping times) must complete the “Course Time Conflict Approval” form. Completing the form requires the signature of both instructors involved in a course time conflict. Without written permission, students will not be allowed to register for courses that are separated by less than one minute or overlap in the time they are offered. Verbal permission will not allow the student to register.

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DEFINITIONS

There are no definitions related to this policy.

RESPONSIBILITIES

There are no specific responsibilities related to this policy.

RELATED INFORMATION

There is no related information for this policy.

HISTORY

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

1. Departments and colleges should be selective in determining prerequisites for courses. Prerequisites should not be set for a course except in progressive, sequence courses or where departments can clearly demonstrate that a student will not be able to complete the course successfully without first completing the prerequisite course work.

2. Where prerequisites have been set, catalogues and course materials must list them and advise students to take only those courses for which the prerequisites have been met.

3. Where prerequisites have been set, instructors may require that any student who has not taken the specified prerequisites for the course must withdraw. Instructors may, however, grant permission, on an individual basis, for a student to take a course without having taken the prerequisite(s).

4. When a student successfully completes a prerequisite course after successfully completing a subsequent course that required the prerequisite, credit for the prerequisite course will be granted. Colleges and departments, at their discretion, may also allow students to receive credit by examination for the prerequisite course.

Exclusions

This policy is not applicable to the Duluth campuses.

REASON FOR POLICY

Prerequisites inform students that, in order to be successful in a particular course, they must enter the course already having attained specific knowledge as a necessary background. Prerequisites provide a process for directing students to courses for which the students are adequately prepared. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.

PROCEDURES

There are no procedures related to this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES
There are no appendices related to this policy.

FREQUENTLY ASKED QUESTIONS

There is no FAQ related to this policy.

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DEFINITIONS

Prerequisite
A course that is a necessary requirement before subsequent advanced courses.

RESPONSIBILITIES

There are no specified responsibilities related to this policy.

RELATED INFORMATION

- *Higher Learning Commission, Criteria and Requirements for Accreditation*

HISTORY

Amended:
September 2014 - Clarifications related to Higher Learning Commission accreditation requirements

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009
POLICY STATEMENT

Evaluation of teaching provides information (1) to help improve teaching, (2) to be used for faculty tenure decisions and salary and promotion decisions based on merit, and (3) to assist students in course selection. The methods used are:

- Student ratings of teaching
- Peer evaluations

A. General Provisions for Evaluation of Teaching

1. All instructors, regardless of their academic rank or tenure status, will have their teaching performance evaluated.
2. The process for evaluating teaching used in tenure and promotion decisions must follow Board of Regents Policy: Faculty Tenure.
3. Student rating data, including the response rates for the data, may be used in personnel decisions for faculty and instructional staff whose salary is fully or partially based on teaching, (e.g., merit and salary reviews, promotion, tenure for tenure-track faculty).
   - The results must be shared with the instructor being reviewed.
   - Only those individuals who are responsible for decisions on reappointment, promotion, tenure, and salary adjustments may have access to information about a specific instructor.
   - Instructors are allowed to respond to student rating results by adding written comments to their files that are communicated to individuals responsible for personnel decisions.
4. When used for salary, promotion, and tenure decisions, information from student ratings should be used in conjunction with other relevant metrics to assess instructional effectiveness.
5. The academic unit must maintain a record of the instructor's contributions to teaching, including cumulative summaries of student ratings of the instructor's courses. Units must protect the materials as private data.
6. To assist students in course selection, students may view Student Rating of Teaching responses that pertain to a course and not to a specific individual. (This provision does not apply to the Crookston campus)
7. Student rating data should be used with other types of information to identify instructors who deserve rewards as well as instructors who may need assistance in improving their classroom effectiveness. When used for salary, promotion, and tenure decisions, these data should be used in conjunction with other relevant metrics.
8. Custom Items

Colleges and departments may, after consultation with, and approval from, the vice provost for faculty and academic affairs, add custom items to the Student Rating of Teaching form. If custom items are added by a department or college, that unit will make available to instructors a written policy that defines which data from the custom items will be used (1) for improvement of teaching, (2) for personnel decisions, and (3) for improving courses or programs.
   - Data used solely for teaching improvement will be provided only to the instructor.
   - Data to be used for personnel decisions will be available to individuals charged with reviewing instructor performance.
   - Data to be used for course and program improvement will be available to curriculum committees and similar bodies only in aggregated form and will not be identified with individual instructors. In all instances, the data will be provided to the instructor.

B. Student Rating of Teaching Form and Requirements

1. Every course with a University course number will be rated by the use of student rating forms every time it is offered, except that
thesis-only credits, directed or independent study, and internships will not be rated using such forms. For courses with one instructor but multiple components (e.g., lab, lecture, recitation, etc.), departments have the discretion to evaluate the components separately. For courses with multiple components, each taught by a different instructor, each component should be evaluated separately.

2. The standard student rating form (see Appendix X) will be used except that:
   - In courses with more than two instructors, departments and/or colleges that wish to use alternative evaluation procedures must seek written approval from the Senate Committee on Educational Policy (SCEP).
   - Academic units in which student evaluation procedures must meet national accreditation standards may use alternative evaluation procedures with written approval from SCEP.
   - A department that wishes to use an alternative form for a course must receive written approval from SCEP.

3. All students present when the evaluation is conducted, or all students enrolled in online courses, must be provided the student rating form. Completed forms will be submitted anonymously. Students, regardless of the rating protocol or method used, have the option to:
   - opt-out of responding to one or more questions on the form; or
   - opt-out of completing the entire student rating form.

4. Instructors may not be present when the evaluations are completed and collected. Instructors may only see the completed forms after his or her grades have been turned in.

5. Students who have withdrawn from the course may not participate in the rating of that course.

6. The dean or chancellor of each college or campus, in consultation with the faculty, will determine whether and how written comments on student evaluation forms may be used in personnel decisions. In units where all written comments on students' ratings of teaching are sent to the chair and/or to reviewing-bodies and are included in the file, unfairly prejudicial comments will be withheld from the file upon request of the instructor concerned and accordingly will not be part of annual or other reviews. The decision whether particular comments are unfairly prejudicial will be made by the chair, a senior faculty member designated through a process determined by the department, or a standing or ad-hoc committee. This provision is intended to cover offensive, racist, sexist, homophobic, and other personal comments, and is not intended to exclude from the file negative comments directly related to the course.

7. The original completed student-rating forms will be returned to the instructor with any student demographic information removed. Information from electronic forms will be made available to the instructor.

C. Peer Evaluation of Teaching

Peer review should include assessment of the instructor's knowledge of the subject matter, general contributions to departmental teaching efforts, and any other teaching contributions. (see Appendix for best practice guidelines.)

1. Peer review process.
   a. Every academic unit should have a documented process for peer review of every instructor's teaching efforts and contributions to teaching, both for purposes of promotion decisions and for teaching-based salary increases. The academic unit should evaluate instructors in ways appropriate to the discipline, and include consideration of activities outside the classroom such as facilitating student research, advising students, and other activities related to students' educational programs.
   b. The peer-review process must include consideration of any additional materials identified by the instructor as relevant to the evaluation. Instructors are encouraged to prepare and regularly update a teaching portfolio that contains materials that will be considered during his/her evaluation.

2. Faculty peer review.
   a. Faculty peers are responsible for evaluating teaching conducted by tenured and tenure-track faculty as outlined in Board of Regents Policy: Faculty Tenure, Administrative Policy: Faculty Compensation, and Administrative Procedure: Reviewing Candidates for Tenure and/or Promotion: Tenure-Track and Tenured Faculty.
   b. Both faculty and instructional staff may participate in the evaluation of instructors who are not tenure-track or tenured faculty.

Exclusions

This policy is not applicable to the Duluth campus.

Course-related SRT results from the Crookston campus will not be released to students.

REASON FOR POLICY

This policy establishes standards and processes for evaluating of teaching: peer review and student rating of teaching for the campuses of Morris, Rochester, and the Twin Cities.

It is essential to ensuring quality of instruction and providing feedback to instructors and supervisors.
PROCEDURES

- Using Paper and Online Forms to Conduct Student Ratings

FORMS/INSTRUCTIONS

- UM 1811 - Student Rating of Teaching

APPENDICES

- Peer Review of Teaching: Best Practices

FREQUENTLY ASKED QUESTIONS

1. Are there costs associated with administering custom items on a form?
   Units should consult the Office of Measurement Services to inquire about costs associated with administering a custom form or adding custom items on the Student Rating of Teaching form.

2. Can instructors administer additional evaluation items?
   Instructors are encouraged to conduct early- and mid-semester course assessments for the purpose of receiving feedback about student learning during the term. Instructors may ask students to answer supplemental questions in the open-ended section of the standard rating form, on a separate sheet, or online. See http://z.umn.edu/earlyterm for more information about early- and mid-semester course assessments.

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DEFINITIONS

There are no definitions associated with this policy.

RESPONSIBILITIES

Executive Vice President and Provost
- Convey to colleges the importance of teaching in decisions regarding promotion, tenure, and merit-pay increases.
- Consult with colleges regarding custom items and exceptions to the policy.

Deans
- Convey the importance of teaching in decisions regarding promotion, tenure, and merit-pay increases.
- Consult with college governing bodies regarding the use of written comments in personnel decisions.
Department Heads
- Convey to instructors the importance of teaching in decisions regarding promotion, tenure, and merit-pay increases.
- Ensure that evaluation of teaching takes place in the unit.
- Decide whether particular written comments are unfairly prejudicial.

RELATED INFORMATION
- Board of Regents Policy: Faculty Tenure
- Administrative Policy: Faculty Compensation
- Administrative Procedure: Procedures for Reviewing Candidates for Tenure and/or Promotion: Tenure-Track and Tenured Faculty
- Peer Review of Teaching material

HISTORY
Amended:
November 2015 - Policy now applies to Crookston - with minor exception: Course-related SRT results from the Crookston campus will not be released to students.

Amended:
January 2015 - Comprehensive Review. Minor Revision. Key policy changes: 1. Meets the student requests for information that may aid in course selection by releasing course related information from the Student Rating Tool that does not violate Minnesota State Data Privacy law. 2. Eliminates unnecessary language related to policy compliance. 3. Revises the language regarding the authority to decide whether written comments may be used for personnel decisions.

Amended:
December 2014 - 1. Meets the student requests for information that may aid in course selection by releasing course related information from the Student Rating Tool that does not violate Minnesota State Data Privacy law. 2. Eliminates unnecessary language related to policy compliance. 3. Revises the language regarding the authority to decide whether written comments may be used for personnel decisions.

Effective:
April 2009
Expected Student Academic Work per Credit: Twin Cities, Crookston, Morris, Rochester

POLICY STATEMENT

Workload expectations in this policy are an estimate of the amount of work needed for an average student to earn an average grade. Course grades are based on the quality of the work submitted, not on hours of effort (as provided in Administrative Policy: Grading and Transcripts: Twin Cities, Crookston, Morris, Rochester). Workload expectations per credit do not vary with the method of delivery of the course or the length of the academic term.

A. Undergraduate Courses

1. Student workload expectations per undergraduate credit. For fall or spring semester, one credit represents, for the average University undergraduate student, three hours of academic work per week (including lectures, laboratories, recitations, discussion groups, field work, study, and so on), averaged over the semester, in order to complete the work of the course to achieve an average grade. One credit equals 42 to 45 hours of work over the course of the semester (1 credit x 3 hours of work per week x 14 or 15 weeks in a semester equals 42 to 45 hours of academic work). Thus, enrollment for 15 credits in a semester represents approximately 45 hours of work per week, on average, over the course of the semester.

2. Exceptions to undergraduate workload standard. Professional norms and the nature of the academic work may necessitate spending more than three hours of work per week on average. For example, clinical experiences, some laboratory work, and some studio activities may require more than an average three hours per week. Demands on the student in excess of the average of three hours per credit per week are permissible with college approval and with appropriate notification to the student of the amount of work expected for the course or educational experience (e.g., in class schedules, bulletins, or syllabi).

3. Student workload statement required for undergraduate courses. All proposals for undergraduate courses must include a student workload statement demonstrating how the course conforms to the student workload expectations in sections (a) and (b). College and campus curriculum committees and other approving bodies (e.g., the Council on Liberal Education) must consider the student workload statement in reaching a decision on whether to approve a proposed course.

B. Graduate School and Professional School Courses

It is expected that the academic work required of Graduate School and professional school students will exceed three hours per credit per week.

C. All Courses

1. For courses using one course number that enroll both undergraduate and graduate/professional students, workload expectations may be different for the two.

2. When a course is offered at two levels (e.g., 1xxx/3xxx or 3xxx/5xxx), workload expectations will differ for the students enrolled at different levels.

3. Instructional units should periodically review course syllabi to determine whether the number of course credits is appropriate for the expected student workload.

Exclusions

This policy is not applicable to the Duluth campus.
REASON FOR POLICY

Information on workload expectations assists students in understanding the necessary time to allocate for their courses. Outlining workload expectations also allows for greater consistency across the curriculum, as well as identifies areas where the expectations are not necessarily applicable due to the nature of the course being taught. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.

PROCEDURES

There are no procedures related to this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices related to this policy.

FREQUENTLY ASKED QUESTIONS

1. Do the student workload expectations per undergraduate credit apply to courses that are scheduled in academic terms other than the standard semester?
   
   Yes. The expectation of academic work per credit established for semesters applies to all academic terms. Courses scheduled during the May session, summer session, and any other special terms have the same expectations for student workload per credit as for courses held during the typical semester. For example, a one-credit course represents approximately 42 to 45 hours of academic work, regardless of the length of the academic term.

2. Do the student workload expectations per undergraduate credit apply to all courses, including on-line and distance education courses?
   
   Yes. The workload expectations per credit are the same, regardless of the method of delivery of the course (for example, online, interactive video, correspondence, classroom, or a combination of delivery methods).

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DEFINITIONS

Average grade
According to the policy on Grading and Transcripts, an average grade (C) represents achievement that meets the course requirements in every aspect.
RESPONSIBILITIES

There are no specific responsibilities related to this policy.

RELATED INFORMATION

- Administrative Policy: Grading and Transcripts: Twin Cities, Crookston, Morris, Rochester
- Higher Learning Commission, Criteria and Requirements for Accreditation

HISTORY

Amended:
September 2014 - Clarifications related to Higher Learning Commission accreditation requirements

Amended:
September 2011 - Comprehensive Review. Minor clarifications made to Policy Statement including that workload expectations per credit do not vary with the method of delivery of the course or the length of the academic term and added Frequently Asked Questions section.

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009

The University of Minnesota expectations for workload per credit were first adopted by the Faculty Senate on February 16, 1922.
ADMINISTRATIVE POLICY

Grade Accountability: Twin Cities, Crookston, Morris, Rochester

Responsible University Officer: Executive Vice President and Provost

Policy Owner: Vice Provost and Dean of Undergraduate Education
Vice Provost and Dean of Graduate Education

Policy Contact: Stacey Tidball

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

By the start of the term, every department must identify, for each course offering, the instructor responsible for the course.

1. Instructor responsibility
   a. The instructor who is in overall charge of a course offering is accountable for all grades given to students. Responsibility for grading or evaluating student work in a course may be assigned to a teaching assistant or grader but ultimate responsibility remains with the instructor for the course. All individuals who grade or evaluate student work in a course must have a formal affiliation with the course (e.g., as instructor of record, teaching assistant, paid grader).
   b. Instructors in charge of a course with multiple sections or laboratories must take reasonable steps to ensure that grading across sections or laboratories is consistent.
   c. In courses where the instructor in charge of a course is an adjunct faculty member who may be affiliated with the University for only a short period of time, the department or academic unit may assign a regular faculty member to be accountable for grades after the course has ended.
   d. Students in every course must be clearly informed about who is ultimately responsible for assigning grades in the course.

2. Student questions about grades
   a. Students have the right to request and receive an explanation for a grade during and after the course but have no right to challenge the academic merits of any grade.
   b. Students may seek an explanation for a grade until the end of the following semester (not including summer session). The instructor is obligated to provide an explanation for a grade within a reasonable time if a request is made by the end of the following semester. The instructor is not obligated to reconsider the grade.
   c. If a student does not receive an explanation for a grade from the instructor within a reasonable time of making a request, he or she may consult the director of undergraduate studies or department chair for assistance in obtaining an explanation. Students also may seek assistance from the campus student conflict resolution office.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

This policy clarifies both the accountability and responsibility for assigning grades; and for responding to requests for explanations about the grades.

PROCEDURES

There are no procedures associated with this policy.
FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

There is no FAQ associated with this policy.

ADDITIONAL CONTACTS

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</table>

DEFINITIONS

Explanation of a grade
The criteria used to formulate a grade, not an automatic change of grade.

RESPONSIBILITIES

Department
Identify an instructor for each course offering by the first week of class.

Instructor
  - Inform students in class who is ultimately responsible for assigning a grade.
  - Respond to grade inquiries and provide explanations upon request.

RELATED INFORMATION

There is no related information associated with this policy.

HISTORY

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
ADMINISTRATIVE POLICY

Grading and Transcripts: Twin Cities, Crookston, Morris, Rochester

Responsible University Officer: Executive Vice President and Provost

Policy Owner: Vice Provost and Dean of Undergraduate Education
Vice Provost and Dean of Graduate Education

Policy Contact: Stacey Tidball

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

A. Establishment and Use of University Grading Systems

1. There are two distinct grading systems on each campus of the University, A-B-C-D-F (with pluses and minuses as permitted by this policy) and S-N. The S-N system is a self-contained alternative to the A-F system and the two may not be combined for a particular student in a particular course. Students may receive grades or symbols only from the grading system under which they have registered for a course. This policy does not require any instructor to use pluses and minuses.

2. There are, in addition, registration symbols identified and described in this policy that carry neither grade nor credit.

3. No campus, college, or program is required to offer a course on the S-N grading system.

4. Any unit may choose to limit grades in a particular course to the A-F or the S-N system.

5. When both grading systems are available to a student, he or she must declare a choice of system as part of the initial registration for the course. The choice may not be changed after the end of the second week of classes (the first week in summer sessions).

6. Except as provided in this policy in Sections A (7) and F (12), no college may use any grading systems other than the ones established by this policy.

7. The Law School and the Medical School are exempt from the provisions of this policy, but will report their grading systems, and any changes therein, to the Faculty Senate. Any other units that believe that the national norms of their profession require a different grading system may make application to the Senate Committee on Educational Policy for an exemption from this policy. The Faculty Senate must approve all such exemptions.

8. The No Grade (NG) grading basis is used for certain graduate-level registrations as determined by the Graduate School.

B. Permanent Grades for Academic Work for Credit

1. The list below identifies the possible permanent grades that can be given for any course for which credit is to be awarded. These grades will be entered on a student's official transcript and, for an A, B, C, or D with permitted pluses and minuses, carry the indicated grade points. (Except for the Law School, the University does not award A+ grades, nor are D- grades permitted). The S grade will not carry grade points but the credits will count toward the student's degree program if allowed by the college, campus, or program.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>4.000</td>
</tr>
<tr>
<td>A-</td>
<td>3.667</td>
</tr>
<tr>
<td>B+</td>
<td>3.333</td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>D+</td>
<td>1.333</td>
</tr>
<tr>
<td>D</td>
<td>1.000</td>
</tr>
<tr>
<td>S</td>
<td>Represents achievement that is satisfactory, which is equivalent to a C- or better.</td>
</tr>
</tbody>
</table>
2. These definitions apply to grades awarded to students who are not enrolled in graduate, post-baccalaureate, and professional programs, but the grade points are the same no matter the level or course of enrollment.

3. Instructors are permitted to hold graduate and undergraduate students who are in the same class to different standards of academic performance and accomplishment. The syllabus must make clear what the different standards will be for the different groups of students who may be enrolled in the class.

4. These are the general University standards. In connection with all symbols of achievement instructors will define for a class, at one of its earliest meetings and as explicitly as possible, the performance that will be necessary to earn each.

C. Permanent Grades for Academic Work for which No Credit is Given

1. There are two permanent grades given for a course for which no credit is to be awarded. These grades will be entered on a student's official transcript.

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>F</td>
<td>“0” Represents failure and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see Section D). The F carries 0 grade points and the credits for the course do not count toward any academic degree program. The credit hours for the course will count in the grade point average.</td>
</tr>
<tr>
<td>N</td>
<td>Represents no credit and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see Section C). The N carries no grade points and the credits for the course do not count toward any academic degree program. The credit hours for the course do not count in the grade point average.</td>
</tr>
</tbody>
</table>

2. a. Scholastic dishonesty. Scholastic dishonesty in any portion of the academic work for a course will be grounds for awarding a grade of F or N for the entire course, at the discretion of the instructor. This provision allows instructors to award an F or an N to a student when scholastic dishonesty is discovered; it does not require an instructor to do so. Students who enroll for a course on the A-F grading system will receive an F if such grade is warranted; students who enroll for a course on the S-N system will receive an N if such grade is warranted. (See Board of Regents Policy: Student Conduct Code for a definition of scholastic dishonesty.)

   b. If the instructor determines that a grade of F or N for the course should be awarded to a student because of scholastic dishonesty, the student cannot withdraw to avoid the F or N. If the student withdrew from the course before the scholastic dishonesty was discovered or before the instructor concluded that there was scholastic dishonesty, and the instructor (or the appropriate hearing body if the student requests a hearing) determines that the student should receive the F or the N, the student will be re-registered for the course and the F and N grade will be entered on the transcripts.

D. Incompletes

1. There will be a symbol I (incomplete) awarded to indicate that the work of the course has not been completed. The I will be assigned at the discretion of the instructor when, due to extraordinary circumstances (as determined by the instructor), the student who has successfully completed a substantial portion of the course's work with a passing grade was prevented from completing the work of the course on time.

2. The assignment of an I requires a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements. In no event may any such written agreement allow a period of longer than one year to complete the course requirements (except as provided in section D (8)).

3. Work to make up an I must be submitted within one year of the last day of final examinations of the term in which the I was given for all students except graduate and professional students. If not submitted by that time, the I will automatically change to an F (if the student was registered on the A-F system) or an N (if the student was registered on the S-N system) for the course. If an I changes automatically to an F or an N, the instructor has the discretion to reinstate the I for one additional year only.

4. For graduate and professional students, an I remains on the transcript until changed by the instructor or department.

5. When an I is changed to another symbol, the I is removed from the record. Once an I has become an F or an N, under the provisions of the preceding paragraph, it may subsequently be converted to any other grade, upon petition by the instructor (or the department if the instructor is unavailable) to the college.

6. A student does not need to be registered at the University in order to complete the work necessary to convert an I to a grade with credit in the time and manner previously agreed upon between the student and the instructor. The instructor is expected to turn in the new grade within four weeks of the date the work was submitted by the student. (Depending on the timing of when the work is turned in and the ability of the instructor to award a grade, an F or an N may appear temporarily on the transcript.) Students who have received an I in a course are not allowed to sit in on the class again (that is, without registering for it) to complete the grade.

7. If a student graduates with an I on the transcript, the I will remain permanently an I. A student may petition his or her college, within a year of graduation, to complete the work in the course and receive a grade. The degree GPA is frozen upon graduation but the cumulative GPA will reflect the change in GPA if a student chooses to complete the work and change the I to a grade within a year of graduation.

8. When students are called to active military duty, and reach agreement with their instructor(s) to take an incomplete, they will have up to one calendar year following their discharge from active duty to complete their incomplete(s).
9. Receipt of an I in a course does not create an entitlement for a student to take the course a second time.

E. Other Transcript Symbols

1. Auditing a course.
   a. There will be a symbol V, visitor, indicating registration as an auditor or visitor, which will carry no credit and no grade.
   b. Students auditing a course are required to pay full tuition but do not take exams and are not required to do homework. An auditor is entered on the class roster (grade report), is counted as filling a seat in a controlled entry course, and is counted in an instructor's student contact hours.
   c. Students may not sit in on a course without registering for it.
   d. A student will be allowed to take a previously audited class for a grade.

2. Withdrawing from a course.
   a. There will be a symbol W, withdrawal, entered upon a student's record when the student officially withdraws from a course in accordance with procedures established by the student's college or campus. The W will be entered on the transcript irrespective of the student's academic standing in that course if the student withdraws from the course during the third through eighth week of class (Crookston) or the third through tenth week of class (Morris, Rochester, Twin Cities) or during the second or third weeks of summer sessions.
   b. If a student officially withdraws from a course during the first two weeks of classes, there will be no record of that course registration entered on the student's transcript.
   c. One-time late withdrawal: Each student may, once during his or her undergraduate enrollment, withdraw from a course without college approval, and receive the transcript symbol W, after the deadline for withdrawal and at any time up to and including the last day of instruction for that course. A student may not withdraw after completing the final examination or equivalent for a course.
   d. Except as provided in the preceding section, withdrawal after the deadlines will require approval of the college and may not be granted solely because a student is failing the course; there must be extenuating non-academic circumstances justifying late withdrawal.

3. Continuation course. There will be a symbol X, indicating a student may continue in a continuation course in which a grade cannot be determined until the full sequence of courses is completed. The instructor will submit a grade for each X when the student has completed the sequence.

4. Course in progress. There will be a symbol K, assigned by an instructor to indicate the course is still in progress and that a grade cannot be assigned at the present time.

5. No grade reported. There will be a symbol NR, administratively assigned to indicate that a grade was not reported for the course. The NR does not carry any GPA points.

F. Other Provisions

1. Zero-credit courses. Courses that carry zero credits do not count in either term or cumulative grade point averages. Such courses carry normal tuition and fee charges.

2. All grades for academic work are based on the quality of the work submitted, not on hours of effort. Instructors have the responsibility and authority to determine how final grades are assigned, including, in classes where they use numeric scores, the method that will be used to translate numeric scores into letter grades. (Examples: the instructor may decide that 90% equals an A, 80% a B, and so on, or the instructor may decide that the top 10% of the scores will receive an A, the next 20% a B, and so on.)

3. Counting credits toward a University degree.
   a. A course that carries University credit toward a degree in one department or college must carry University credit in all other departments and colleges.
   b. A department or college has discretion to decide whether a course completed in another unit will count towards the specific college or department/program/major requirements.

4. When a student graduates, no further changes to his or her transcript will be made (to that portion of the transcript related to the program from which the student graduated) except as expressly allowed under the provisions of this policy.

5. Releasing transcripts. The University's official transcript, the chronological record of the student's enrollment and academic performance, will be released by the University only at the request of the student or in accord with state or federal statutes.

6. Repeating courses.
   a. An undergraduate student may repeat a course only once (except as noted in section 6(c)). The college offering the course may grant an exception to this provision. [Morris only] Students who receive a grade of S or C or higher may repeat a course only if space permits.
   b. When a student repeats a course before receiving his/her degree, (a) both grades for the course will appear on the official transcript, (b) the course credits may not be counted more than once toward degree and program requirements, and (c) only the last enrollment for the course will count in the student's grade point average.
   c. Provisions 6 (a) and (b) of this policy will not apply to courses (1) using the same number but where students study different content each term of enrollment and (2) to courses designated as "repetition allowed."
d. If an undergraduate student repeats a course after his/her degree has been awarded, the original course grade will not be excluded from the degree GPA nor will the new grade be included in the degree GPA.

e. Bracketing is the practice of not including a course in the calculation of a student's GPA and not counting the course as satisfying any degree requirements, including electives, because a student has repeated a course. When a student repeats a course, all prior attempts are bracketed and only the most recent attempt counts (except as provided in 6 (c)). No department or college may bracket the courses of another department or college for any reason other than course repetition. An F may not be bracketed with an N. A University course may not be bracketed with a course taken at another institution. The Graduate School does not bracket courses.

f. When a student enrolled in the Graduate School repeats a course, provisions 6(a) and (b) apply, but all grades for the course will be counted in the student's grade point average.

7. Grade point average. Every student will have calculated, both at the end of each grading period (quarter or semester) and cumulatively, a grade point average, which will be the ratio of grade points earned divided by the number of credits attempted with grades of A-F (including pluses and minuses). Both the term and cumulative grade point average will appear on each student's record.

8. Final grade due date. Final grades will be submitted to the Registrar no later than three business days after the last day of the final examination period.

9. This policy may be modified from time to time but existing transcripts will not be modified when there are changes in policy. Changes to the grading and transcript policy will be reflected on the legend on the back of the official transcript.

10. Compiling and reporting grading data.
   a. Data on the mean grade point average by designator and course level, on the percentage of As awarded by course level, and on overall collegiate grade point averages will be prepared for grades awarded each Fall Semester. Data should be reported for all undergraduate students. Cells in the tables with fewer than 10 grades should be suppressed, in order to protect the privacy of students, but the numbers should be included in the totals.
   b. The Office of Institutional Research will produce the required tables and provide them to the chair of the Senate Committee on Educational Policy and to the Office of the Executive Vice President and Provost.
   c. The data tables and graphs required in 10 (a) and (b) will be reported annually to the Faculty Senate. These data should also be provided to all deans and department heads and made available to faculty and students.

11. All colleges and campuses will publish each term a dean's list, consisting of students who achieved a 3.666 GPA or higher and who completed a minimum of 12 credits on the A-F grading system. There will be a transcript notation for each term that a student achieves the dean's list. Students who have chosen to suppress all their public information (which includes academic awards and honors) will not be included on the published dean's list.

12. Alternative grading systems.
   a. Only the Senate Committee on Educational Policy will have the authority to grant to individual colleges or campuses permission to use alternative grading methods outside the provisions of this official University system, for a specified period (but no longer than five years), and only for the purpose of experimenting with a new grading system for possible system-wide adoption. Such permission may be granted if the proposal does not interfere significantly with the registration options of students from other colleges, campuses, and programs. Such alternative systems will be reported for information to the University Senate as soon as permitted and, after the specified period, will be re-evaluated, either to be discontinued, or with University Senate approval on recommendation from the Senate Committee on Educational policy, made part of the system-wide policy. Except for the provisions of this section 6, no college or program may use any grading system except for the one contained in this policy.
   b. Because alternative grading systems, once used, must be maintained by the University forever afterward (to preserve the integrity of the transcripts), the Senate Committee on Educational Policy will rarely grant permission for alternative grading systems. It will consider doing so only when (1) those who propose it can make a persuasive case that the alternative is a more accurate and effective way to measure and record student academic performance, and (2) there is strong reason to believe that the proposal will be useful to all colleges and campuses of the University (except the Law School and Medical School).

Exclusions
This policy is not applicable to the Duluth campus.

REASON FOR POLICY

A standard grading system establishes a common understanding of the meaning of grades and promotes uniformity in assigning them. Defining grades and their associated meaning (grade points and assessment of achievement) allows for comparison and for computation of the term and cumulative grade point average.
There are no procedures associated with this policy.

**FORMS/INSTRUCTIONS**

There are no forms associated with this policy.

**APPENDICES**

- [Scholastic Committee Guidelines: Petition guidelines for undergraduate students enrolling in a course a third time](#)
- [Student Guidelines: Petition guidelines for undergraduate students enrolling in a course a third time](#)

**FREQUENTLY ASKED QUESTIONS**

- [Grading and Transcripts FAQ](#)

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**DEFINITIONS**

**Major/program requirements**
Program requirements include those determined as the requirements to complete a major or minor in a department. Program requirements must be completed in addition to the other requirements for a degree (e.g. liberal education requirements).

**Scholastic Dishonesty**
Plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

**RESPONSIBILITIES**

**Office of the Registrar**
Maintain the transcript

**Instructor**
Submit final grades within three working days of the last day of final exams.

**RELATED INFORMATION**
HISTORY

Amended:
May 2014 - Major Revision. Moves the drop course date from the eighth week of the class to the tenth week of the class for Morris, Rochester, and the Twin Cities, which allows the student to make a more informed decision about the drop.

Amended:
April 2013 - Minor revision: 2 appendices added - Scholastic Committee Guidelines: Petition guidelines for undergraduate students enrolling in a course a third time and Student Guidelines: Petition guidelines for undergraduate students enrolling in a course a third time

Amended:
April 2010 - Scholastic Dishonesty: Aligns practices across campuses and eliminates a way for students to avoid consequences for cheating by withdrawing from course; Final Grade due date - makes language consistent with related policy and with current practice.

Amended:
December 2009 - Policy now applies to Crookston.

Amended:
September 2009 - Added question 2 to FAQ.

Amended:
April 2009

Effective:
April 2009

University Policy Program
350-2 McNamara Alumni Center, Minneapolis, MN 55455 - P: 612-624-8081, policy@umn.edu

Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

This policy guides academic units in scheduling the instructional time for a specified number of course credits. Instructional time expectations per credit do not vary with the method(s) of delivery of the course or with the length of the academic term.

1. For all enrollment periods and for all courses, the hours of instructional time for a course must equal at least the number of credits for the course times the number of weeks the course is offered during the full academic term.

2. Instructional time is defined for these purposes as instruction by the instructor(s) assigned to the class as scheduled by the academic department. Instructional time does not include office hours or casual or informal time spent with students.

3. Course proposals must include information regarding instructional time. Proposals must provide significant evidence to justify a schedule that includes fewer total instructional hours than the standard defined in paragraph (1.). Instructional hours of all types equal to or in excess of the standard defined in paragraph (1.) need not be justified.

4. When reviewing a course proposal, college and campus curriculum committees and other approving bodies (e.g., the Council on Liberal Education) must consider the instructional hours in reaching a decision on whether to approve a proposed course; such bodies should normally reject course proposals that have fewer instructional hours than the standard defined in paragraph (1.), barring significant evidence that reduced instructional contact hours are appropriate. In their review, these bodies will also take into consideration the method(s) of delivery of the course (e.g., traditional classroom setting, various distance education delivery methods).

5. Courses for individualized instruction such as directed study, directed readings, and directed research, which require a written contract outlining the responsibilities of the student for the course, are explicitly exempted from this standard, and may have fewer instructional hours per week than the standard.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Instructional time per course credit is defined to provide a consistent minimum expectation for students and faculty. Students and faculty should know in general what time commitment is involved for a specified number of course credits. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission and compliance with the federal definition of a “credit hour” for financial aid eligibility.

PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.
APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

- Instructional Time per Course Credit FAQ

ADDITIONAL CONTACTS

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<td>612-624-3970</td>
<td><a href="mailto:reckn001@umn.edu">reckn001@umn.edu</a></td>
</tr>
<tr>
<td>Twin Cities Campus Procedures</td>
<td>Stacey Tidball</td>
<td>612-626-0075</td>
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<tr>
<td>Rochester Campus Procedures</td>
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<td>507-258-8006</td>
<td><a href="mailto:lcarrell@r.umn.edu">lcarrell@r.umn.edu</a></td>
</tr>
</tbody>
</table>

DEFINITIONS

Instructional time
Scheduled instruction/teaching by an individual appointed for that purpose.

RESPONSIBILITIES

Collegiate and campus curriculum committees
Review proposed courses in light of conformance with policy; assess the appropriateness of proposed instructional hours. When proposed instructional hours vary from the standard, assess the type of course, and the proposed delivery method.

Academic Departments
Follow the established policy for instructional time per course credit when scheduling courses.

RELATED INFORMATION

- Administrative Policy: Academic Unit Authority over the Curriculum and Major: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Expected Student Academic Work per Credit: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Class Scheduling: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Higher Learning Commission, Criteria and Requirements for Accreditation

HISTORY

Amended:
April 2016 - Comprehensive Review. Major Revision. Simplifies language for clarity and removes repetitive language. Adds language in paragraph three to include the need for significant evident to justify proposals with fewer than normal instructional hours. Clarifies the section
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
ADMINISTRATIVE POLICY

Leave of Absence and Reinstatement from a Leave: Graduate Students

Responsible University Officer: Executive Vice President and Provost
Policy Owner: Vice Provost and Dean of Graduate Education
Policy Contact: Amber Cellotti, Karen Starry

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

Graduate students are expected to maintain active status through continuous registration from the time they matriculate until they graduate. Students who are not able to maintain active status are strongly encouraged to consult with their Director of Graduate Studies, advisor, and relevant offices to determine whether requesting a leave of absence is the most appropriate course of action. Students who do not have an approved leave of absence and are not continuously enrolled may experience negative consequences related to academic, visa, financial aid, and other student issues.

1. Students who experience circumstances that prevent them from maintaining active student status will ordinarily be granted college approval for a leave of absence upon request. Students must complete a leave of absence form that specifies the term(s) and year(s) of the leave.
2. An approved leave of absence may not exceed two academic years.
3. Students who do not obtain a college-approved leave of absence prior to interrupting their enrollment (excluding summer) may be terminated from their graduate program or held to new requirements if they are subsequently readmitted.
4. Students granted a leave of absence may not use University facilities or services available only to registered students.
5. The term(s) and year(s) of an approved leave of absence will not be counted toward time to degree.
6. Students who obtain a college-approved leave of absence in accordance with this policy are eligible for reinstatement provided they enroll no later than the term immediately following the expiration of the leave (excluding summer). Colleges may specify reasonable conditions for reinstatement to active status, whether the student returns early or at the expiration of the leave. Colleges may deny reinstatement to active status based on crimes or other serious misconduct occurring during the leave that would have been grounds for suspension or expulsion had the student engaged in the conduct while enrolled (see Board of Regents Policy: Student Conduct Code).
7. Students whose leave of absence has expired and who have not yet registered for the following term (excluding summer) will be placed on inactive status. Students who are placed on inactive status must apply for readmission.
8. Collegiate units may develop additional rules governing leaves of absence, as long as they are consistent with this policy.

Documentation

Each college must establish and publicize its process for implementing this policy and must inform all entering students about it.

REASON FOR POLICY

Students may need to interrupt their enrollment for reasons they cannot control. Allowing students to take a leave of absence provides students the opportunity to return to the University under the rules and policies in effect when they left and without affecting their time to degree. It also allows the University the opportunity to counsel students about actions they must take to be reinstated upon the expiration of the leave.

PROCEDURES

- Guide to Leave of Absence
FORMS/INSTRUCTIONS

- UM 1759 - Leave of Absence Reinstatement Request: Graduate Students (Twin Cities, Duluth, Rochester)
- UM 1758 - Leave of Absence Request - Graduate Students: Twin Cities, Duluth, Rochester

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

- Leave of Absence Reinstatement FAQ

ADDITIONAL CONTACTS

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<tr>
<th>Subject</th>
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| University of Minnesota - Duluth Questions | Erik Brown | 218-726-8891 | etbrown@umn.edu |

DEFINITIONS

Continuous registration
Registration for every fall and spring semester. Required to maintain active status.

Graduate students
Students enrolled in post baccalaureate degree programs with the exception of “first professional” degrees. (The first professional degrees are: the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

Active status
Graduate students who register every fall and every spring (i.e., continuously registered) are considered active.

Inactive status
Graduate students who do not register every fall and spring and who have not been granted a formal leave of absence by their college will be placed on inactive status.

Leave of absence
Refers to a process by which students obtain college approval to leave the University for a specified period of time (i.e., not register for fall/spring term[s]), but for no longer than two academic years.

Matriculate
Individuals matriculate upon their first registration as an admitted graduate student at the University.

Reinstatement
The process required for returning to the University after an approved leave of absence. Students with a college-approved leave of absence are eligible for reinstatement if they notify their college via the appropriate reinstatement form prior to the term in which they intend to enroll, they enroll no later than the term immediately following the expired leave (excluding summer), and they return to the same major and degree objective.

Readmission
The process of reapplication to the University for admission. Readmission is required following a break in enrollment without an approved leave of absence, as well as after failure to return by the term immediately following an approved leave of absence (excluding summer).
RESPONSIBILITIES

College
- Establish and publicize leave of absence policy and ensure that students are informed throughout their academic careers of the policy and consequences of inactive status.
- Inform students of potential conditions that may be imposed upon reinstatement at the end of an approved leave of absence.
- Help students who are pursuing degrees in multiple colleges to connect with each college to ensure coordinated leave of absence requests.
- Help reinstate students at the end of an approved leave of absence.
- Enter the necessary information into PeopleSoft related to effect start - and return - leave of absence dates for each degree being pursued by the student.
- Discontinue students from the degree(s) they are pursuing in the event that students do not request reinstatement prior to the approved term/year, or if upon reinstatement, fail to register for the approved term/year.

Graduate student
- Talk with their advisor and Director of Graduate Studies for each degree they are pursuing, and other relevant offices (e.g., International Student and Scholar Services, Office of Student Finance, Graduate Assistant Employment).
- Submit the Leave of Absence Form for Graduate Students when planning a leave of absence. Submit the Application for Reinstatement for Graduate Students prior to intended term of return. Students pursuing degrees in more than one college must submit the Leave of Absence and Reinstatement forms with each college.

RELATED INFORMATION
- Board of Regents Policy: Student Conduct Code
- Administrative Policy: Family and Medical – FMLA Leave
- Administrative Policy: Grading and Transcripts
- Administrative Policy: Military, Court Appearance, or Civic Duty Leaves
- Administrative Policy: Parental Leave for Academic Employees
- Boynton Health Service
- Disability Resource Center
- Graduate Assistant Employment
- International Student and Scholar Services
- Office of Student Health Benefits

HISTORY
Effective: August 2011 - New Policy, Comprehensive Review: Establishes a formal leave of absence for graduate students who need to interrupt their enrollment for reasons they cannot control such as illness, family emergencies, etc. This policy parallels a similar policy already in effect for undergraduate students. Allows students to return to the University under the rules and policies in effect when they left. Aligns with best practice at peer institutions.
POLICY STATEMENT

1. Instructors and academic units should retain submitted student work for 30 days after grades for the course are posted to the student's transcript in order to permit students the opportunity to retrieve or review their work, as appropriate. After 30 days, such student work may be discarded securely (following applicable University document-destruction procedures).

2. A student may request that his or her work be retained until 30 days into the next semester (not including summer, so a request in the spring would require a unit to hold the work until 30 days into the following fall semester). A student must make this request to the instructor no later than the last day of instruction for the course.

3. Instructors must follow state and federal privacy laws in retaining and returning student work. (For example, student work may not be left in hallways or other public places where anyone may see it.)

4. Academic units must retain grade books or their equivalents for a minimum of one year or, if a grade is appealed, until the end of the appeal. Instructors leaving the University must give all grading records to the department.

5. Academic units must also be aware of and follow Administrative Policy: Managing University Records Retention.

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

To establish a reasonable time period after the end of a term during which students are able to retrieve or view their work and that recognizes the physical storage space limitations in units.

PROCEDURES

There are no procedures related to this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices related to this policy.
**What is student work?**
Any work submitted by a student to meet meeting course requirements is considered student work. This includes but is not limited to exams, quizzes, papers, projects, problem sets, designs, artwork, and architectural models.

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### ADDITIONAL CONTACTS

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### DEFINITIONS

**Student Work**
Materials a student has submitted for a course, including but not limited to, papers, projects, exams, problem sets, artwork, and architectural models.

**Maintain**
The process of keeping the student work where it can be safely stored and accessed.

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### RESPONSIBILITIES

There are no specific responsibilities related to this policy.

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### RELATED INFORMATION

- Administrative Policy: [Managing University Records Retention](#)

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### HISTORY

**Amended:**
December 2009 - Policy now applies to Crookston.

**Effective:**
April 2009
**POLICY STATEMENT**

University policy recognizes that there are a variety of legitimate circumstances under which students will miss coursework, and that accommodations for makeup work will be made.

This policy applies to all course requirements, including any final examination.

1. Students are responsible for planning their schedules to avoid excessive conflict with course requirements.
2. Voting in a regional, state, or national election is not an unavoidable or legitimate absence.
3. Instructors may not penalize students for absence during the academic term due to unavoidable or legitimate circumstances. Such circumstances include:
   - illness, physical or mental, of the student or his or her dependent;
   - medical conditions related to pregnancy;
   - participation in intercollegiate athletic events;
   - subpoenas;
   - jury duty;
   - military service;
   - bereavement, including travel related to bereavement;
   - religious observances; and
   - activities sponsored by the University if identified by the senior academic officer for the campus or his or her designee as the basis for excused absences.
4. Instructors are expected to accommodate students who wish to participate in party caucuses, pursuant to Board of Regents resolution (see December 2005 board of Regents Minutes, p 147.)
5. For circumstances not listed in (3), the instructor has primary responsibility to decide on a case-by-case basis if an absence is due to unavoidable or legitimate circumstances. Instructors have the discretion to grant a request for makeup work in such circumstances.

**Notification, Verification of Absences, and Make-up Work**

6. Students must notify their instructors of circumstances identified in (3) or other circumstances leading to a request for makeup work as soon as possible and provide information to explain the absence. Some situations will be sufficiently urgent that arrangements for makeup work cannot be made prior to the date of an absence. In such cases, arrangements should be made as soon as possible following the student's return.
7. The instructor has the right to request verification for absences.
8. Students must provide verification of the absence if requested by the instructor.
9. The instructor may not penalize the student and must provide reasonable and timely accommodation or opportunity to make up missed work, including exams or other course requirements that have an impact on the course grade if the student:
   - Was absent due to circumstances identified in (3);
   - Has complied with the notification requirements; and
10. Colleges and academic units may establish more specific criteria for notifying instructors and completing the associated make-up work.

11. Instructors are not obligated to accommodate a student who has missed so much of the critical components of a course, even for legitimate reasons, that arrangements for makeup work would not be reasonable.

Instructors should take all factors into consideration when determining whether to grant an excused absence and how to make arrangements for makeup work that has an impact on the course grade. If a student has missed a component of the course that cannot be made up in exactly the same manner, the instructor may substitute another activity or assignment in order to assess the missed components. If no substitution can be devised, the missing component(s) cannot be factored into determining that student's final grade for the course.

Appeals

If a student believes he or she has been wrongly denied the opportunity to make up work due to disagreement with the instructor about the legitimacy or unavoidability of an absence, the student should pursue his or her complaint using the usual process for appeals of student grievances. Chairs and deans who have questions about what constitutes an excusable bereavement absence, religious observance, or eligible dependent illness should consult with the senior academic officer for the campus for resolution of the disagreement.

In accordance with the Administrative Policy: *Addressing Student Academic Complaints*, final authority rests with the senior academic officer for the campus.

Special Situations

In the event that the University declares a pandemic emergency (e.g., a flu epidemic), the senior academic officer for the campus or his or her designee may waive the requirement that students, if requested by the instructor, provide verification from a health care provider for illness.

Exclusions

This policy does not apply to the Duluth campus.

**REASON FOR POLICY**

It is in both the University's and the student's interest to outline some academic protections for students when they miss class for legitimate reasons. This policy places parameters around what is a legitimate absence, and reinforces the responsibilities of the instructor and the student.

**PROCEDURES**

There are no procedures associated with this policy.

**FORMS/INSTRUCTIONS**

There are no forms associated with this policy.

**APPENDICES**

There are no appendices associated with this policy.

**FREQUENTLY ASKED QUESTIONS**

- [Makeup Work for Legitimate Absences FAQ](#)

**ADDITIONAL CONTACTS**
DEFINITIONS

Dependent
A person, typically a qualifying child or other relative, other than the taxpayer or spouse, who entitles the taxpayer to claim a dependency exemption for tax purposes.

Intercollegiate athletics
Sports teams organized and funded by the institution through the athletics department. Intercollegiate does not refer to or include recreational sports, intramural sports, club sports, or other special interest sport clubs or organizations.

RESPONSIBILITIES

Instructor

- Provide timely and clear responses to requests for makeup work for absences.
- Provide reasonable and timely accommodation for makeup work for legitimate absences.
- Maintain consistency in how this policy is applied to all students enrolled in the course.

Student

- Plan schedules to avoid excessive conflict with course requirements.
- Notify instructors of circumstances related to absences as soon as possible.
- Provide verification of absence, if requested by the instructor.

RELATED INFORMATION

Related Administrative Policies

- Administrative Policy: Intercollegiate Athletic Events during Study Day and Finals Weeks: Twin Cities, which prohibits intercollegiate athletic competition during study day and finals week except under certain circumstances.
- Administrative Policy: Teaching and Learning: Student Responsibilities
- Administrative Policy: Teaching and Learning: Instructor and Unit Responsibilities
- Administrative Policy: Mandatory Attendance at First Class Session and Consequences for Absence

Other Related Information

- Board of Regents resolution, December 9, 2005, "Approval of a resolution related to Events and Classes on Precinct Caucus Night", [See pp.147-8].

HISTORY

Amended:
December 2015 - Comprehensive Review, Minor Revisions. 1. Organizes the information more logically and includes key subheadings. 2. Expands on the FAQ to incorporate numerous questions and answers received or given over the past years, including information related to family vacations and attendance at weddings. 3. Added new language addressing travel related to bereavement.
Amended:
June 2014 - Comprehensive Review. Clarifies the instructor responsibility for accommodating student absences due to medical conditions related to pregnancy, supporting a request from Kim Hewitt. Moves the sentence re: instructors having the right to request verification to a separate bullet. Adds instructor and student to the Responsibilities section.

Amended:
January 2011 - Comprehensive Review. Expands allowable absences to include caring for student's dependent. Documentation required only when requested by instructor. Responsibility for determining whether absence is legitimate rests with instructor.

Amended:
May 2010 - Expands the application of this policy to final exams, in addition to all course requirements, since legitimate absences can occur anytime during the academic year.

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009
POLICY STATEMENT

The University protects the rights of students with respect to their education records. Education records generally include any personally identifiable records maintained about a student by the institution, including academic, disciplinary, and administrative records. Each campus must:

- provide students with an annual notice of their rights,
- regulate access to education records in accordance with law and policy,
- maintain records as required by law and policy,
- provide students with the right to request amendment to their education records and the right to a hearing concerning their education records, and
- provide complete records, from all units at the University, in response to a student's request that records be provided.

Access to student records. University officials may have access to student information, if their responsibilities reasonably require access to that information for educational, administrative, or research purposes in the performance of their job duties. University employees who have access to student education records are obligated to carefully protect them and will be held accountable for safeguarding them. Policy or procedure violations may result in disciplinary action, including possible termination of employment, and applicable civil and criminal sanctions.

Distributing grades. The posting of grades or examination results with personally-identifiable information (i.e., student ID number, Social Security Number, student name) is prohibited. Examinations, papers, blue books, or any other graded materials that contain personally-identifiable student information (i.e., name, student ID number) should be distributed directly to students or made available for pick up in departmental offices in a manner that ensures the privacy of each student's grade.

Student right to review. Students are entitled by law to review portions of their records at the University and to request amendments of such records if the student believes they are inaccurate, misleading, or otherwise in violation of the privacy or other rights of the student.

Disclosure of student records, including disciplinary background checks. Personally-identifiable student information may only be released under the conditions outlined in the procedures or with the written permission of the student. When a student provides a valid authorization to release student records to a third party, all records that are legally covered by the authorization must be released as requested by the student. Units responding to external requests for information must ensure that the response includes all requested information that exists at the University.

REASON FOR POLICY

This policy implements Board of Regents Policy: Student Education Records, and establishes procedures to ensure compliance with state and federal law governing student education records.

PROCEDURES

- Assuring Student Rights Regarding Education Records
- Accessing and Using Student Education Records
- Releasing Student Information
- Responding to Authorizations to Disclose Student Records
- Students Managing Their Education Records
FORMS/INSTRUCTIONS

- UM 1801 - Reference Request and Employee Authorization
- UM 1711 - Reference Request and Student Authorization
- FA 857 - Student Information Release Authorization
- Access Request Form (ARF) on the OIT Data Security page

APPENDICES

- Persons And Institutions That May Receive Information Without Student Permission

FREQUENTLY ASKED QUESTIONS

There is no FAQ associated with this policy.

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<td>Susan McKinney</td>
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DEFINITIONS

- **Directory Information**
  Student's name, address, etc.

- **Legitimate Education Interest**
  An interest in student records for the purpose of performing stated job duties.

- **Student Applicant**
  A person who has applied for admission to a University college. It includes students who are enrolled in a University college and are applying for admission to another University college.

- **Student Education Records**
  Any student record maintained by the institution that contains personally identifiable information.

- **University Official**
  University officials are those members of the University whose responsibilities reasonably require access to student records for educational, administrative, or research functions and may include faculty, administration, clerical and professional employees, and other persons who manage student record information.

RESPONSIBILITIES

- **Custodian of Education Records**
  Bring Board of Regents Policy: Student Education Records and other pertinent federal and state laws to the attention of all people who have access to student records. Respond to requests by student to amend an educational record.

- **Vice Provost & Chancellors**
Appoint the custodians of student education records.

**Departments with Academic Records**
Adopt these administrative procedures or prepare its own departmental procedures that are set forth in the Regents and this policy.

**Hearing Officers**
Comply with the hearing procedures.

**Registered Student**
Complete a request to prevent disclosure to prohibit the disclosure of directory information during the term of enrollment.

**Office of the Registrar**
Publish an annual public notice designating directory information and informing students of their option to prohibit release of directory information.

**University Officials**
Respond to inquiries about students without their consent if the requested information is a matter of public record or directory information and not suppressed.

## RELATED INFORMATION

### Statutes:

### Related Policies:
- Board of Regents Policy: *Student Education Records*
- Administrative Policy: *Reporting and Notifying Individuals of Information Security Breaches*

## HISTORY

**Amended:**
October 2009 - Added new procedure: *Responding to Authorizations to Disclose Student Records*. Title changed from Protecting the Privacy of Student Education Records to Managing Student Records. Clarifying changes made throughout policy.

**Effective:**
June 2005
MANDATORY ATTENDANCE AT FIRST CLASS SESSION AND CONSEQUENCES FOR ABSENCE: TWIN CITIES, CROOKSTON, MORRIS, ROCHESTER

RESPONSIBLE UNIVERSITY OFFICER: Executive Vice President and Provost

POLICY OWNER: Vice Provost and Dean of Undergraduate Education
Vice Provost and Dean of Graduate Education

POLICY CONTACT: Stacey Tidball, Karen Starry

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

1. Students are required to attend the first class session in order to receive important information about the course from the instructor. Students must attend the first class meeting of every part of a course in which they are registered (including, labs, discussion sections, lectures, and other types of class meetings), unless they have obtained prior approval from the instructor (or department, if appropriate) for an intended absence before the first class meeting. Without such prior approval, a student may lose his or her place in the class to another student.

2. If a student wishes to remain in a course from which he or she has been absent the first day without prior approval, the student must contact the instructor as soon as possible. In this circumstance, instructors have the right to deny access to the class if other students have been added and the course is full. However, instructors should consider extenuating circumstances that may have prevented a student from attending the first class session and from notifying the instructor in advance.

3. Absence from the first class session that falls during a recognized religious holiday (e.g., Rosh Hashanah) does not require instructor approval, but the student must notify the instructor in advance regarding the absence and the reason for the absence. In this instance, the place for the student will be retained. (See Administrative Policy: Makeup Work for Legitimate Absences: Twin Cities, Crookston, Morris, Rochester for further information regarding absences.)

4. Students are responsible for officially cancelling their enrollment in any course in which they have enrolled and subsequently been denied enrollment. If any such student does not officially cancel enrollment from the course, the instructor has the choice to either (a) assign a failing grade to the student for that course, or (b) request that the student be disenrolled.

EXCLUSIONS

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Students are required to attend the first class session to receive important information about the course from the instructor. In addition, because students can enroll and disenroll for courses on-line, the list of registered students fluctuates. A student’s presence at the first class session is required to clearly indicate the number of students who are committed to taking the course. Instructors can then determine whether any students who were not able to register for a course because all seats were taken may take the place of students who registered but did not attend the first class session.

PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS
There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

1. Is it mandatory that a student be removed from a class if he/she misses the first class session?
   Instructors are not required to request that the student be removed from the class, but it is their prerogative to make such a request.

2. What is the necessary process for instructors to disenroll students from a course?
   Instructors can contact their college’s student services department or One Stop Student Services to request students be disenrolled for not attending the first class session.

3. How does this policy apply to on-line courses?
   The policy extends to on-line courses as well as traditional in-person courses. Students must attend the first class meeting or obtain permission from the faculty member to be absent. In the traditional classroom courses, attendance means the student is physically present in the course. For courses that are delivered partially or completely online, instructors have discretion to indicate on the syllabus the specific action(s) a student would need to take within a specified time period (e.g., post an online discussion group on academic matters, initiating contact with a faculty member to ask a question about an academic course topic, submitting an assignment, taking a quiz) in order to be considered as having attended the online course.

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DEFINITIONS

Officially cancel
Students must cancel (drop) a class if they have been denied enrollment in that course. Students are responsible for dropping a course to officially remove it from their record and may do so online in the course registration system.

RESPONSIBILITIES

Students
Attend the first sessions of courses for which they have registered, or seek prior approval from the instructor if they are unable to attend. Use the course registration system to drop a course they have registered for but will not be attending.

Instructors
Monitor official course registration lists. Take attendance at first class meeting(s). Respond promptly to students who have contacted the instructor regarding not attending the first class session. Notify students if they have been denied enrollment in a course. Report a failing grade if a student who was denied enrollment in a course does not drop the course, or request that the student be disenrolled.

RELATED INFORMATION
HISTORY

Amended:
December 2009 - Policy now applies to Crookston.

Effective:
April 2009
POLICY STATEMENT

Students are responsible for meeting all requirements for completing the master’s degree, including thesis or project defense and submission, where applicable.

I. Final Examination Committee: Plan A and B Master’s Degrees
   a. The final examination committee must consist of at least three members, including the advisor/s. All members of the committee and the student must participate in the final examination. Committee members and/or the student may participate remotely as long as all conditions for remote participation in examination are met.
      i. At least one member must represent a field outside the student’s major field.
      ii. If the student has a declared minor(s), the outside member(s) must be from the minor field(s).
      iii. Members cannot satisfy the requirement with respect to more than one field.
   b. Changes in committee membership may be made after filing the degree plan if approved by the program Director of Graduate Studies and the collegiate unit. Changes must also be archived centrally in the system of record.

II. Final Examination:
   a. For students submitting a Plan A thesis, the final examination must contain an oral component. The final oral examination is a closed examination open only to the final oral examination committee and the student. Programs may also require a written examination.
   b. For students submitting a Plan B project, the final examination may be oral, written, or both. The final oral examination is a closed examination open only to the final oral examination committee and the student.
   c. Students must provide the reviewers with a copy of the Plan A thesis or project submitted in lieu of a thesis at least 14 days before the scheduled date of the final examination.
   d. Every member of the final examination committee must certify on the master’s thesis reviewer’s report that the thesis or project submitted in lieu of a thesis is ready for defense before the final examination may take place.
   e. A majority vote of an examining committee is required to pass the master’s final examination.
   f. If revisions are required as a condition of passing, the advisor/s must certify that the revisions have been completed before the degree is awarded.
   g. If the student fails the final examination, he or she may retake the examination only if all committee members, or all committee members save one, approve this option.
   h. The second attempt to pass the master’s final examination must use the same committee members as the first examination unless an emergency situation necessitates a substitution.
   i. If the committee does not approve a retake, or if the student fails the second attempt, the student will be terminated from the program.

III. Thesis Submission: Master’s Thesis/Professional Engineering Design Project
   All students who complete a Plan A Thesis or Professional Engineering Design Project must file a digital copy of the thesis with the University in accordance with University standards. Students may request that the University embargo publication of the thesis for a limited period of time.

IV. Plan C Master’s Degrees
   Plan C master’s degrees typically do not include standard final examination formats like those for Plan A and Plan B master’s degrees. However, students must satisfy all of the course and other requirements specified by the program in order to complete the degree.
V. Minimum GPA required for graduation

Students must have a 2.800 minimum GPA for courses included on the degree plan at the time of degree clearance.

Effective Date

This policy applies to all students admitted after January 1, 2013. Students who matriculated before January 1, 2013 may choose to continue under the policies in effect when they initially matriculated in their graduate program.

This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

REASON FOR POLICY

This policy establishes uniform standards for the master’s final examination; defines timely submission of copies of the thesis for University archives, and supports Board of Regents Policy: Openness in Research which covers public dissemination of University-sponsored research.

PROCEDURES

- Canceling or Recessing the Doctoral Preliminary and/or Master's or Doctoral Final Oral Examination
- Degree Completion Procedures

FORMS/INSTRUCTIONS

- Master’s Graduation Packet Request
- Thesis or Dissertation Hold Request

APPENDICES

- Degree Completion Steps: Master's Plan A
- Degree Completion Steps: Master's Plan B, Master's Plan C
- Mutual Roles and Responsibilities for Faculty and Graduate Students: Guidelines
- Required Conditions and Best Practices for Remote Participation in Graduate Examinations
- Thesis Formatting and Submission Guidelines

FREQUENTLY ASKED QUESTIONS

- Master's Degree: Completion FAQ

ADDITIONAL CONTACTS

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<th>Subject</th>
<th>Contact</th>
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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Karen Starry</td>
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DEFINITIONS
**Project in lieu of a thesis**

Some programs permit students to submit a project instead of a written thesis. Such projects may consist of performances, displays, working models, etc.

### RESPONSIBILITIES

#### Graduate School
- Provide guidelines for formatting and submitting the thesis, to include not only current instructions for electronic formatting and filing, but also guidelines governing the use of already published material in the thesis. Guidelines should take account of possible copyright issues.

#### Collegiate Units
- Approve and archive in the system of record committee membership (including any subsequent changes to an approved committee). Changes in committee membership must also be approved by the program DGS.
- Approve and record the specific procedures used by programs for administering and grading the master’s final examination.
- Maintain and publish any additional collegiate-level publishing standards or guidelines (e.g., stylistic conventions based on discipline, language of the thesis).

#### Departments/Programs
- Publish the specific procedures used for administering and grading the master’s final examination, and identify whether candidates for each degree and track offered must take written examinations, oral examinations, or both.
- Provide program-specific information in the graduate handbook.
- Maintain and publish any additional program-level publishing standards or guidelines (e.g., stylistic conventions based on discipline, language of the thesis).
- Review and approve any changes in committee membership; route program-approved requests to the collegiate unit for approval and archiving.

### RELATED INFORMATION

- Administrative Policy: [Appointments to Graduate Examination Committees](#)
- Administrative Policy: [Master’s Degree: Performance Standards and Progress](#)
- Administrative Policy: [Admission for Master’s and Doctoral Degrees](#)
- Administrative Policy: [Readmission or Changes to Master’s or Doctoral Degree Objectives](#)

### HISTORY

**Effective:**
July 2012 - New Policy, Comprehensive Review: 1. Establishes guidelines for remote participation in graduate milestone examination. 2. Establishes the University as the digital archive of record for deposit of dissertations. 3. Extends applicability of policy requirements to programs not formerly under the aegis of the Graduate School.
POLICY STATEMENT

Students are responsible for knowing all program requirements of their master’s program when they matriculate. If program requirements change, students may elect to continue under the requirements in effect when they matriculated, provided they have remained in good standing.

The advisor and the Director of Graduate Studies (DGS) for the program are jointly responsible for helping each student plan and appropriately complete the requirements in a timely fashion. The DGS is also responsible for ensuring that each student receives training appropriate to the discipline in the responsible conduct of research and ethical teaching and scholarship.

Programs and collegiate units may have additional and/or more stringent requirements.

I. Pre-Matriculation Requirements for Programs

Programs must, before students begin their first term of study:

- Provide each student a current graduate program handbook, specifying the program’s requirements and policies governing successful degree completion
- Assign each student a temporary advisor

II. Progress Review

a. Annual Review Programs must review the progress of each master’s student annually. Students deemed not to be in good standing must be informed of the results of the review in writing, with a copy to the student’s advisor.

b. Degree Plan Master’s degree students must have an approved degree plan on file in the collegiate unit in order to defend and/or apply for degree clearance. It is recommended that the degree plan be filed at least one term (fall or spring semester) before the intended term of the defense and/or application for degree clearance. The degree plan must be archived in the system of record.

   For students intending to pursue a minor:
   i. In master’s programs that include a final examination/defense, students must declare the minor prior to the examination/defense.
   ii. In master’s programs that do not include a final examination/defense, students must declare the minor prior to filing for degree conferral.

III. Performance Standards

a. Continuous Enrollment Students are required to enroll every semester (fall and spring) from the time of matriculation until degree conferral.

b. Time Limit for Earning the Master’s Degree All requirements for the master’s degree must be completed and the degree awarded within the shorter of five calendar years after initial enrollment in the graduate program or the more restrictive time frame specified by the program.

   Students who are unable to complete the degree within the time limits described above due to extraordinary circumstances may petition the program and collegiate unit for an extension of up to 12 months. Students must obtain the approval of their advisor/s and program DGS and submit the petition by the deadline.

   o If a petition is approved, the student is notified in writing of the expectations for progress and for the month/year of degree conferral.
   o If the petition is denied, the student is notified in writing that he or she will be terminated from the graduate program upon
expiration of the limit.

Students who have been terminated under such circumstances may apply for readmission to the program; however, readmission is not guaranteed.

c. **Minimum Grade Requirements** To remain in good academic standing students should meet the minimum GPA requirement specified by the graduate program or 2.800 (on a 4.000 scale), whichever is higher. Students who have filed a master's degree plan should maintain a 2.800 GPA for courses included on the degree plan. Only courses with grades of A, B, C (including C-) and S may be counted toward the degree. Students who have not yet filed a degree plan should maintain an overall GPA of 2.800. Students who fall below the program's minimum GPA requirement may be terminated from the program.

Note: Students must have at least a 2.800 GPA for courses included on the degree plan at the time of degree clearance.

d. **S/N grades for courses** A minimum of 2/3 of the course credits included on a degree plan must be taken A/F.

**Exception**

Programs with a distinctive student population or approved joint-degree programs may request a program-wide exception to the five-year time limit for earning the master's degree.

**Effective Date**

This policy applies to all students admitted after January 1, 2013. Students who matriculated before January 1, 2013 may choose to continue under the policies in effect when they initially matriculated in their graduate program.

This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

**REASON FOR POLICY**

Assists student and advisor in planning for timely completion of program requirements; provides timely evaluations to students as they proceed through program; alerts student and advisors to problems, and provides opportunity to develop best approach for addressing those problems; creates clear record in cases where program decides to terminate student.

**PROCEDURES**

There are no procedures associated with this policy.

**FORMS/INSTRUCTIONS**

- OTR 198 - Graduate Degree Plan
- UM 1778 - Master's Degree: Program-Wide Exception to the Maximum Time Limit
- UM 1779 - Master's Degree: Request for Extension to the Maximum Time Limit

**APPENDICES**

- Academic Freedom and Responsibility
- Annual Graduate Student Reviews: Guidelines
- Graduate Program Student Handbook: Guidelines
- Mutual Roles and Responsibilities for Faculty and Graduate Students: Guidelines
- Responsible Conduct of Research and Ethical Teaching and Scholarship

**FREQUENTLY ASKED QUESTIONS**
DEFINITIONS

Good standing/good academic standing
Students remain in good standing if they: (a) make timely progress towards degree completion as required by the program and by this policy; (b) maintain a GPA at or above the minimum set by the program and by this policy; and (c) pass all appropriate examinations within the time frame specified by the program.

RESPONSIBILITIES

Collegiate Units
- Ensure appropriate review of coursework on the degree plan (including any subsequent changes to an approved degree plan); archive the degree plan in the system of record
- Set college deadline for students who are requesting an extension to the time limit for completing master's degrees
- Review and approve program-wide requests for exceptions to the time limit for completing the master's degree; archive requests in the system of record
- Review and approve requests for extensions to the time limit for completing the master's degree; archive petitions in the system of record

Departments/Programs
- Clearly state the program requirements for maintaining good standing in the Graduate Program Handbook, even if they are identical to the requirements in this policy
- Review and approve the degree plan (including any subsequent changes to an approved degree plan)
- Review and approve requests for extensions to the time limit for completing the master's degree; notify students in writing of the decision and subsequent actions (i.e., expectations for progress and for the month/year of degree conferral or termination from the program upon expiration of the limit)

Students
- Must obtain the required approvals and file the degree plan with the collegiate unit
- Must initiate the request for an extension to the maximum time limit for completing the master’s degree, obtain the approval of their advisor/s and program DGS, and submit their request for an extension by the deadline

RELATED INFORMATION

- Administrative Policy: Admission for Master’s and Doctoral Degrees
- Administrative Policy: Appointments to Graduate Examination Committees
- Administrative Policy: Leave of Absence and Reinstatement from a Leave: Graduate Students
- Administrative Policy: Master’s Degree: Completion
- Administrative Policy: Readmission or Changes to Master’s or Doctoral Degree Objectives
Effective:
July 2012 - New Policy, Comprehensive Review. 1. Continues the five year time limit for master’s degrees, but provides a process for requesting a program wide exception for distinction student populations. 2. Requires an annual progress review for all master’s students. 3. Extends applicability of policy requirements to programs not formerly under the aegis of the Graduate School.

University Policy Program
350-2 McNamara Alumni Center, Minneapolis, MN 55455 - P: 612-624-8081, policy@umn.edu

Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
ADMINISTRATIVE POLICY

Post-baccalaureate Certificate Plans
Approved by the Board of Regents

Responsible University Officer: Executive Vice President and Provost
Policy Owner: Executive Vice President and Provost
Policy Contact: Emily Ronning
Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

This policy governs post-baccalaureate certificates approved by the Board of Regents. Such certificates may be offered by collegiate units to individuals who wish to enhance their knowledge, skills, and professional training.

I. Admission
   Minimum admission requirements for post-baccalaureate certificates are the same as for master’s and doctoral degrees. Admission is governed by the Administrative policy: Admission for Master’s and Doctoral Degrees.

II. Program Requirements
   Programs offering post-baccalaureate certificate plans must assure students receive graduate-level training. The minimal criteria are:
   a. Plans must consist of at least 12 semester course credits.
   b. All courses must be at the 4000 level or above. At least 50% of the certificate course credits must be at the 5000 level or above.
   c. Students must maintain at least a 2.800 GPA (on a 4.000 scale) for satisfactory progress.
   d. Only courses with grades of A, B, C (including C-) and S may be counted toward the degree.

   Colleges and programs may specify additional or more stringent requirements. Colleges and graduate programs must publish these requirements and provide them to students upon matriculation.

   Note: Students must have at least a 2.800 GPA for courses included on the degree plan at the time of degree clearance.

III. Transfer of Credits
   a. Graduate course credits earned at other institutions may be transferred to University post-baccalaureate certificate plans subject to approval by the University graduate program. Such credits must have been earned at an accredited institution in the United States or at a non-U.S. institution judged by the graduate program to be comparable to a regionally accredited graduate program in the United States.
   b. At least 60% of the graduate course credits required for the certificate must be taken at the University.

IV. Credits in Common
   A maximum of three graduate course credits may be counted in common between two University post-baccalaureate certificate plans.

V. Certificate Completion Timeline
   All requirements for the certificate must be completed and the certificate awarded within five calendar years after initial enrollment. Colleges and programs may set more stringent time requirements and may allow students to petition for exceptions to the time limit.

REASON FOR POLICY

This policy provides a framework for offering post-baccalaureate education that is oriented primarily toward professional and skills development and that culminates in the award of a certificate.
PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

- Degree Completion Steps: Specialist Certificate in Education (SC), Post-Baccalaureate Certificate (PBC)

FREQUENTLY ASKED QUESTIONS

- Post-Baccalaureate Certificate Plans Approved by the Board of Regents FAQ

ADDITIONAL CONTACTS

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<tr>
<th>Subject</th>
<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Emily Ronning</td>
<td>612-626-8031</td>
<td><a href="mailto:ronn0044@umn.edu">ronn0044@umn.edu</a></td>
</tr>
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</table>

DEFINITIONS

Post-baccalaureate
Following the completion of undergraduate studies and the award of the undergraduate degree.

RESPONSIBILITIES

Colleges and Programs
Publish the requirements for post-baccalaureate certificate plans and provide them to students upon matriculation.

RELATED INFORMATION

- Administrative Policy: Adding, Changing, or Discontinuing Academic Plans

HISTORY

Effective:
May 2012 - New Policy. Comprehensive Review. Expands the current admission, program and credit requirements across all Board of Regents approved post-baccalaureate certificate plans. Specifies a minimum GPA of 2.8 to remain in good standing.
ADMINISTRATIVE POLICY

Readmission and Changes to Master's or Doctoral Degree Objectives

Responsible University Officer: Executive Vice President and Provost
Policy Owner: Vice Provost and Dean of Graduate Education
Policy Contact: Dean Tsantir

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

Graduate programs make all decisions about readmission, change of degree objective, or addition of degree objective. Programs have the discretion to require a full admissions application from a student requesting a new or additional degree objective.

I. Readmission
   Students whose active student status has lapsed and who wish to resume graduate work must seek readmission to their graduate program or to another graduate program. Readmission is not guaranteed, and colleges and programs may add conditions to the readmission (e.g., course grades older than a specified number of years may not be included in the degree plan).

II. Change or Addition of Degree Objective within the Same Program
   Currently enrolled graduate students who wish to change or add a degree objective (e.g., add the doctoral degree in the same program in which they are completing a master's degree) must request the change or addition of degree objective. The student's graduate program must either approve or deny the request.
   a. If the change is to a lesser degree (e.g., to a master's degree from a doctoral degree) in the same program to which the student was admitted, the student must still request a change of degree objective (see Procedures for Readmission/Change or Addition of Degree Objective and Associated Requirements).

III. Change or Addition of Degree Objective within the Same College
   Currently enrolled graduate students who wish to change to a different program, or add another degree objective in a different program, in the same college in which they are already enrolled must request a change of degree objective. The graduate program offering the new degree must either approve or deny the request (see Procedures for Readmission/Change or Addition of Degree Objective and Associated Requirements).

IV. Change or Addition of Degree Objective in a Different College or Campus
   Currently enrolled graduate students who wish to change to a different program in a different college, add a degree objective in a different college, or change their campus of enrollment must complete and submit an application for admission. The graduate program offering the new degree must either approve or deny the application.

V. Exceptions
   This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

REASON FOR POLICY

Decisions on readmission, and the addition or change of a degree objective, should ensure that students admitted to a program have appropriate preparation for graduate work in a particular discipline and at the intended degree level.

PROCEDURES

- Use of the Central Graduate Admissions Application System
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
Resolving Alleged Student Conduct Code Violations

**POLICY STATEMENT**

Each campus will develop and maintain fair processes for resolving complaints against students and student organizations under Board of Regents Policy: *Student Conduct Code*. These processes will emphasize student development through understanding and accepting responsibility for personal behavior, while protecting community interests and due process. Each campus's disciplinary process will:

- provide fair notice to students of alleged violations of Board of Regents Policy: *Student Conduct Code*;
- encourage informal resolution of alleged violations without the need for a hearing;
- permit students the opportunity for a fair hearing upon request, and the opportunity for one campus-wide appeal of a finding of violation of the Code; and
- provide for a preponderance of the evidence (i.e. more likely than not) standard of proof.

For cases involving violations of sexual assault, sexual harassment, stalking, or relationship violence, each campus's disciplinary process will also:

- be conducted by officials who receive annual training on the issues related to sexual assault, sexual harassment, stalking, and relationship violence and how to conduct an investigation and hearing process that protects the safety of victims and promotes accountability;
- provide equitable access to an appeal by both the accused student and the reporting party;
- allow equitable access to a support person of their choice for both the accused student and the reporting party at any related meeting or proceeding;
- allow equitable access to an advocate, if permitted for either, for both the accused student and the reporting party at any related meeting or proceeding; and
- provide simultaneous written notice to both the accused student and the reporting party:
  - of the results of any disciplinary proceeding;
  - of the procedure for the accused student and the reporting party to appeal the results of the disciplinary proceeding;
  - of any change to the results prior to the time the results become final; and
  - when the results become final.

The campus will provide a hearing body to conduct hearings requested by students. The hearing body may differ depending on the college or program in which the student is enrolled and the nature of the alleged violation. Each campus will maintain a student behavior committee that may be the hearing body for any case under Board of Regents Policy: *Student Conduct Code*. Colleges may, however, establish their own hearing bodies to decide intracollege scholastic honesty cases under the Code (that is, cases that involve the college's student within the college's own course). Likewise, certain administrative programs, such as housing and residential life, student activities offices, and learning abroad offices, may establish and apply their own codes of conduct and hearing procedures. Any student found to have violated Board of Regents Policy: *Student Conduct Code* under any of these processes is entitled to one campus-wide appeal.

**REASON FOR POLICY**

This administrative policy implements Board of Regents Policy: *Student Conduct Code*. It provides a framework for each campus to fairly resolve complaints about violations of Board of Regents Policy: *Student Conduct Code*. 
PROCEDURES

- Student Conduct Code Procedure: Twin Cities
- Resolving Student Conduct Code Violations - Crookston
- Student Academic Integrity Misconduct Procedures - Morris
- Student Conduct Code Procedure - Morris
- Student Behavior Committee Hearing Procedures - Morris
- Student Conduct Code Procedure: Duluth
- Student Conduct Code Procedures: Rochester

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

- Academic Integrity Violation Files: Morris
- Committee on Academic Integrity Order of Proceedings: Morris
- Committee on Academic Integrity Pre-Hearing Conference: Morris
- Student Proctors and Graders: Morris
- Campus Committee on Student Behavior Hearing Procedures: Twin Cities
- Disciplinary Processes of Professional or Graduate Programs and Administrative Units: Twin Cities
- Guidelines for Colleges: Student Conduct Code Conflict Resolution Procedures: Twin Cities

FREQUENTLY ASKED QUESTIONS

There are no FAQs associated with this policy.

ADDITIONAL CONTACTS

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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Sharon Dzik</td>
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<td>Office for Student Conduct and</td>
<td>612-624-6073</td>
<td><a href="mailto:sdzik@umn.edu">sdzik@umn.edu</a></td>
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<td>Academic Integrity (OSCAI)</td>
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<td>Conflict Resolution</td>
<td>Student Conflict Resolution</td>
<td>612-614-7272</td>
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Campus Contacts

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<tr>
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</tr>
</tbody>
</table>
DEFINITIONS

Advocate:
Non-attorney chosen by the party who represents the party through the disciplinary process.

Attorney:
An individual who has a law degree.

Support Person:
For sexual assault, sexual harassment, stalking, or relationship violence case, a person chosen by the party who accompanies the party through the disciplinary process but does not speak or participate in the process.

Student organizations:
Student-led organizations that are registered pursuant to campus policies.

RESPONSIBILITIES

Chancellors:
Ensure the establishment and maintenance of appropriate disciplinary procedures on their system campus.

Provost:
Ensure the establishment and maintenance of appropriate disciplinary procedures on the Twin Cities Campus.

RELATED INFORMATION

- Board of Regents Policy: Conflict Resolution Process for Student Academic Complaints
- Board of Regents Policy: Student Conduct Code
- Administrative Policy: Sexual Assault, Stalking, and Relationship Violence

HISTORY

Amended:
March 2014 - Comprehensive Review, Major Revision: 1. This policy version includes a new section that outlines required elements of a campus disciplinary process related to allegations of sexual assault, sexual harassment, stalking, or relationship violence. 2. Provides for one campus-wide appeal for the reporting party to align with recent law changes in the Violence Against Women Reauthorization Act of 2013.

Effective:
March 2008 - Administrative Policy to implement Board of Regents Policy: Student Conduct Code.
POLICY STATEMENT

A. Examinations During the Term

1. Examinations during the term (e.g., mid-terms) will normally be given only during the regular class sessions, except that make-up exams may be given at other times arranged to accommodate student class schedules. Exams may be held at times other than the regularly scheduled class period only under unusual circumstances, and only if approved by the dean of the college in consultation with the Vice Provost and Dean of Undergraduate Education or the appropriate decision-making office on the system campuses. Any regularly scheduled examination to be held outside of regular class time must be listed in the published class schedule.

2. Accommodation must be provided by the examining department(s) to any student who encounters an academic conflict, such as between an examination scheduled outside of regular class time and the regular class period of another course, or between two exams scheduled to be held simultaneously outside of regular class time.

3. Comprehensive examinations, which require reflection, study, and application of the work of the entire semester, are strongly encouraged, but must be given during the final examination period. The only examinations allowed during the last week of classes are those equivalent in scale, scope, length, and percent of grade to other examinations given in that class during the term. Although late-semester examinations may rely on cumulative knowledge of the work of the course during the semester, such examinations must not be comprehensive in nature if they are given prior to the final examination period. In a course where only one examination is given during the term, that examination must be given during the final examination period.

4. Take-home examinations are specifically exempted from this section of the policy.

B. Final Examinations

1. All classes that normally permit undergraduates to enroll will follow the standard examination schedule. Final examinations on the Twin Cities campus will extend over a six-day period. It is not a violation of this policy for a faculty member to use secure online test-taking, authorized by the academic unit, that permits students to take an exam at a time of their choosing rather than at a scheduled final examination time. System campuses will each determine the length of their final examination period.

2. Final examinations normally will be two clock hours (120 minutes) long.

3. Instructors may schedule longer examinations with the approval of their department, which will arrange longer use of the examination room with the appropriate campus scheduling office. Instructors and departments must decide in advance of scheduling a course if the examination is to exceed two hours, and must work with the campus office that schedules central classrooms on scheduling the location of the exam. Any examinations that exceed two hours must be noted in the class schedule, in order that students are informed and can try to fit the longer examination in their schedule of final examinations. Accommodation must be provided by the examining department to any student who encounters a conflict with another final examination because of this lengthened examination time.

4. Instructors may offer take-home final examinations (but see 7(c) below).

5. For courses that do not run for a full semester, the final examination will be administered (or due, in the case of take-home or other out-of-class examinations) on the last day of the course, except that short courses that end with the semester may use the final exam time scheduled for that course.

6. The requirement that the final examination period on the Twin Cities campus be six days will not apply to units that have been
granted an exemption from the University calendar by the Senate Committee on Education Policy.

7. Final examinations at times other than regularly scheduled:
   a. **Examinations outside the final examination period.** Instructors are permitted to schedule their final examinations outside of the scheduled examination days only under extraordinary circumstances and with the approval of their dean and the campus academic officer. (For the Twin Cities, this is the Vice Provost and Dean of Undergraduate Education.)
   b. **Moving an examination within the final examination period.** When an instructor and students conclude they wish to move the final examination for the course to a different time and/or day during the final examination period, the change must be (1) proposed by the instructor, (2) have the concurrence of the department chair, and (3) must be approved unanimously by written secret ballot by students in class when the vote is taken.
   c. Laboratory practicums may be given during the final week of classes during the normal lab period, and take-home or other out-of-class finals may be distributed prior to the final exam period but may not be due before the scheduled final exam for that course.
   d. Students with final examination conflicts, or with three (or more) final examinations in one calendar day, will be expected to notify and provide documentation to instructors as soon as possible during the term. Instructors are expected to make appropriate accommodation to eliminate the conflict. In the event none of the instructors agrees to make appropriate accommodation, the student should contact his or her advisor. If a student has three or more examinations in one day because one exam date was changed, the instructor who changed the exam must make the accommodation. Note: this section does not cover cases where a student has three (or more) examinations within a 24-hour period, only cases where he or she has three (or more) examinations from morning to evening the same day.
   e. **Summer term final examinations.** Final examinations for summer terms will be scheduled during the regular meeting time of the course on the last day.

C. Study Days

Each campus will decide whether or not to have a Study Day; when the calendar permits, a Study Day should be added to the schedule. For campuses that choose to have one, the final examination period will begin on the second day after classes end, with the day after classes designated as a Study Day. In the event classes end on a Friday, final examinations will not start until the following Monday and Saturday and Sunday will be designated Study Days.

D. Classes and Events During the Study Day/Finals Period

1. No classes will be permitted after the last scheduled day of instruction for that term/semester for any course that normally includes undergraduate students. Instructors may not schedule classes on a Study Day.
2. Instructors may not hold a regular class during the final examination period (which can interfere with students’ other exams) and may not hold a class during the first hour of the examination period and then conduct the final examination during the remaining hour(s).
3. No University-sponsored extra-curricular events, which require the participation of students, may be scheduled from the beginning of Study Day to the end of Final Examinations. Exceptions to this policy may be granted ONLY by the Senate Committee on Educational Policy. Instructors must provide an alternative and timely opportunity for students to complete course requirements they were unable to complete because of an absence permitted by this policy.

Exclusions

This policy is not applicable to the Duluth campus.

Special Situations

The Senate Committee on Educational Policy has the authority to grant waivers to the provisions of this policy, and will report such waivers to the Faculty Senate at its next meeting.

REASON FOR POLICY

This policy defines exams and outlines common scheduling practices and guidelines to allow students and faculty to plan for Study Day and examinations with a minimum of scheduling conflicts.

PROcedures

There are no procedures associated with this policy.
FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

There are no FAQs associated with this policy.

ADDITIONAL CONTACTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Contact</th>
<th>Phone</th>
<th>Fax/Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Susan Van Voorhis</td>
<td>612-624-1111</td>
<td><a href="mailto:vanvo002@umn.edu">vanvo002@umn.edu</a></td>
</tr>
<tr>
<td>Twin Cities Campus Procedures</td>
<td>Stacey Tidball</td>
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<tr>
<td>Crookston Campus</td>
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<td><a href="mailto:kmyers@crk.umn.edu">kmyers@crk.umn.edu</a></td>
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<tr>
<td>Morris Campus</td>
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</tr>
<tr>
<td>Rochester Campus</td>
<td>Laura Walker</td>
<td>507-258-8008</td>
<td><a href="mailto:ljwalker@r.umn.edu">ljwalker@r.umn.edu</a></td>
</tr>
</tbody>
</table>

DEFINITIONS

Study Day
A day designated in the Academic Calendar reserved for study, which occurs immediately before finals period or during finals period; no required classes or exams may be scheduled on a Study Day.

RESPONSIBILITIES

There are no specific responsibilities associated with this policy.

RELATED INFORMATION

- Administrative Policy: [Makeup Work for Legitimate Absences](#)

HISTORY

Amended:
May 2016 - Comprehensive Review, Minor Revision. 1. Clarifies that a course with a single exam must have the exam during the finals week. 2. Replaces “coordinate campuses” label with “system campuses”. 3. Provides clarity around the final exam period. May not necessarily be a final exam week.

Amended:
December 2009 - Policy now applies to Crookston.
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

Introduction

The University supports and promotes international travel and education abroad by students for University purposes, while encouraging sound health, safety and security measures that minimize risks to the traveler and institution. This policy includes the minimum pre-departure requirements and minimum requirements while abroad. The education abroad office on each campus may have additional requirements.

Units Pre-Travel and Program Planning Requirements

All University units (including campuses, colleges, departments, centers, offices, or other operational units) and education abroad offices organizing or promoting student travel abroad must:

- complete a due diligence review of all programs before promoting them to University students;
- ensure appropriate contracting of partners;
- develop a 24-7 contact protocol and emergency plan;
- obtain International Travel Risk Assessment and Advisory Committee (ITRAAC) approval before promoting any program in a United States Department of State (USDOS) Travel Warning Country;
- ensure completion of the student requirements; and
- ensure completion of faculty/staff leader requirements, where relevant.

Undergraduate travel: All University units must work through one of the University's education abroad offices prior to organizing or promoting undergraduate student travel abroad for University purposes.

All University units supporting student travel (e.g. scholarship, credit, degree requirement etc.) that they are not organizing or promoting, must:

- notify students of the student requirements listed below; and
- provide students with a 24-7 University contact information.

Education Abroad Offices

In addition to the requirements above, each education abroad office in the system must also:

- register students for USDOS Smart Traveler Enrollment Program (STEP) or advise them on self registry;
- implement the student health disclosure form and process;
- implement consistent processes for any participant under the age of 18;
- implement the student behavior review and code of conduct policy/process; and
- for any program with a program leader:
  - require the program leader acknowledgement form from the leader;
  - implement the program leader health process;
  - implement the program leader companion process; and
  - ensure staff/faculty led programs have two program leaders.

Student Pre-Travel Requirements
All students must complete the following requirements in advance of this travel:

- register their travel officially with the University;
- sign a Student Release and Waiver detailing their academic, financial, behavioral, travel risk and health-related responsibilities while abroad;
- obtain University-approved international travel, health and security insurance;
- create an emergency communications plan;
- complete the mandatory online health and safety orientation; and
- address any health and safety concerns prior to departure (e.g., check-ups, immunizations).

In addition, students must discuss self-identified travel plans (international activities not promoted by the University) with an appropriate education abroad office, University faculty and/or staff member prior to confirming travel plans.

All travelers are strongly encouraged to register with the USDOS Smart Traveler Enrollment Program (STEP) and review the USDOS, Centers for Disease Control (CDC) and World Health Organization (WHO) resources for their planned destination.

**Travel Approval**

The University does not encourage travel to a country subject to a current travel warning issued by the U.S. Department of State (USDOS Travel Warning Country).

**Pre-Approval of Student Travel**

Any student planning to travel for University purposes, as well as any faculty member or staff planning to lead or travel with any University students, to a USDOS Travel Warning Country must obtain approval from the International Travel Risk Assessment and Advisory Committee (ITRAAC). Units who wish to promote an education abroad opportunity in a USDOS Travel Warning Country must receive ITRAAC approval prior to promotion. The University, in its sole discretion, may deny approval for international travel. In addition, travelers may be required to submit a request for permission to travel to locations or participate in programs that pose a specific health, safety, or security concern as indicated by authorities other than the U.S. Department of State, such as the Center for Disease Control (CDC), World Health Organization (WHO), non-U.S. government authorities (e.g., Australian or Canadian authorities), and University of Minnesota authorities.

**Suspension of Travel**

ITRAAC will review student travel currently in process when a significant health or safety concern arises regarding that travel including new and renewed USDOS travel warnings or advisories, travel warnings from the CDC or WHO, natural disasters, wars or other political disturbances, or other indicators of potential health or safety threats. The University, in its sole discretion, may withdraw approval for international travel at any time.

**While Abroad**

Students, and faculty/staff/units traveling with students and/or organizing, promoting or supporting student programs abroad, must keep their University contact apprised of any changes to their address and contact information while abroad. Changes should be submitted as soon as possible and at a minimum within 24 hours of the change taking effect.

Students are held to Board of Regents Policy: Student Conduct Code while abroad for University purposes in addition to any additional codes of conduct or behavior codes from the University unit organizing, promoting or supporting travel, education abroad office, affiliate or host.

Students are not permitted to drive motor vehicles (including but not limited to scooters, motorbikes, motorcycles and cars) while participating in an education abroad opportunity.

Faculty and staff may not drive vehicles in which students are passengers abroad without an approved exception from the Office of Risk Management in advance of departure from the U.S. Faculty and staff who need transportation for students must either use public transportation or hire a local driver/vehicle.

**Travel in Violation of this Policy**

Students who choose to travel in violation of this policy are acting outside the control and responsibility of the University. If the travel is occurring during a required term, the student must take a leave of absence from the University, where possible. Students on leave of absence from the University are not eligible for financial aid, scholarship, travel stipends and other University supports including credit. If a leave of absence is not an option, students who travel in violation of this policy risk losing their student status.

**Exclusions**

This policy does not apply to personal, non-University travel by students. For information on reimbursement for travel and faculty and staff travel requirements, see Administrative Policy: Traveling on University Business.
This policy endeavors to support education abroad by balancing the educational value of participation in international activities with the potential risks to the welfare and safety of students.

PROCEDURES

- **Travel Approval (ITRAAC)**
- **Preparing for Travel and Education Abroad (Students)**
- **Preparing for Student Travel and Education Abroad (Units)**

FORMS/INSTRUCTIONS

- **Emergency Plan Template**
- **ITRAAC Application Process**
- **International Travel, Medical and Security Insurance (CISI)**
- **Program Leader Acknowledgement Form**
- **Release and Waiver for Education Abroad**:
  - For activities through an education abroad office: OGC-SC245
  - For activities NOT through an education abroad office: OGC-SC246

APPENDICES

- **International Health Insurance Eligibility Requirements**
- **University Policy Process Flowchart: Student International Travel and Education Abroad**

FREQUENTLY ASKED QUESTIONS

- **Student Travel and Education Abroad FAQ**

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<tr>
<td>Primary Contact(s)</td>
<td>Kevin Dostal Dauer</td>
<td>612-625-5107</td>
<td><a href="mailto:dauer001@umn.edu">dauer001@umn.edu</a></td>
</tr>
<tr>
<td>International Insurance and Non-education Abroad Office travel registration</td>
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<td>612-626-8832</td>
<td><a href="mailto:nunnx016@umn.edu">nunnx016@umn.edu</a></td>
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<tr>
<td>Education Abroad Programs Offices</td>
<td>Crookston: Learning Abroad Office</td>
<td>218-281-8442</td>
<td>218-281-8588 <a href="mailto:umclabrd@umn.edu">umclabrd@umn.edu</a></td>
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<tr>
<td></td>
<td>Duluth: International Education Office</td>
<td>218-726-8764</td>
<td>218-726-7352 <a href="mailto:ieo@d.umn.edu">ieo@d.umn.edu</a></td>
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<tr>
<td></td>
<td>Morris: Academic Center for Enrichment (ACE)</td>
<td>320-589-7014</td>
<td><a href="mailto:ummace@morris.umn.edu">ummace@morris.umn.edu</a></td>
</tr>
<tr>
<td></td>
<td>Twin Cities: Learning Abroad Center</td>
<td>612-626-9000</td>
<td>612-626-8009 (fax) <a href="mailto:UMabroad@umn.edu">UMabroad@umn.edu</a></td>
</tr>
<tr>
<td></td>
<td>Twin Cities: Carlson Institute for Global Studies</td>
<td>612-625-9361</td>
<td><a href="mailto:cgi@umn.edu">cgi@umn.edu</a></td>
</tr>
<tr>
<td></td>
<td>Emergencies Abroad - Students</td>
<td>Their designated 24-7</td>
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DEFINITIONS

Education abroad/University purpose travel
Travel by students (both for credit and not for credit) that is affiliated with the University in any way. This includes, but is not limited to:

- travel through one of the University’s education abroad offices sponsored or affiliated programs;
- travel through unit organized or promoted education abroad programs or activities;
- travel to a University or unit exchange partner;
- travel as part of, or in support of, a University research activity;
- travel for University credit;
- travel that fulfills a degree requirement (including internships, field studies, service learning, research);
- travel that fulfills University contractual agreements;
- professional development opportunities promoted by or supported by any University unit (including conference attendance);
- travel for which you are acting as a representative of the University;
- travel for University athletics;
- travel supported by University funding including grant awards, scholarships, informal financial awards and financial aid;
- travel with, or organized by, a University faculty or staff member; and
- travel with a University Campus Life Program.

Students traveling abroad for University purposes, including education abroad, are held to this policy within the dates of their activity. Thus, they must follow this policy for any weekend or overnight travel taken during the activity. See definition of non-University travel below for more information on when this policy does not apply.

Campus Life Program
A University program similar to a student organization in purpose and composition but whose activities, operations, and decision-making processes are directly governed by University academic or administrative departments, and for which the University is ultimately responsible. A CLP is considered part of the University and is required to have a designated University faculty or staff advisor. University Recognized Organizations (URO) at Morris and Recognized Student Groups (RSG) at Rochester are treated like CLPs for the purpose of this policy.

Faculty and staff
Full and part-time faculty, including adjunct faculty and staff employees at the University. Graduate assistantship appointments and other appointments that require student status are not considered employees for the purpose of this policy. Where faculty and staff are also taking classes, they are faculty/staff when traveling for work and a student when traveling for education/coursework.

International travel
Travel to any country (including Mexico and Canada) or territory outside the continental U.S. (CONUS), Alaska and Hawaii. Travel to the non-contiguous US locations of American Samoa, Guam, Midway Islands, Northern Mariana Islands, Puerto Rico, the U.S. Virgin Islands, and Wake Island are considered international travel for purposes of this policy and CISI insurance purposes.

International Travel Risk Assessment and Advisory Committee (ITRAAC)
Committee responsible for reviewing all proposed student travel to USDOS Travel Warning Countries and other locations that pose a specific health, safety, or security concern as indicated by authorities other than the U.S. Department of State, such as the Center for Disease Control (CDC), World Health Organization (WHO), non-U.S. government authorities (e.g., Australian or Canadian authorities), and University of Minnesota authorities. Committee has University-wide jurisdiction and its decisions apply uniformly to all campuses.
Associate Vice President and Dean for International Programs (Chair), the General Counsel, the Associate Dean of Graduate Education, and the Vice President for Health Sciences (officials may delegate their responsibilities to others within their areas of authority and consult other administrators, faculty and experts as they choose). The Dean of the School of Public Health will serve on the committee whenever a decision is being considered to cancel or suspend an education abroad opportunity for public health reasons.

**Non-University travel**

Travel that is not related to the University in anyway. This means travel that is not in support of University business, programs or education and for which the University assumes no control or responsibility, and therefore this policy does not apply. Examples include:

- Registered Student Organization travel (see definition below) that is not otherwise funded or supported by the University (see Education abroad/University purpose travel above);
- Personal travel such as vacation;
- Personal travel before or after a University/education abroad activity.

**Registered Student Organization (RSO)**

A voluntary association composed primarily of students that has no direct relationship to the University; but upon completion of the established registration process is entitled to certain privileges including operating, meeting, advertising, and participating in activities on the University of Minnesota campuses, as well as eligibility to receive services from the University. Also referred to as an Independent Student Group (Morris) and Non-Recognized Student Organization (Rochester).

**Sponsored or Affiliated Programs through Education Abroad Offices**

Sponsored programs are study abroad experiences developed, administered and evaluated by an education abroad office. Affiliated programs are administered by other institutions/organizations and approved by the University (students will receive support and services from the education abroad office, and credits will be posted as resident credit).

**Students**

Any undergraduate, graduate or professional student enrolled in a degree program, credit bearing non-degree program, professional certificate or executive education program at the University. Students traveling as part of assigned duties within an assistantship are considered students and not employees for the purpose of this policy.

**Unit**

A campus, college, department, program, research center, institute, business center, office or other operating unit.

**Unit Organized or Promoted Travel**

Student travel or education abroad activities organized or promoted by a University unit. This includes programs for the unit administers directly as well as any education abroad opportunities administered outside the University for which a University staff or faculty member has promoted to students (via email, word of mouth, print, etc.). Units are required to comply with the Procedure: Preparing for Student Travel and Education Abroad (Units) and, for all undergraduate student travel abroad, work through one of the University's education abroad offices.

**Unit Supported Travel**

Student travel or education abroad activities NOT organized or promoted by a University unit but supported by a unit by providing funding, offering credit, fulfilling a degree requirement, etc. Units are required to notify students of the student requirements in this policy and provide students with a 24-7 University emergency contact.

**U.S. Department of State (USDOS) Travel Warning Country**

A country subject to a current travel warning issued by the U.S. Department of State. Travel warnings are issued when long-term, protracted conditions make a country dangerous or unstable and lead the State Department to recommend that Americans avoid or consider the risk of travel to that country. A travel warning is also issued when the U.S. Government's ability to assist American citizens is constrained due to the closure of an embassy or consulate or because of a drawdown of its staff. See list of countries subject to a travel warning at [http://travel.state.gov/travel/cis_pa_tw/tw_tw_1764.html](http://travel.state.gov/travel/cis_pa_tw/tw_tw_1764.html).

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**RESPONSIBILITIES**

**Associate Vice President and Dean for International Programs**

Promotes the global dimensions of teaching, research, and engagement across all colleges and campuses of the University. Chair the International Travel Risk Assessment and Advisory Committee (ITRAAC).

**Director of International Health, Safety and Compliance, GPS Alliance**

Provide background information on specific health and safety risks and participate in the decision whether to cancel or suspend education abroad opportunities. Call a meeting of the International Travel Risk Assessment and Advisory Committee (ITRAAC). Notify unit and/or program directors when an educational opportunity has been suspended or canceled by the committee and when ITRAAC approves applications to travel to a USDOS Travel Warning Country or other locations that pose a specific health, safety, or security concern as indicated by authorities other than the U.S. Department of State, such as the Center for Disease Control (CDC), World Health Organization (WHO), non-U.S. government authorities (e.g., Australian or Canadian authorities), and University of Minnesota authorities. A member of his/her staff will provide assistance to ITRAAC applicants and facilitate ITRAAC reviews of applications.

**Education abroad offices**
Ensure compliance with University policy for all programs and activities they support. Serve as a resource to units, faculty and staff planning international activities.

The following are the education abroad offices:
- Carlson School of Management Global Institute
- Crookston Learning Abroad Office
- Duluth International Education Office
- Morris Academic Center for Enrichment
- Twin Cities’ Learning Abroad Center

Export Controls Officer and Designated Cuba Representative
Reviews and approves proposed student travel to embargoed countries and works with travelers to apply for any licenses needed for U.S. citizens to travel to Cuba. Advises on any restrictions that may apply during travel to embargoed countries.

Faculty, staff and unit organizing or promoting travel and/or leading student travel abroad
Ensure compliance with University policy before and during organizing or promoting travel or leading student travel abroad.

International Travel Risk Assessment and Advisory Committee (ITRAAC)
Determine when to cancel or suspend education abroad opportunities because of significant health or safety risks to students at any time. In the members’ absence, appoint alternates to serve on the ITRAAC. Make exceptions to suspension of education abroad opportunities and approve applications for travel to USDOS Travel Warning Countries or other locations that pose a specific health, safety, or security concern as indicated by authorities other than the U.S. Department of State, such as the Center for Disease Control (CDC), World Health Organization (WHO), non-U.S. government authorities (e.g., Australian or Canadian authorities), and University of Minnesota authorities on a case-by-case basis.

Office of General Counsel (OGC)
Create and approve the student release and waiver. Serve on the International Travel Risk Assessment and Advisory Committee (ITRAAC). Work with the International Health, Safety and Compliance Director to review mandatory health and safety orientation, assist faculty and staff with related questions and resources while abroad.

Office of Risk Management (ORM)
Regularly review and approve the University's mandatory international travel, health and security insurance. Work with the International Health, Safety and Compliance Director to review mandatory health and safety orientation, assist faculty and staff with related questions and resources while abroad.

Purchasing/Travel Services
Advises University faculty and staff on appropriate contracting procedures for activities involving travel or purchasing. Assists those traveling for University purposes on a variety of travel items. Ensures the integrity, accountability, and efficiency of purchasing processes.

Students
Complete the requirements detailed in this policy and procedures before departure on international travel. Take independent measures to promote one's own safety, the safety of fellow travelers and the safety of the broader University community including consulting with experts on the region of travel, as appropriate. Abide by the University Student Code of Conduct while abroad.

RELATED INFORMATION

Board of Regents Policies
- International Engagement and Education
- Student Conduct Code

Administrative Policies
- Export Controls
- Leave of Absence and Readmission for Undergraduates: Twin Cities, Crookston, Morris, Rochester
- Leave of Absence and Reinstatement from a Leave: Graduate Students
- Purchasing a Professional Service
- Traveling on University Business

Other Policies
- Student Conduct Code for Education Abroad

Related Websites
HISTORY

Amended: October 2014 - 1. Adds the involvement of the collegiate dean(s) in any situation where ITRAAC is considering a rejection (or request to delay travel) of an application submitted by a graduate student. 2. Explicitly notes the role of the Vice President for Academic Affairs when consensus cannot be reached. 3. Standardizes processes carried out the education abroad offices across the University system. 4. Clarifies the pre-travel and program planning requirements for units and students. 5. Adds a new requirement that units may not promote or organize an education abroad opportunity for undergraduates unless they work through an education abroad office. Title changed from Education Abroad Opportunities: Addressing Health and Safety Risks to Student Travel and Education Abroad: Health and Safety

Amended: January 2009 - Statement and Responsibilities clarified, Updated Contacts section, Updated procedures, and added Appendix: International Insurance Eligibility Requirements.

Amended: January 2007 - Statement, definitions and responsibilities and procedures rewritten.

Effective: February 2004

Policy published publicly April 2005
POLICY STATEMENT

Instructors are required to develop a course syllabus for each offering of a course and communicate the syllabus to students unless the course is offered to an individual student (e.g. directed study, readings or research courses that require contracts between the student and instructor). For the purposes of this policy, a syllabus is a written or electronic document that contains information students need to know in order successfully to complete the work of the course.

Each syllabus includes two types of information. First is information specific to the course such as its title, goals, readings, assignments and instructor. Second is information informing students of University policies that may have an impact on their participation in the course. This information includes, for example, the University grading system, a disabilities statement, and how to resolve problems between students and instructor.

A. Syllabus Requirements: Information Specific to the Course

The elements listed in this section of the policy are required. This information may also be distributed or provided by the department or college if done so routinely and explicitly. (For additional recommendations for good practice in teaching, see Administrative Policy: Teaching and Learning: Instructor and Unit Responsibilities: Twin Cities, Crookston, Morris, Rochester).

1. Catalog information such as the course name, department, number, meeting time, meeting place, and credits.
2. Instructor’s name and contact information.
3. Course pre-requisites if any exist.
4. Course goals and objectives. (For undergraduate courses on the Twin Cities campus, instructors are encouraged to identify learning and development outcomes addressed by the course. See the Administrative Policy: Undergraduate Student Learning and Development Outcomes: Twin Cities, Crookston, Morris, Rochester).
5. Required and recommended materials and, if necessary, the location of materials. After the second week of the term, minor, but not major, changes in the assigned readings may be made (see Administrative Policy: Teaching and Learning: Instructor and Unit Responsibilities: Twin Cities, Crookston, Morris, Rochester).
6. General description of assignments, papers, projects, exams and other student work with a schedule of approximate due dates and relative weight in the grade. Minor but not major changes may be made to assignments after the second week of the term.
7. Description of any course meetings that occur outside of the regularly scheduled class time (see Administrative Policy: Teaching and Learning: Instructor and Unit Responsibilities: Twin Cities, Crookston, Morris, Rochester).
8. Attendance requirements and penalties if any (see the Administrative Policy: Enrolling in Overlapping or Back-to-back Classes: Twin Cities, Crookston, Morris, Rochester).
9. Statement on extra credit. If an instructor wishes to offer what is commonly known as extra credit opportunities for students in a class to allow them to improve their grade, those opportunities must be announced and made available to all students. (This provision does not address the option of increasing the number of credits a student may earn for the course.)
10. Policy for making up missed exams and grading late work.
11. The date, time and place of the final examination if one is scheduled. Instructors who schedule final exams that are longer than two hours must provide alternative testing times for students who have other final exams scheduled during that time (see the Administrative Policy: Scheduling Examinations, Final Examinations, and Study Days: Twin Cities, Crookston, Morris, Rochester).

B. Syllabus Requirements – Policy Statements
Instructors must have as part of the syllabus copies of, references to, or statements on the following and are encouraged to discuss elements of the policies particularly applicable to their course (see Appendix - Recommended Policy Statements for Syllabi):

8. Statement about the availability of mental health and stress management services.

The Office of the Executive Vice President and Provost will prepare electronic copies of these policy statements for instructors to incorporate into syllabi. Instructors are encouraged to provide paper copies of these policies to classes with first-year students.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

Students need a consistent level of basic information about the content and expectations for each course in which they are enrolled. This policy outlines the minimum components of a syllabus and notes recommended policy statements for inclusion, to ensure that instructors communicate course requirements to students in writing and in a timely manner. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.

PROCEDURES

There are no procedures related to this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

- Recommended Policy Statements for Syllabi

FREQUENTLY ASKED QUESTIONS

There is no FAQ related to this policy.

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<tbody>
<tr>
<td>Primary Contact(s)</td>
<td>Stacey Tidball (undergraduate)</td>
<td>612-626-0075</td>
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<tr>
<td></td>
<td>Karen Starry (graduate)</td>
<td>612-625-2815</td>
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</tr>
</tbody>
</table>
DEFINITIONS

There are no definitions related to this policy.

RESPONSIBILITIES

There are no specific responsibilities related to this policy.

RELATED INFORMATION

- Board of Regents Policy: Equity, Diversity, Equal Opportunity, and Affirmative Action
- Board of Regents Policy: Sexual Harassment
- Board of Regents Policy: Student Conduct Code
- Administrative Policy: Enrolling in Overlapping or Back-to-back Classes: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Grading and Transcripts: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Scheduling Examinations, Final Examinations, and Study Days: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Teaching and Learning: Instructor and Unit Responsibilities: Twin Cities, Crookston, Morris, Rochester
- Administrative Policy: Teaching and Learning: Student Responsibilities (Twin Cities, Crookston, Morris, Rochester)
- Administrative Policy: Undergraduate Student Learning and Development Outcomes: Twin Cities, Crookston, Morris, Rochester
- Higher Learning Commission, Criteria and Requirements for Accreditation

HISTORY

Amended: October 2014 - Clarifications related to Higher Learning Commission accreditation requirements.

Amended: December 2009 - Policy now applies to Crookston.

Effective: April 2009
Tailgating on Stadium Event Days: Twin Cities

**Responsible University Officer:** Athletics Director

**Vice President for University Services (Interim)**

**Policy Owner:** Athletics Director

**Vice President for University Services (Interim)**

**Policy Contact:** Scott Ellison, Ross Allanson

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

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**POLICY STATEMENT**

The University promotes community-building activities for its faculty, staff, students, and visitors, and recognizes that tailgating has the potential to enhance the Stadium event experience within a safe, responsible, and controlled environment.

Tailgating is permitted on football game days and other approved large Stadium event days in designated areas, during specified hours, and under the conditions specified in the Tailgating Rules. The vice president for University Services and the director of Intercollegiate Athletics must approve all tailgating at specific stadium events.

**Violations**

Individuals who violate this policy, the Tailgating Rules, or applicable policies, rules, or law may be assessed fines; lose their season tickets, parking, or tailgating privileges; be removed from campus; and, for students, be subjected to disciplinary action under Board of Regents Policy: **Student Conduct Code**.

**Exceptions**

In rare instances, the vice president for University Services and the director of Intercollegiate Athletics may grant exceptions to the Tailgating Rules within the scope of the law.

This policy applies to the Twin Cities campus only, and only to those events held in the Stadium.

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**REASON FOR POLICY**

To provide the framework for responsible tailgating on football game days or large Stadium event days that enhances the event experience, promotes a safe campus environment, and preserves the beauty of the campus.

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**PROCEDURES**

There are no procedures associated with this policy.

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**FORMS/INSTRUCTIONS**

There are no forms associated with this policy.

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**APPENDICES**

Date Revised
January 2014

Date Effective
January 2009
FREQUENTLY ASKED QUESTIONS

There is no FAQ associated with this policy.

ADDITIONAL CONTACTS

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<tbody>
<tr>
<td>Primary Contact(s)</td>
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<tr>
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</tr>
</tbody>
</table>

DEFINITIONS

Tailgating
Eating food and drinking beverages (alcoholic or nonalcoholic) outdoors as part of pre-and post-game festivities in designated tailgating locations.

RESPONSIBILITIES

University of Minnesota Parking and Transportation
Open and close designated tailgating areas on football game days.

University of Minnesota Police Department
Enforce applicable laws and Tailgating Rules on football game days.

Vice President for University Services and Director, Intercollegiate Athletics
Administer the policy, including maintaining Tailgating Rules and communicating policy and rules for responsible tailgating to participants. Determine, in consultation with appropriate University administrators, the University-authorized locations and hours for tailgating on football game days.

RELATED INFORMATION

- Board of Regents Policy: Alcoholic Beverages on Campus
- Board of Regents Policy: Code of Conduct
- Board of Regents Policy: Student Conduct Code
- Administrative Policy: Distributing Publications and Installing Banners at the University
- Administrative Policy: Drug Free University
- Administrative Policy: Use and Lease of Real Estate
- Administrative Policy: Using and Leasing University Outdoor Space: Twin Cities

HISTORY

Amended:
January 2014 - Comprehensive Review, Major Revision. 1. Expands the applicability of the policy to other major stadium events on the Twin Cities campus, such as concerts. 2. Revises the list of lots in which tailgating is allowed, and addresses hours for tailgating on weekdays and for the RV tailgating lot. 3. Prohibits pets on tailgating lots and includes a new reference to the Board of Regents policy on weapons.
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

Instructors have a responsibility to establish and maintain a civil, productive, inclusive, and stimulating learning environment. Both instructors and students have a fundamental obligation to respect the instructional setting as a place for civil, courteous discourse. Instructors have a responsibility to accommodate students with documented disabilities and are encouraged to invite students to talk or communicate with them about such circumstances.

Instructors have a responsibility to accommodate legitimate student absences and student exam conflicts in accordance with the policies (1) Intercollegiate Athletic Events During Study Day and Finals Week, (2) Makeup Work for Legitimate Absences, and (3) Scheduling Examinations, Final Examinations, and Study Days.

Instructor Responsibilities

A. Provide Course Information

Instructors are responsible for providing accurate and timely information about their courses to prospective students, current students, and relevant members of the University community.

1. Instructors must provide academic units and students with accurate course descriptions in a timely fashion. Instructors should use official information tools, to provide information about courses to students.

2. The course descriptions available in University catalogs and/or in the Course Guide must be generally consistent with the content of the actual course taught, though the content may vary somewhat with the individual instructor and across sections.

3. At the beginning of each course, instructors must communicate the course objectives. Class activities should be directed toward the fulfillment of these objectives and student performance should be evaluated in relationship to these objectives.

4. If an instructor changes the course requirements or materials, students should be given timely notice consistent with the magnitude of the change (e.g., a few days of notice for an additional article to read or a few weeks of notice if a paper is added). No major change (e.g., adding a research paper or major examination) should be imposed after the second week of the semester.

5. In accordance with Administrative Policy: Grading and Transcripts, instructors must inform students in their classes of the methods to be used in determining course grades, i.e., evaluation criteria and the contribution to the final grade of each graded component.

6. At the beginning of the course, instructors must inform students of any requirements related to regular course attendance and participation.

7. At the beginning of the course, instructors must inform students of any special attendance requirements. This includes, insofar as possible, specific dates, times, and places of additional outside-of-class work such as field trips, study sessions, or extra class meetings, and whether or not attendance at these additional activities will be reflected in the grade. If an instructor schedules mandatory activities that occur outside the regularly scheduled class time, information about these activities must be included on the syllabus and, when possible, in the class schedule.

8. Instructors should discuss scholastic dishonesty and what it means in the context of their class (e.g., whether collaboration is permitted and limits on it, requirements about and methods for citing sources, whether direct quotes are allowed and to what extent, receiving or giving aid on tests, and using electronic aids or communications during exams when prohibited).

B. Provide Students with Access to and Feedback on Their Work

1. Instructors must evaluate examinations and other student work with sufficient promptness to enhance the learning experience.
Instructors must promptly return examinations or permit students to review their exams to request clarification of grades.

2. Instructors should specify the process and schedule for returning student work during the semester. Term papers and comparable projects are the property of students who prepare them (see Board of Regents Policy: Copyright.) Instructors who desire to retain a copy for their own files should state their intention to do so.

3. Instructors are strongly encouraged to provide sufficient graded feedback early in the term and before the deadline for withdrawing from classes to enable students to assess their progress in the course.

4. Instructors must turn in grades within three business days after the last day of final examinations.

5. Instructors must provide mid-term alerts to students in 1-xxx courses who are at risk of failing a class, in accordance with the provision of the policy on Mid-term Alerts.

C. Secure Handling of Examinations

Instructors must maintain the security of student examinations both before and after exams are given. For those using a University office, such as the Office of Measurement Services (OMS), for scoring answer sheets, instructors or their designate (departmental office employee or teaching assistant) must submit examination answer sheets in the manner prescribed by that office.

D. Observe Scheduled Class Times

1. Instructors are expected to meet their classes at the scheduled times, to be prepared for all class sessions, and to start and end classes at the scheduled times.

2. When instructors know in advance that they will be unable to attend particular class sessions, they are responsible for working with their academic unit to make appropriate alternate arrangements.

E. Observe Office Hours or Appointment Times

Instructors must schedule and keep a reasonable number of office hours or appointment times for student conferences. The minimum number of office hours or appointment times may be defined by the academic unit.

F. Report Scholastic Dishonesty

Instructors are obligated to report suspected scholastic dishonesty to their departments and to the appropriate office on campus (on the Twin Cities campus, the Office for Student Conduct and Academic Integrity; at Morris, the Office of the Vice Chancellor for Student Affairs; at Rochester, the Office of Student Affairs; and at Crookston, the Vice Chancellor of Academic Affairs and Student Life).

G. Maintain an Appropriate Learning Environment

Instructors should take appropriate steps to have removed from class students who disrupt the educational process because of discourteous, threatening, harassing, or other aggressive behavior. "Appropriate steps" may include calling the University Police.

H. Maintain the Classroom Environment

Instructors are expected to leave the classroom and its equipment in good order (e.g., white/blackboards clean, chairs arranged, electronic equipment shut off).

Academic Unit Responsibilities

A. Maintain an Appropriate Schedule

1. Courses must be offered on a schedule, and frequently enough, to permit students to graduate in a timely fashion. All undergraduate departments must have a four-year graduation plan in place and must have course offerings that support it.

2. Classes must be offered at standard times. Failure to observe standard class periods leads to inefficient use of classrooms and is disrespectful of students and faculty: students are forced to be late to other classes, and faculty access to classrooms they need is reduced.

3. Academic units are responsible for retaining course records in accordance with Administrative Policy: Maintaining Course Records.

Exclusions

This policy is not applicable to the Duluth campus.

REASON FOR POLICY

This policy clarifies and outlines responsibilities, to provide clear expectations for the instructor and the instructor's department and college. Faculty and students need a common understanding of their responsibilities for the learning process. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.
There are no procedures associated with this policy.

**FORMS/INSTRUCTIONS**

There are no forms associated with this policy.

**APPENDICES**

There are no appendices associated with this policy.

**FREQUENTLY ASKED QUESTIONS**

1. How do these instructor responsibilities apply to courses in which instruction is provided by more than one individual, for example, a course in which a faculty member and teaching assistants share responsibilities?

   The person in charge of the course (e.g., the lead instructor, course coordinator, faculty member supervising teaching assistants who work with the faculty member within a course) is responsible for ensuring that standards and policies are applied consistently to all students enrolled in the course. The lead instructor is responsible for communicating this information to teaching assistants, responding to questions, and ensuring a common understanding among everyone who is part of the instructional team for the course.

**ADDITIONAL CONTACTS**

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<tr>
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<tr>
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<td>507-258-8006</td>
<td><a href="mailto:lcarrell@r.umn.edu">lcarrell@r.umn.edu</a></td>
</tr>
</tbody>
</table>

**DEFINITIONS**

**Scholastic Dishonesty**

Plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

**RESPONSIBILITIES**

There are no specified responsibilities associated with this policy.

**RELATED INFORMATION**

- Board of Regents Policy: [Copyright](#)
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
POLICY STATEMENT

1. Satisfying prerequisites. Students should not register for courses in which they lack the prerequisites unless they have permission from the instructor.

2. Responsibility for class work. Students are responsible for knowing all information contained in the syllabus. Students are responsible for meeting all course requirements, observing all deadlines, examination times, and other course procedures.

3. Attending class.
   a. Students are expected to attend all meetings of their courses. They may not be penalized for absence from class, however, to participate in religious observances, for approved University activities, and for other reasons in accordance with the policy on Makeup Work for Legitimate Absences. Students should notify instructors as soon as possible about such absences. (See Administrative Policy: **Makeup Work for Legitimate Absences: Twin Cities, Crookston, Morris, Rochester**).
   b. Students must attend the first class meeting of every course in which they are registered unless (1) they obtain approval from the instructor before the first meeting or (2) they provide notice to the instructor they must miss class because of a recognized religious holiday (see the policy on Mandatory Attendance at First Class Session and Consequences for Absence). Otherwise, they may lose their places in class to other students. (See Administrative Policy: **Mandatory Attendance at First Class Session and Consequences for Absence: Twin Cities, Crookston, Morris, Rochester**).
   c. Students are responsible for being on time and prepared for all class sessions.

4. Maintaining academic integrity. Students are expected to maintain academic integrity, including doing their own assigned work for courses. If it is determined that a student has engaged in scholastic dishonesty, the instructor may impose an academic consequence (e.g., giving the student a grade of "F" or an "N" for the course), and the student may face additional sanctions from the University. (See Board of Regents Policy: **Student Conduct Code**, Section VI, Subd 1, Scholastic Dishonesty, and Administrative Policy: **Grading and Transcripts: Twin Cities, Crookston, Morris, Rochester**).

5. Seeking help and accommodation.
   a. Students are responsible for seeking academic help in a timely fashion.
   b. Students who need special accommodations are responsible for working first with the relevant University offices and then with the instructor at the beginning of the course.

6. Respecting intellectual property. Students may not distribute instructor-provided notes or other course materials, except to other members of the same class or with the express (written) consent of the instructor. Instructors have the right to impose additional restrictions on course materials in accordance with copyright and intellectual property law and policy. Students may not engage in the widespread distribution or sale of transcript-like notes or notes that are close to verbatim records of a lecture or presentation.

7. Keeping classroom in good order. Students may be responsible for helping straighten up a classroom at the end of a class period, if requested to do so by the instructor. Keeping a classroom in good order includes taking away or disposing of everything one came in with, such as pop cans/bottles, food containers/wrappers, newspapers, etc. Students must also not deface or damage classrooms or classroom furniture or equipment.

8. Use of personal electronic devices in the classroom. Instructors determine if personal electronic devices (such as cell phones and laptops) are allowed in the classroom. Students may be directed to turn off personal electronic devices if the devices are not being used for class purposes. Students are not permitted to record any part of a class/lab/other session unless explicitly granted permission by the instructor. If the student does not comply, the student may be asked to leave the classroom.

9. Guests may not be brought to class without permission from the instructor.
Exclusions
This policy is not applicable to the Duluth campus.

REASON FOR POLICY

This policy clarifies and outlines student responsibilities and expectations for enrollment and participation in a course. Faculty and students need a common understanding of their responsibilities for the learning process. This policy implements criteria and requirements for accreditation established by the Higher Learning Commission.

PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

1. Is it permissible for a student to bring his or her child to class?
   All guests, including a student's family members, may not attend class with the student without permission from the instructor.

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<tr>
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<td><a href="mailto:lcarrell@r.umn.edu">lcarrell@r.umn.edu</a></td>
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DEFINITIONS

Prerequisite
A course that is a necessary requirement before subsequent advanced courses.

Scholastic Dishonesty
Plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using
Have a good faith belief there has been a violation of University policy? Please report concerns to your supervisor, the appropriate University administrator to investigate the matter, or submit a report to UReport.
ADMINISTRATIVE POLICY

University-Administered Graduate Student Fellowships and Traineeships

Responsible University Officer: Executive Vice President and Provost
Policy Owner: Vice Provost and Dean of Graduate Education
Policy Contact: Alison Skoberg

Printed on: 12/08/2016. Please go to http://policy.umn.edu for the most current version of the Policy or related document.

POLICY STATEMENT

Graduate student fellowships and traineeships are awarded on the basis of academic merit and provide actively enrolled students with the opportunity to pursue study, training and research. Fellowships carry no service obligations. Traineeships may carry service obligations.

I. Eligibility and Selection for Graduate Student Fellowships and Traineeships
   a. University of Minnesota (University) graduate students are eligible to hold a University-administered fellowship or traineeship if they are admitted to a University graduate program and are registered for at least the minimum number of credits required by the fellowship or traineeship for a particular term.
   b. All students who meet the eligibility criteria for a fellowship or traineeship must be considered for the fellowship or traineeship in accordance with established review and selection processes and criteria. Recipients of graduate student fellowships and traineeships must meet registration requirements and other terms and conditions of their award.
   c. University colleges and departments, or other University units as appropriate, must publicize the fellowships the unit offers.

II. Fellowship and Traineeship Stipends and Benefits
   a. Ranges for graduate fellowship and traineeship stipends are established each fiscal year by the awarding collegiate unit, department, academic program, and/or external agency. These ranges must follow the rules and guidelines set by the sponsoring entity.
   b. The awarding collegiate unit, department, academic program, and/or external agency stipulates the benefits. These benefits must follow the rules and guidelines set by the sponsoring entity.
   c. Graduate students who hold fellowships or traineeships that are administered by the University and provide a stipend that is at least equal to a 25% graduate assistantship may be eligible for resident tuition rates. Members of the student’s immediate family may be eligible for resident tuition rates.
   d. Fellows and trainees are responsible for payment of charges not covered by the fellowship or traineeship (e.g., lab, installment, or late registration fees).
   e. Fellows or trainees who leave their graduate program before the end of a semester in which they hold a fellowship or traineeship may be required to re-pay all or a portion of the stipend for that term.
   f. Fellowships and traineeships may be supplemented by other University-administered support (e.g., a graduate assistantship) unless restricted by the terms of the fellowship or traineeship.

III. Exceptions
   This policy does not apply to first professional degrees. (The first professional degrees are the J.D., M.D., Pharm.D., D.V.M., D.D.S, and L.L.M. degrees.)

REASON FOR POLICY

This policy incorporates equity and fairness standards in the selection of recipients for University-administered fellowships and traineeships. This policy also aids the University in recruiting high-quality graduate students.
PROCEDURES

There are no procedures associated with this policy.

FORMS/INSTRUCTIONS

There are no forms associated with this policy.

APPENDICES

There are no appendices associated with this policy.

FREQUENTLY ASKED QUESTIONS

- University-Administered Graduate Student Fellowships and Traineeships FAQ

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<tr>
<td>Primary Contact(s)</td>
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<td>612-625-9310</td>
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<tr>
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<tr>
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</tr>
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DEFINITIONS

**Graduate Fellowship**
A merit-based stipend award that an individual student wins competitively. The student applies (or is nominated) directly to the funding source.

**Graduate Traineeship**
Is awarded competitively to a group of faculty members in a particular disciplinary or interdisciplinary area, the discipline having been specified in advance by the funding agency. The University faculty group awarded the training grant identifies the recipients from among its students interested in studying in the targeted field.

**Service**
Work performed that is typically recognized by payment of a salary.

**Stipend**
A fixed sum of money primarily paid to cover living costs and educational expenses while the recipient is enrolled in an educational program.

**Salary**
A wage paid for work performed.

**Immediate Family (for the purpose of qualifying for resident tuition rate)**
Spouse, children, or legal ward living in the household.

RESPONSIBILITIES

**Colleges**
- Publicize the fellowships the college offers.
• Clearly stipulate the benefits provided by each fellowship offered by the college.
• Fairly consider all students who meet the eligibility criteria for a fellowship or traineeship.

Programs
• Publicize the fellowships the program offers.
• Clearly stipulate the benefits provided by each fellowship offered by the program.
• Fairly consider all students who meet the eligibility criteria for a fellowship or traineeship.

Students
• Meet all requirements, terms and conditions associated with their award.

RELATED INFORMATION
• Board of Regents Policy: Tuition and Fees
• Administrative Policy: Leave of Absence and Reinstatement from a Leave: Graduate Students
• Administrative Appendix: Resident Tuition Rate

HISTORY
Effective:
July 2012 - New Policy, Comprehensive Review - 1. Establishes standards that apply to all University-Administered fellowships and traineeships. 2. Distinguishes fellowships and traineeships from salaried graduate student employment. 3. Requires fair and transparent selection process for awards. 4. Extends applicability of policy requirements to all programs, including that not formerly under the aegis of the Graduate School.
Withholding Diplomas and Official Transcripts from Students

**Policy Statement**

The University will not issue diplomas or official transcripts to students with financial obligations equal to, or in excess of, $100 or to students who have not satisfied any student conduct or academic integrity sanctions.

Once a student satisfies his or her financial obligation or satisfies the outstanding sanction, the diploma will be issued and the hold barring issuance of the official transcript will be removed.

**Reason for Policy**

The University expects students to meet any financial and/or student conduct and academic integrity obligations to the institution, both during their enrollment and upon graduation. Withholding the diploma and official transcript for not meeting these responsibilities is consistent with both of these expectations.

**Procedures**

- Diplomas and Official Transcripts: Notification to Students of the Hold and Issuance after the Obligation is Met

**Forms/Instructions**

There are no forms associated with this policy.

**Appendices**

There are no appendices associated with this policy.

**Frequently Asked Questions**

1. How is a student notified that he or she will not be receiving a diploma or an official transcript due to these obligations?
   Students are notified via both email and paper letter.

2. Will a student's degree still be posted to his or her record if money is owed or a judicial sanction is not met?
   Yes.
ADDITIONAL CONTACTS

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<tr>
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<td>612-626-1754</td>
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</tr>
</tbody>
</table>

DEFINITIONS

Financial Obligation
Students that owe a minimum of $100 to the University handled by the University collections offices on respective campuses.

Student conduct and academic integrity sanction
A sanction imposed upon a student for violation of the University's Student Conduct Code

RESPONSIBILITIES

Registrar
Notify faculty, staff and students of the policy of withholding diplomas and official transcripts.

College or department
Advise students of the policy on the policy of withholding diplomas and official transcripts.

Campus Collections Office
Determines if diploma can be issued based on satisfactory payment of financial obligations.

Office of Student Conduct and Academic Integrity (OSCAI) - Twin Cities Campus
Notify faculty, staff and students of the policy of withholding diplomas and official transcripts. Determines if diploma can be issued based on satisfactory resolution of obligation.

RELATED INFORMATION

There is no related information associated with this policy.

HISTORY

Amended:
December 2013 - Comprehensive Review, Minor Revision. Provides additional guidance to the students who have a hold on their record through a new FAQs.

Amended:
December 2009 - Changes withholding of "degrees" to withholding of "diplomas and official transcripts"; Improves satisfaction of student conduct or academic integrity sanctions by expanding the policy to address these types of obligations; Aligns with practices of our peer institutions.

Effective:
December 2004
investigate the matter, or submit a report to UReport.
Twin Cities Campus
Occupational Therapy M.O.T.
Allied-Occupational Therapy
Academic Health Center Shared

Link to a list of faculty for this program.

Contact Information:
Program in Occupational Therapy
MMC 368
420 Delaware Street SE
Minneapolis, MN 55455
877-334-2659; fax: 612-626-8127
Email: cahpinfo@umn.edu
Website: http://www.cahp.umn.edu/ot

- Program Type: Master's
- Length of program in credits: 78
- This program requires summer semesters for timely completion.
- The program admits students to two locations, the Minneapolis campus and the Rochester campus.

Level I Fieldwork occurring within select courses, will be located across the state of Minnesota. Two full-time Level II Fieldwork placements occur in Minnesota with rare exceptions. Students are responsible for all costs associated with Level I and Level II fieldwork including housing arrangements and transportation for all fieldwork placements.

- Degree: Master of Occupational Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Occupational Therapy (OT) program is a 22-25 month, 78-credit, graduate-level professional program completed over five semesters.

Graduates of the program will be eligible to sit for the National Certification Examination for the Occupational Therapist, administered by the National Board for Certification in Occupational Therapy (NBCOT). After successful completion of this examination, the graduate will be an occupational therapist, registered (OTR). In addition, most states require licensure to practice; however, state licenses are usually based on the results of the NBCOT certification examination.

A felony conviction may affect a graduate's ability to sit for the NBCOT certification examination or attain state licensure. Information is available from:
National Board for Certification in Occupational Therapy
12 South Summit Avenue, Suite 100
Gaithersburg, MD 20877-4150
(301) 990-7979
FAX (301) 869-8492
www.nbco.org
info@nbco.org

The program has been continuously accredited since 1946. In 2007, a new location was accredited making the OT program available in both Minneapolis and Rochester, Minnesota.

The OT program is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA).
4720 Montgomery Lane, Suite 200
Bethesda, MD 20814-3449
ACOTE's telephone number, c/o AOTA, is (301) 652-AOTA
www.acoteonline.org.

Accreditation
This program is accredited by Accreditation Council for Occupational Therapy Education (ACOTE) - see above contact information
Program Delivery
This program is available:
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree completed prior to fall enrollment in order to apply to the Occupational Therapy program. There are no preferred undergraduate majors.

Required prerequisites
Core Prerequisite Courses
Courses must be satisfactorily completed at a regionally accredited institution. Six of the seven courses must be completed at the time of application. All prerequisites must be completed no later than the end of summer session of the year of admission. The non-core prerequisite, medical terminology, may be taken as a college course or as an online course equivalent to 1 college credit.

Prerequisites must be fulfilled with a minimum number of semester credits, listed next to each course.
Human Anatomy (3 cr)
Human Physiology (3 cr)
Statistics (3 cr)
This course must include descriptive and inferential statistics. Courses that focus on Research Methods are not sufficient to fulfill this requirement.
General Psychology (3 cr)
Abnormal Psychology (3 cr)
Human Development Across Life Span (3 cr)
Students will be required to verify that the course(s) taken covered content from conception to death. Students may need to take a series of courses to complete this prerequisite.

Sociology/Anthropology
This course should include content related to human societies and behaviors, social theory and theories of social change, methods of study in sociology, characteristics of social units (for example, race/ethnicity, economics/social organizations, gender, politics, religious systems) and the impact of cultural diversity. Courses that focus on one topic (e.g. sociology of education or sociology of sports) are not sufficient to fulfill this requirement.
Intro to Sociology (3 cr)
or Cultural Anthropology (3 cr)

Non-Core Prerequisite
Medical Terminology (1 cr)
Or the equivalent to 1 college credit may be substituted.

Other requirements to be completed before admission:
Computer Competency:
Admitted applicants must be proficient at using a personal computer, including but not limited to sending and receiving email, using data and word processing software (primarily Microsoft Office software), using the Internet, and navigating the U of MN and other web sites. See computer requirements for online courses http://cahp.umn.edu/minimum-technical-standards.

Practical Experience:
Minimum of 20 hours of OT observation in at least two practice areas OR completion of an Orientation to OT course is required.

Recommended:
• Additional OT observation experience, above that which is required.
  • Work, volunteer or observation experience in health or education related fields (e.g. nursing, physical therapy, education/teaching, speech pathology, long term care, home health, children and youth, neurotypical or disability populations). Experiences must be direct interaction with patients/clients/students.
  • Participation in research.
  • Leadership experiences.

Special Application Requirements:
• Applicants must meet Minimum Technical Standards found on the OT Program web page. http://cahp.umn.edu/minimum-technical-standards
- Applicants whose native language is not English or whose academic studies were done exclusively at a non-English speaking institution(s) must prove English proficiency by providing official Test of English as a Foreign Language (TOEFL) scores.

- International Applicants: The OT Program is NOT able to accept students on F1 or F2 visas due to federal regulations regarding online degree programs. Applicants with other visa types should contact cahpinfo@umn.edu for information about admission eligibility.

- Applicants should complete a prerequisite planning sheet found on the OT program web page. http://cahp.umn.edu/prerequisites

If the student's school(s) is not listed, or if the Prerequisite Planning Sheet does not list the courses taken, the student should send course description(s) for each course taken that the student believes fulfills a specific prerequisite requirement to cahpinfo@umn.edu.

- Criminal Background Studies: The University of Minnesota requires Minnesota Department of Health criminal background studies on all students admitted to the OT Program. Failure to pass the background study may preclude successful completion of the program. Additional background studies may be required by specific fieldwork settings. Students will be required to complete these studies in order to participate in the experiences.

Admitted students are provided detailed instructions for how to request a criminal background study soon after beginning the program.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 78 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Students will engage in a group or individual study of a research question related to occupational therapy. Students will demonstrate a high level of critical thinking as they plan, conduct, and evaluate their mentored scholarly project. Students will submit a written description of their project in APA format and defend their scholarly project through an oral poster presentation.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

All courses must be graded "C" or higher and a minimum semester GPA of 2.8 is also required for students to remain in good standing.

Students complete two 12-week, full-time equivalent, Level II fieldwork experiences in Minnesota after successfully completing all classroom-based coursework. All Level II fieldwork must be completed within 24 months of classroom-based coursework.

Year One

The first year builds a foundation in the study of activity and occupation; society, community, family, and environmental influences on human occupation; and foundations of occupational therapy practice when human occupation is reduced. All students participate in their communities as engaged citizens and with their inter-professional colleagues as they practice professional level skills. Five Level I fieldwork experiences provide guided practice in the occupational therapist role.

Fall Semester

6-8 sessions face-to-face

CAHP 5110 - Foundations of Interprofessional Communication and Collaboration (1.0 cr)
OT 6100 - Public and Professional Engagement I (0.5 cr)
OT 6101 - Foundations of Occupational Science and Occupational Therapy (4.0 cr)
OT 6102 - Professional Identity: Behaviors and Attitudes (2.0 cr)
OT 6103 - Occupational Therapy Process for Society (3.0 cr)
OT 6111 - Foundations: Occupations as Therapy (3.0 cr)
OT 6113 - Occupational Therapy Process for Community (3.0 cr)

Spring Semester

6-8 sessions face-to-face

OT 6200 - Public and Professional Engagement II (0.5 cr)
OT 6201 - Functional Anatomy and Kinesiology (3.0 cr)
OT 6202 - Occupational Therapy Process for Individuals: Occupation Through Compensation (5.0 cr)
OT 6203 - Occupational Therapy Process for Family (2.0 cr)
OT 6213 - Occupational Therapy Process for Individuals: Medical Contexts (2.0 cr)
OT 7201 - Scholarly Inquiry in Health Sciences (4.0 cr)

**Summer Semester**
8-15 sessions face-to-face
OT 6200 - Public and Professional Engagement II (0.5 cr)
OT 6301 - Neuroscience (5.0 cr)
OT 6302 - Occupational Therapy Process for Individuals: Occupation Through Remediation (4.0 cr)
OT 6312 - Occupational Therapy Process for Individuals: Psychosocial Approaches (3.0 cr)
OT 6322 - Occupational Therapy Process for Individuals: Work Contexts (2.0 cr)
OT 7394 - Scholarly Project in OT I (2.0 cr)

**Year Two**
Year two shifts to a focus on practice. Students apply OT concepts to increasingly complex areas of practice in a broad range of contexts including work, school, and group settings. Level I fieldwork provides opportunities to practice within communities. Six months is devoted to Level II fieldwork where students practice under the direct supervision of an occupational therapist in a medical and/or community setting. Students should expect to travel to fieldwork sites.

**Fall Semester**
15 sessions face-to-face
OT 6200 - Public and Professional Engagement II (0.5 cr)
OT 6402 - Occupational Therapy Process for Individuals: Occupation Through Neurorehabilitative Approaches (4.0 cr)
OT 6403 - Management of Occupational Therapy Services (1.0 cr)
OT 6412 - Occupational Therapy Process for Individuals: Orthotics and Prosthetics (3.0 cr)
OT 6422 - Occupational Therapy Process: Group Context (2.0 cr)
OT 6432 - Occupational Therapy Process for Individuals: Educational Context (2.0 cr)
OT 7494 - Scholarly Project in OT II (4.0 cr)

**Spring Semester**
OT 7596 - Occupational Therapy Level II Fieldwork I (6.0 cr)
OT 7696 - Occupational Therapy Level II Fieldwork II (6.0 cr)

**Program Sub-plans**
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

**Rochester**
Sub-plan is used by the program in Occupational Therapy to differentiate between students admitted to the Minneapolis or the Rochester campus. Regardless of the assigned campus, all occupational therapy students take the same courses with the same instructors during the same semester. Instructional support staff may vary by campus.
Twin Cities Campus
Ecology, Evolution and Behavior M.S.
Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Email: eebgrad@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/eeb/graduate/about-program

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Courses in inorganic chemistry, organic chemistry, biochemistry, general physics, one year of college calculus, animal biology, genetics, physiology, and plant biology are strongly recommended and provide an important background to pursue graduate work in EEB. Proficiency in a foreign language is not required but is strongly recommended for students who expect to pursue field work in a country where English is not the native language. Deficiencies must be made up early in the graduate program.

Special Application Requirements:
Students are admitted only in fall semester. Deadline for application is December 1. Refer to the EEB website for more details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MS is offered under both Plan A (with thesis) and Plan B (without thesis). Plan A requires 20 course credits in the major and 10 thesis credits. Plan B requires 30 course credits in the major and one to three research papers, which may be written in conjunction with graduate courses. Significant field or laboratory experience and competence in statistics, to include hypothesis testing, regression, and correlation are required. Degree programs are planned by the student and an advisory committee of three faculty members to meet the student's interests and needs.

Plan A and Plan B course options

Plan A

Elective courses
Take 20 or more credit(s) from the following:
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5407 - Ecology (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5605 - Limnology Laboratory (2.0 cr)
- EEB 8201 - Graduate Foundations in Ecology, Evolution and Behavior Semester 1 (4.0 cr)
- EEB 8202 - Graduate Foundations in Ecology, Evolution and Behavior - Semester 2 (4.0 cr)
- EEB 8360 - Behavioral Biology Seminar (1.0 cr)
- EEB 8500 - NSF GRF Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EEB 8301 - Prelim Proposal Writing Seminar (1.0 cr)
- EEB 8302 - EEB Written Prelim Workshop (1.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- EEB 8641 - Spatial Ecology (3.0 cr)
- EEB 8980 - Seminar on Current Topics (1.0 - 3.0 cr)
- EEB 8990 - Graduate Seminar (1.0 - 3.0 cr)
- Students may select graduate level courses outside of EEB in consultation with their advisor.

Thesis credits
10 master's thesis credits are required.
EEB 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Students may select from the courses listed below, or, in consultation with their advisor, choose other graduate-level courses with other designators.
Take 30 or more credit(s) from the following:
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5407 - Ecology (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5605 - Limnology Laboratory (2.0 cr)
- EEB 8201 - Graduate Foundations in Ecology, Evolution and Behavior Semester 1 (4.0 cr)
- EEB 8202 - Graduate Foundations in Ecology, Evolution and Behavior - Semester 2 (4.0 cr)
- EEB 8301 - Prelim Proposal Writing Seminar (1.0 cr)
- EEB 8302 - EEB Written Prelim Workshop (1.0 cr)
- EEB 8360 - Behavioral Biology Seminar (1.0 cr)
- EEB 8500 - NSF GRF Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)

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Information current as of December 20, 2016
• EEB 8602 - Stream Restoration Practice (2.0 cr)
• EEB 8641 - Spatial Ecology (3.0 cr)
• EEB 8980 - Seminar on Current Topics (1.0 - 3.0 cr)
• EEB 8990 - Graduate Seminar (1.0 - 3.0 cr)

• Students may select graduate-level courses outside of EEB in consultation with their advisor.
Twin Cities Campus

Ecology, Evolution and Behavior Minor

Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Ecology, Evolution, and Behavior Graduate Program, 140 Gortner Laboratory, 1479 Gortner Ave, St. Paul, MN 55108 (612-624-6770, fax: 612-624-6777)
Email: eebgrad@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/eeb/graduate/about-program

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in Ecology, Evolution, and Behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Master's Course List
Take 6 or more credit(s) from the following:
- EEB 5xxx
- EEB 8xxx

Doctoral
Doctoral Course List
Take 12 or more credit(s) from the following:
- EEB 5xxx
Twin Cities Campus
Ecology, Evolution and Behavior Ph.D.
Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Ecology, Evolution, and Behavior Graduate Program, 140 Gortner Laboratory, 1479 Gortner Avenue, St. Paul, MN 55108 (612-624-6770, fax: 612-624-6777)
Email: eebgrad@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/eeb/graduate/about-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Courses in inorganic chemistry, organic chemistry, biochemistry, general physics, one year of college calculus, animal biology, genetics, physiology, and plant biology are strongly recommended and provide an important background to pursue graduate work in EEB. Proficiency in a foreign language is not required but is strongly recommended for students who expect to pursue field work in a country where English is not the native language. Deficiencies must be made up early in the graduate program.

Special Application Requirements:
Students are admitted only in fall semester. Deadline for application is December 1. Refer to the EEB website for more details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Significant field or laboratory experience, proficiency in using computers in research, and competence in advanced statistics are required. Students are expected to gain some appreciation of history or philosophy of science and are required to teach a minimum of two semesters at 50 percent time. Course plans are discussed and agreed upon by the student and an advisory committee of three to five faculty members.

Required courses
- EEB 8201 - Graduate Foundations in Ecology, Evolution and Behavior Semester 1 (4.0 cr)
- EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
- EEB 8500 - NSF GRF Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EEB 8980 - Seminar on Current Topics (1.0 - 3.0 cr)
- EEB 8301 - Prelim Proposal Writing Seminar (1.0 cr)
- EEB 8302 - EEB Written Prelim Workshop (1.0 cr)

Quantitative course options
- EEB 5042 - Quantitative Genetics (3.0 cr)
- or EEB 5371 - Principles of Systematics (3.0 cr)
- or STAT 5021 - Statistical Analysis (4.0 cr)
- or STAT 5303 - Designing Experiments (4.0 cr)
- or STAT 5302 - Applied Regression Analysis (4.0 cr)
- or Student may select another course with the approval of the Director of Graduate Studies.

History and Philosophy of Science course options
- PHIL 3601W - Scientific Thought [WI] (4.0 cr)
- or PHIL 4105W - Epistemology [WI] (3.0 cr)
- or PHIL 4607 - Philosophy of the Biological Sciences (3.0 cr)
- or HSCI 3242 - The Darwinian Revolution [HIS] (3.0 cr)
- or HSCI 3244 - History of Ecology and Environmentalism [HIS, ENV] (3.0 cr)
- or HSCI 3815 - Revolutions in Science: Lavoisier, Darwin, and Einstein [HIS, GP] (3.0 - 4.0 cr)
- or HSCI 5401 - Ethics in Science and Technology (3.0 cr)
- or HSCI 5211 - Biology and Culture in the 19th and 20th Centuries [CIV] (3.0 cr)
- or HSCI 5242 - The Darwinian Revolution (3.0 cr)
- or HSCI 5244 - History of Ecology and Environmentalism (3.0 cr)
- or HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
- or Student may select another course with the approval of the Director of Graduate Studies.

Electives
Students take additional graduate level courses to supplement their 24 total credit requirement. Elective coursework is chosen in consultation with the adviser.

Ethics requirement
The ethics requirement for doctoral students is training in four areas. The EEB graduate program has a four-session ethics seminar that is offered during the Friday noon seminar series. Students should complete all four sessions before the end of their second year.

Joint- or Dual-degree Coursework: Joint Degree Program in Law, Health & the Life Sciences
Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Microbial Ecology Minor
College of Biological Sciences - Adm
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Email: micecol@umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This minor is available to master's (M.S.) and doctoral (Ph.D.) students. Microbial ecology is an interdisciplinary research area concerned with the relationships between microorganisms and their natural environment. The microbial ecology minor offers core coursework in microbiology, microbial physiology, microbial genetics, microbial genomics, microbial ecology, ecology, and theoretical ecology. Additional courses and opportunities to interact with others interested in microbial ecology are also part of the minor. The microbial ecology/biotechnology seminar series allows students and faculty to interact with microbial ecologists from other universities. The curriculum encourages interdisciplinary interaction, communication, and synthesis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
To be admitted to the minor, a student must be admitted to a master's or doctoral degree-granting program within the Graduate School, should have broad training in the biological sciences, and must be accepted by the director of graduate studies of the microbial ecology minor program. All students are expected to have had the equivalent of introductory microbiology (MICB 3301) and general ecology, but may fulfill deficiencies in these areas by taking these courses while in the program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 graduate credits, all of which must be outside the student's major department and must include at least one laboratory course in microbiology (e.g., MICB 4215) and one ecology (EEB) course chosen from the list below. The remaining courses also are chosen from this list with the guidance and approval of the director of graduate studies.

The doctoral minor requires 12 graduate credits, 9 credits of which must come from the core courses listed below (contact the director of graduate studies for potential alternatives to these courses). The remaining credits must come from at least two courses chosen from this list, but may not be in the student's major.

Core courses:
EEB 5053 (4 cr)
MICB 4111 (3 cr)
MICB 4121 (3 cr)
MICA 8002 (4 cr)
Additional courses
CE 8541
CE 8542
CE 8551
EEB 4601
EEB 4609
PLPA 8102
PLPA 8103
SOIL 5515
SOIL 5611
Twin Cities Campus
Microbial Engineering M.S.
Biological Process Technology Institute
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, Saint Paul, MN 55108 (612-624-6774; fax 612-625-5780)
Email: mice@umn.edu
Website: http://www.bti.umn.edu/MicE

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Microbial engineering allows students to pursue an interdisciplinary program that combines microbiology, biochemistry, molecular biology, bioinformatics, chemical engineering, and related sciences. Students perform brief rotations in faculty laboratories to choose an independent project, and tailor their coursework to support and complement their research. Projects can span modern basic microbiology, applied industrial engineering, as well as include computer science and informatics disciplines. After graduation, many students choose to continue on to a PhD program in a related discipline or work directly in biotechnology research and development. Supporting courses are chosen from fields including biochemistry, microbiology, food science, genetics and cell biology, and computer science. The program is coordinated by the BioTechnology Institute (BTI) and involves faculty from 10 departments and 5 institutes of the University.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Typically, applicants with a bachelor's degree in biological sciences, biochemistry, chemistry, or chemical engineering apply. Recommended academic preparation includes one year each of calculus, organic chemistry, physics, microbiology, and a background in a field such as basic chemical engineering, biology, physical chemistry, or genetics. Background deficiencies can be made up during the first year of graduate work. Most students enter the program with a GPA of 3.40 or higher.

Special Application Requirements:
Three letters of recommendation, scores from the General Test of the GRE, the TOEFL score for international applicants, transcripts, Curriculum Vitae, and an autobiographical statement including occupational goals must be submitted to the director of graduate studies. Applications are accepted for fall semester only. To receive full consideration for financial aid, students must apply for fall semester admission by February 1.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
  - Speaking test score: 0

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students must attend research seminars during the first-year spring semester, and must present a research seminar in a biotechnology seminar series the following year.

Required Course

MICE 5355 - Advanced Fermentation and Biocatalysis Laboratory (1.0 cr)

Supporting Coursework

Take at least 6 credits of supporting coursework, which can either be from the following list or other courses, in consultation with the advisor.

BIOC 5xxx
BIOC 8xxx
FSCN 5xxx
FSCN 8xxx
PHAR 5xxx
PHAR 8xxx
PBIO 5xxx
PBIO 8xxx
GCB 5xxx
GCB 8xxx

Plan Options

Plan A
Take at least 13 credits, in consultation with the advisor, to meet the 14-credit minimum for the major.

CHEN 5xxx
CHEN 8xxx
MICB 5xxx
MICB 8xxx

Thesis Credits
Take at least 10 master's thesis credits.

MICE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Take at least 23 additional credits, in consultation with the advisor, to meet the 24-credit minimum for the major.

CHEN 5xxx
CHEN 8xxx
MICB 5xxx
MICB 8xxx

Plan B Requirement
The Plan B project comprises a 4-credit summer preceptorship in a private company research laboratory, or in a University research institute, culminating in a project paper. The appropriate 4-credit course is selected with the approval of the advisor.
Twin Cities Campus
Microbial Engineering Minor
Biological Process Technology Institute
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, Saint Paul, MN 55108 (612-624-6774; fax 612-625-5780)
Email: mice@umn.edu
Website: http://www.bti.umn.edu/MicE

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 10
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Microbial engineering is an interdisciplinary program that combines an understanding of basic principles in microbiology, biochemistry, molecular biology, chemical engineering, and related sciences. Students are trained in the industrial application of microorganisms, cultured cells, and immunologic agents. Students learn both modern basic microbiology and biological engineering. Courses may be chosen from specific fields including biochemistry, microbiology, food science, genetics and cell biology, or pharmacognosy. The program is coordinated by the BioTechnology Institute (BTI) and involves faculty from 10 departments and 5 institutes of the University.

Note: The minor in microbial engineering is offered at the doctoral level only.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Master's-level Minor
Take at least 10 credits, chosen in consultation with the Microbial Engineering director of graduate studies.

Doctoral
Doctoral-level Minor
Take at least 12 credits, chosen in consultation with the Microbial Engineering director of graduate studies.
Twin Cities Campus
Plant Biological Sciences M.S.
Plant and Microbial Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant Biological Sciences Graduate Program, 1445 Gortner Avenue, Room 256, St. Paul, MN 55108 (612-625-4222; fax:612-625-1738)
Email: pbiogp@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/plantbio/gradprog

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all application materials by December 1st is required in order to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL 
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Core Coursework
Take the following core courses. Take 8900 twice (Section 001 - Colloquium, and Section 003 - Seminar) for a total of 2 credits.
- PBIO 5960 - Special Topics (1.0 - 3.0 cr)
- PBS 8081 - Integrative Plant Biology: Connecting Molecules to Ecosystems (3.0 cr)
- PBS 8900 - Seminar (1.0 - 2.0 cr)
- PBS 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- PBS 8994 - Research (1.0 - 5.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)

Electives
Take additional coursework, in consultation and director of graduate studies, to complete the 14-credit minimum for the major field.

Outside Coursework
Take at least 6 credits of outside coursework in consultation with the advisor and director of graduate studies.

Plan Options

Plan A Requirements
Take 10 master's thesis credits.
- PBS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Requirements
Take an additional 10 credits, in consultation with the advisor and director of graduate studies, to meet the 30-credit minimum.
Twin Cities Campus

Plant Biological Sciences Minor

Plant and Microbial Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant Biological Sciences Graduate Program; 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-625-4222; fax: 612-625-1738)
Email: pbiogp@umn.edu
Website: http://www.cbs.umn.edu/plantbio/gradprog

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Master's-level Minor
Take at least 6 credits, chosen in consultation with the Plant Biological Sciences director of graduate studies.

Doctoral
Doctoral-level Minor
Take at least 12 credits, chosen in consultation with the Plant Biological Sciences director of graduate studies.
Twin Cities Campus
Plant Biological Sciences Ph.D.
Plant and Microbial Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant Biological Sciences Graduate Program, 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-625-4222; fax: 612-625-1738)
Email: pbiogp@umn.edu
Website: http://www.cbs.umn.edu/explore/departments/plantbio/gradprog

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Prospective students are expected to have completed a year of coursework in at least three of the following four areas: differential and integral calculus; organic and inorganic chemistry; biology; and physics. For students with demonstrated ability, background deficiencies as determined by the admissions committee can be made up during the first year of graduate studies. All admitted students are assigned to an advisor in the graduate program before they begin their studies.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all application materials by December 1st is required in order to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
13 to 18 credits are required in the major.
12 to 17 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Up to two 4xxx-level courses can be applied to the PhD degree.

Required Coursework
Take the following required courses for a total of at least 13.5 credits. Take at least 1 credit each of PBIO 5960, PBS 8994, and PBS 8900 (Sec 01, Sec 02, and Sec 03).

- **PBIO 5960** - Special Topics (1.0 - 3.0 cr)
- **PBS 8081** - Integrative Plant Biology: Connecting Molecules to Ecosystems (3.0 cr)
- **PBS 8123** - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- **PBS 8900** - Seminar (1.0 - 2.0 cr)
- **PBS 8901** - Preparation of Research Proposals (2.0 cr)
- **PBS 8994** - Research (1.0 - 5.0 cr)

**Required Teaching Experience**
PSTL 5106 (Sec 001) can be substituted for GRAD 8101.

- **GRAD 8101** - Teaching in Higher Education (3.0 cr)

**Thesis Credits**
Take at least 24 thesis credits.

- **PBS 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Electives**
Take at least 12 supporting program credits. Courses can be selected from the following list, or other courses can be chosen in consultation with the advisor and advisory committee with approval of the director of graduate studies.

**Take 12 or more credit(s) from the following:**

- **AGRO 4401** - Plant Genetics and Breeding (4.0 cr)
- **AGRO 4505** - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- **AGRO 4888** - Issues in Sustainable Agriculture (2.0 cr)
- **AGRO 5121** - Applied Experimental Design (4.0 cr)
- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- **AGRO 8023** - Evolution of Crop Plants (3.0 cr)
- **AGRO 8202** - Breeding for Quantitative Traits in Plants (3.0 cr)
- **AGRO 8241** - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
- **BIOL 3270** - Introduction To Systems Biology (3.0 cr)
- **BIOL 5272** - Applied Biostatistics (3.0 cr)
- **BIOL 5407** - Ecology (3.0 cr)
- **BIOL 5409** - Evolution (3.0 cr)
- **BIOC 4331** - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
- **BIOC 4332** - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
- **BIOC 4621** - Introduction to Physical Biochemistry (3.0 cr)
- **BIOC 5361** - Microbial Genomics and Bioinformatics (3.0 cr)
- **BIOC 8001** - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- **BIOC 8002** - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- **BIOC 5216** - Current Topics in Signal Transduction (3.0 cr)
- **EEB 5042** - Quantitative Genetics (3.0 cr)
- **EEB 5221** - Molecular Evolution (3.0 cr)
- **EEB 5609** - Ecosystem Ecology (3.0 cr)
or EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
or FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
or FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
or FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• GCD 5036 - Molecular Cell Biology (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or GCD 8151 - Cell Structure and Function (3.0 cr)
or GCD 8161 - Advanced Developmental Biology (3.0 cr)
• HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or HORT 4401 - Plant Genetics and Breeding (4.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
• PBS 8910 - Journal Club (1.0 cr)
or PBS 8993 - Directed Studies (1.0 - 5.0 cr)
• PBIO 4321 - Minnesota Flora (3.0 cr)
or PBIO 4511 - Flowering Plant Diversity (3.0 cr)
or PBIO 5412 - Plant Physiology and Development (3.0 cr)
or PBIO 5516 - Plant Cell Biology (3.0 cr)
or PBIO 5301 - Plant Genomics (3.0 cr)
• PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
• SOIL 5611 - Soil Biology and Fertility (4.0 cr)
Twin Cities Campus
Addictions Counseling M.P.S.
CCE Addiction Studies
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education Information Center
20 Ruttan Hall
1994 Buford Ave
St Paul, MN 55108
(612-624-4000)
Email: cceinfo@umn.edu
Website: http://www.cce.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the MPS in Addictions Counseling experience a rigorous, evidence-informed applied clinical preparation program that fulfills Minnesota’s Licensed Alcohol and Drug (MNLADC) educational requirements, with the added benefit of receiving a master's degree. The 30-credit curriculum includes specific licensure preparation content in the following areas: evidence based practices and evaluation, individual and group counseling skills, professional ethics, diversity and cultural sensitivity, co-occurring assessment and treatment interventions, and an applied field placement experience. The MPS meets the education and training needs of individuals new to the helping profession as well as individuals with an allied license (MSW, LP, LPC, LMFT) seeking to add the LADC.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Bachelor's degree from an accredited institution - Transcripts - Personal statement - Two letters of reference - Updated resume or CV

Special Application Requirements:
International students interested in the M.P.S. in Addictions Counseling should contact the International Student and Scholar Service (www.isss.umn.edu) for information on visa status and academic requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The ADDS 5996 Internship Seminar serves as a capstone experience where students apply the knowledge and skills learned in their previous courses in a real world clinical setting. Students receive close clinical supervision from both a site and faculty supervisors, participate in formal on-campus clinical supervision meetings, and actively engage in weekly required postings and practice assignments. Upon completion of the internship experience, each student undergoes an extensive formal written and oral evaluation process to ensure ethical and competent clinical practice.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

In addition to course work, an 880-hour field placement is required to complete the degree. This field placement will be done as part of the 4 credit class ADDS 5996.

Students may take one or more courses per term and have up to five years to complete a master's degree. Students who wish to transfer graduate-level coursework from other institutions should contact the Graduate Programs office at cceinfo@umn.edu for information and assistance.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 30 semester credits required for the degree.

Required Courses: 23 credits

- ADDS 5011 - Foundations in Addiction Studies (2.0 cr)
- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- ADDS 5031 - Applied Psychopharmacology (2.0 cr)
- ADDS 5041 - Methods and Models I: Motivational Counseling (2.0 cr)
- ADDS 5051 - Methods and Models II: Cognitive Behavioral Therapy (2.0 cr)
- ADDS 5061 - Foundations of Group Work (3.0 cr)
- ADDS 5071 - Foundations of Co-occurring Disorders (2.0 cr)
- ADDS 5081 - Multicultural Foundations of Behavioral Health (3.0 cr)
- ADDS 5091 - Assessment and Treatment Planning I (3.0 cr)
- ADDS 5121 - Professional Seminar 1 (1.0 cr)

Required Internship: 4 credits

- Students must take 4 credits/880 field hours of ADDS 5996.
- ADDS 5996 - Internship in Behavioral Health (1.0 - 8.0 cr)

Elective Courses: 3 credits

Electives must relate to counseling, human development, human services, or must enhance student's understanding of mental health, substance use disorders, or human behavior within a broader context. Electives will be chosen in consultation with student's adviser/mentor.
Twin Cities Campus
Arts and Cultural Leadership M.P.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, M.P.S. in Arts and Cultural Leadership, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108
(612-624-4000; fax: 612-626-2800)
Email: cceacl@umn.edu
Website: http://www.cce.umn.edu/acl

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students for both administrative and leadership roles in professional leadership of arts and cultural-related nonprofit organizations. It is aimed at career administrators in nonprofit arts and cultural organizations looking for a graduate degree to boost their advancement in the field and/or to interact with other students/faculty in discussing artistic and cultural leadership, planning, and policy. It is available to career administrators working in fields not directly related to the arts, but who want new careers in arts and/or cultural related nonprofit organizations.

The program of study leads to a master's degree that is: individualized, allowing students to tailor electives and a capstone project to their unique interests; interdisciplinary, including required interdisciplinary seminars and elective coursework drawn from other related academic departments at the University; and career focused, with a capstone project centered on an issue or topic expressly related to the student's career interest.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

Other requirements to be completed before admission:
At least three years of relevant work experience with an arts and/or cultural organization is required. Factors of academic preparation, relevant experience, evidence of readiness and maturity, writing ability, and reasons for seeking the degree will be taken into account as part of the admissions review. GRE scores may be submitted, but are not required.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, a current resume, two letters of reference, a two- to three-page written statement of purpose in which the student elaborates on his or her interest in the program, and an additional writing sample of approximately 10 pages. Application deadlines are in spring for summer term and fall semester admission, and fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

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Information current as of December 22, 2016
MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 32 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The ACL Final Project (ACL 8002, 3 credits) provides students with an opportunity to focus on the needs of a particular organization or community as they identify and carry out, in consultation with the leadership of that group and their academic adviser(s), a project that meets a need within that group and reflects both the interest of the students and their academic achievement.

The ACL Final Project consists of two parts: an applied project which includes an accompanying report, and an academic paper.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

A minimum of 32 credits are required for completion of the MPS degree.

Take core courses for a letter grade, earning a B- or better.

Obtain a cumulative GPA for all degree course work of 3.0 or better.

Required courses (18 credits)

ACL 8001 - Introduction to Interdisciplinary Inquiry (3.0 cr)
ACL 5200 - Trends and Impacts in Arts and Cultural Leadership (3.0 cr)
ACL 5220 - Philanthropy, Development, and Strategic Leadership (3.0 cr)
ACL 5230 - Ethics and the Law (3.0 cr)
ACL 8201 - Leadership: Skills and Practice (2.0 cr)
ACL 8202 - Nonprofit Board Practicum (1.0 cr)
ACL 8002 - Final Project Seminar (3.0 cr)

Selected applications courses (6 credits)

Required: At least two of the following courses with selection based on prior experiences.

Take 2 or more course(s) totaling 6 or more credit(s) from the following:

  • PA 5011 - Management of Organizations (3.0 cr)
  • PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
  • PA 5104 - Strategic Human Resource Management (3.0 cr)
  • PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
  • PA 5111 - Financing Public and Nonprofit Organizations (3.0 cr)
  • PA 5251 - Strategic Planning and Management (3.0 cr)
  • PA 5103 - Leadership and Change in an Innovation Society (3.0 cr)

Electives (6 credits)

Elective courses can be selected from related academic departments. Studio or applied courses, such as a course in painting or piano, may not be included as electives. Electives should relate to the professional tasks required of arts and cultural leaders or enhance student's understanding of the arts within a broader cultural context. Examples include, but are not limited to the courses listed below.

Take 8 or more credit(s) from the following:

  • ACL 5100 - Topics in Arts and Cultural Leadership (1.0 - 4.0 cr)
  • ACL 5950 - Special Topics (1.0 - 4.0 cr)
  • LS 5100 - Liberal Studies Seminar (1.0 - 4.0 cr)
  • JOUR 4263 - Strategic Communication Campaigns (3.0 cr)
  • JOUR 5251 - Strategic Communication Theory (3.0 cr)
  • MUS 5950 - Topics in Music (1.0 - 4.0 cr)
  • MST 5011 - Museum History and Philosophy (3.0 cr)
  • MST 5012 - Museum Practices (3.0 cr)
  • Other electives chosen in consultation with student's adviser.
Twin Cities Campus
Biological Sciences M.B.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, Master of Biological Science Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000; fax: 612-626-2800)
Email: ccembs@umn.edu
Website: http://www.cce.umn.edu/Master-of-Biological-Sciences/index.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Biological Sciences

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Biological Sciences (MBS) degree is a highly flexible graduate-level program designed to meet the needs of members of the working community who wish to increase their knowledge in areas of modern biology. Students focus their studies in one of three broad areas: Molecular Biosciences, Cellular and Organismal Biology, or Environmental and Population Biology. Limited elective credits in areas, such as Education, Business, and Public Health can be used to support a student's individual career goals and program focus. The degree enables recipients to learn new job skills, change professional emphasis, or provide added value to their present job and may be completed on a part-time basis.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

Other requirements to be completed before admission:
Evidence of knowledge of current, college-level concepts of basic chemistry, organic chemistry, and some biology coursework is required. Transcripts showing equivalent coursework combined with professional experience will be considered for application toward fulfillment of the prerequisites for admission. Two years of relevant experience in the workforce is preferred for admission. GRE scores may also be submitted, but are not required.

Special Application Requirements:
A statement of career goals, letters of reference, transcripts for all undergraduate and post-baccalaureate degrees or coursework, and an updated resume must accompany the application. Application deadlines are in the spring for fall semester admission, and in the fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is carried out under the direction of a faculty mentor. It can be literature-based or lab-based with a testable hypothesis and a final paper of 30-50 pages in length, which is an-depth examination and analysis of a particular area, problem, technique, etc.

Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The Plan C requirement is the Capstone course APS 8003.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The program includes coursework, independent study, and a project for Plan B master's students or capstone course for Plan C master's students. With guidance from program advisers, students complete 30 credits. M.B.S. candidates may transfer up to 12 credits into the program. Foundation credits may be waived or substituted if the student can show proficiency in the subject area. Coursework is taken from the regular graduate-level coursework. An overall GPA of 3.00 is required for the degree to be awarded.
Twin Cities Campus
Biological Sciences Minor

CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
Email: ccembs@umn.edu
Website: http://www.cce.umn.edu/Master-of-Biological-Sciences/index.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting students. Please contact the College of Continuing Education for more information about the status of this program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus
Horticulture M.P.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
Email: ccehort@umn.edu
Website: http://www.cce.umn.edu/Master-of-Professional-Studies-in-Horticulture

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Professional Studies in Horticulture is designed to enhance the capacity of those currently working in the horticulture industry and to provide the knowledge base needed by others interested in beginning new careers, starting their own business, or pursuing personal interests in horticulture. The degree provides a solid foundation of contemporary horticultural knowledge, yet is flexible enough to allow individuals to focus on the specific skills they wish to hone.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

Other requirements to be completed before admission:
Evidence of knowledge of current, introductory, college-level concepts of algebra, chemistry, biology, botany, or plant propagation is required for admission to the program. Prerequisite coursework may be completed at the University of Minnesota or at other educational institutions subject to transfer review. In all cases, documentation of completed, equivalent coursework combined with professional experience will be considered for application toward fulfillment of the prerequisites for admission to the M.P.S. in Horticulture. A minimum grade of C will be the standard for admission for all prerequisite coursework. Undergraduate prerequisite coursework must come from the following areas: Algebra, Chemistry, Biology, Botany, or Plant Propagation. Please refer to the program website for further details.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, a current resume, two letters of reference, a written statement of purpose (no more than two pages) which addresses pertinent aspects of the student’s background and academic qualifications as related to admission to the program and demonstrates a strong interest in horticultural science including documentation of any relevant experiences in the field of horticulture. Application deadlines are in spring for fall semester admission, and in fall for spring semester admission. Refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
- MELAB
- Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The capstone course, HORT 6002 - Problem Solving in Horticulture, accounts for 4 of the minimum 30 credits required for the degree and is not considered part of the horticulture core course requirements.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students who have not completed relevant introductory coursework in soils, plant pathology, and entomology, either during or subsequent to completion of their bachelor's degree, will be required to complete courses in these areas as part of their M.P.S. degree requirements. These courses are not prerequisites for admission. Depending on the specific courses included in the student's program, some additional coursework may also be required over and above the 30 graduate credits required for the degree.

All prerequisites associated with courses included in the student's course program must be completed as part of the student's degree requirements, unless exempted in writing by the instructor for the course and approved by the student's advisor and the program DGS prior to taking the course.

Excluding the capstone course, a maximum of 3 credits taken S/N may be applied toward the minimum requirements for the degree.

The student's course program must be approved by the DGS and M.P.S. Steering Committee.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 30 semester credits required for the degree.

Horticulture courses (15 credits)

15 credits of Horticulture (HORT) courses are required.

These courses must be 4xxx and above. A maximum of 9 credits total at the 4xxx level may be applied toward the program.

A maximum of 3 credits of HORT 5090 Directed Studies may be applied toward the minimum horticulture core course requirements.

HORT 6002 Capstone may not be applied toward the minimum horticulture core course requirements.

Take 15 or more credit(s) from the following:

- HORT 4000 - International Experiences in Horticultural Science (3.0 cr)
- HORT 4015 - Advanced Woody and Herbaceous Plant Topics (1.0 cr)
- HORT 4061W - Turfgrass Management [WI] (3.0 cr)
- HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
- HORT 4063 - Turfgrass Science (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
- HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
- HORT 4401 - Plant Genetics and Breeding (4.0 cr)
- HORT 4461 - Horticultural Marketing (3.0 cr)
- HORT 4601 - Aquaponics: Integrated fish and plant food systems (4.0 cr)
- HORT 4850 - Pollinator Protection in Managed Landscapes (3.0 cr)
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
- HORT 5011 - Common Chinese Medicinal Plants: Classification, Identification, and Application (3.0 cr)
- HORT 5012 - Common Chinese Medicinal Plants: Growing and Processing (3.0 cr)
- HORT 5023 - Public Garden Management (2.0 cr)
- HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
- HORT 5032 - Organic Vegetable Production (3.0 cr)
- HORT 5051 - Plant Production II (4.0 cr)
- HORT 5058 - Plant Cytogenetics (2.0 cr)
- HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
• HORT 5090 - Directed Studies (1.0 - 3.0 cr)
• HORT 6003 - Masters of Professional Studies in Horticulture Professional Experience Program: Internship (1.0 - 3.0 cr)

Related fields (11 credits)
Courses in related fields can be chosen from graduate-level courses across the U of M. A maximum of 9 credits total at the 4xxx level may be applied to the program. Courses are selected with the help of the student's advisor. See the MPS in Horticulture website for course suggestions and sample specializations.

Capstone: HORT 6002 (4 credits)
Intended as a capstone experience that integrates the knowledge gained from coursework, personal research, and the student's academic and professional experiences. Enrollment is limited to students who have completed 18 or more credit hours of their required 30 credits, and accounts for 4 of the minimum 30 credits required for the degree. These credits are not considered part of the horticulture core course requirements.

HORT 6002 - Problem Solving in Horticulture (2.0 - 4.0 cr)
Twin Cities Campus
Innovation Studies Postbaccalaureate Certificate
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
(612-624-4000; fax: 612-626-2800)
Email: cceis@umn.edu
Website: http://www.cce.umn.edu/is

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Innovation Studies Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting students. Please contact the College of Continuing Education for more information about the status of this program.

This certificate is built on two premises: (1) that the economic order of the 21st century will be determined more by intellectual capital and knowledge worker productivity than by the traditional resources of labor, capital, and raw materials; and (2) that an individual's success in the new economic order will be determined more by such personal characteristics as knowledge, inventiveness, adaptability, and self-reliance, than by the institutional structures and protections traditionally provided to workers by employers. Workers can no longer rely, in other words, on any established company or organization to provide secure, long-term employment. Today, they are much more on their own, requiring them to develop new skills in self-leadership, self-marketing, and team formation.

These shifts are nothing less than revolutionary, propelled by ever-advancing information and communications technologies. Likewise, they will be sustained by educational systems geared to preparing human capital for continuous innovation. Associated implications for international and global cooperation, collaboration, and competitiveness will be addressed throughout the innovation studies certificate seminars.

The focus of the certificate in innovation studies will be the individual, with emphasis on developing the requisite insights and skills needed to support a shift from an institutional model to a self-reliance model that rewards innovative leadership and problem solving. The curriculum will draw on a broad, growing body of interdisciplinary literature that deals with such topics as the impact of accelerating change on the nature of work and social institutions, the expansion and globalization of business and industry, geo-political change, socio-cultural change, ecological/environmental issues, population issues, the evolution of technology, and adaptive human behavior.

Potential students for the certificate are adults with bachelor degrees or better who develop or innovate significant portions of their work, or who wish to learn the principles and general skills of doing so. These are knowledge workers whose professional life pivots on thought, collaboration, and decision making to help envision or produce new goods and services. Familiar job titles for this target audience include:
- Organizational planners and strategists
- Managers from both the private and public sectors
- Engineers and scientists seeking to develop commercially successful new products
- Teachers and consultants in both the public and private sectors
- Financial planners and analysts
- Entrepreneurs and "intrepreneurs," in both profit and nonprofit organizations

The program is beneficial to anyone wanting to be better aligned with the future in her or his current position or wishing to make a strategic, innovation-focused career change.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)
Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary US institution or its foreign equivalent.

**Special Application Requirements:**
To be admitted, prospective students must show evidence that they are prepared to successfully undertake graduate-level work, and that they understand the nature of the program. Applicants must:
- hold a baccalaureate degree from an accredited college or university;
- submit transcripts from their undergraduate institution(s) and any subsequent credit coursework;
- submit a two-page statement of purpose that explains why this program is a good fit for them; and
- submit a current résumé, describing professional and life/work experiences.
Letters of reference from past or current employers and/or professors are optional.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 84

Key to [test abbreviations](TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

The certificate consists of at least 16 credits: 7 credits in two required core seminars and 9 credits in innovation studies electives. The core seminars include a 3-credit introductory course, IS 5001 - Introduction to Innovation Studies and a 4-credit capstone final project, IS 5002, which concludes the program. In addition to the core, students choose 9 credits of innovation studies seminars from a group of existing or prospective IS 5100 or IS 5950 topics seminars. These electives allow a student to focus on areas of innovation studies that offer the highest potential level of integration into his or her own educational and professional goals.
Twin Cities Campus
Integrated Behavioral Health M.P.S.
CCE Addiction Studies
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education Information Center, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN, 55108 (612-624-4000)
Email: cceinfo@umn.edu
Website: http://cce.umn.edu/Master-of-Professional-Studies-in-Integrated-Behavioral-Health/index.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The high prevalence of co-occurring mental health and substance use disorders virtually guarantees that counselors, no matter the treatment setting, will encounter clients struggling with not one, but two or more disorders.

The Master of Professional Studies in Integrated Behavioral Health (IBH) prepares counselors for this clinical reality. The IBH degree merges mental health and substance abuse education and training into a single, comprehensive and cohesive program. This synthesis represents an important and pioneering shift in the preparation of clinicians.

The IBH is designed to fulfill education and training requirements for two licenses: Licensed Professional Clinical Counselor (LPCC) and Licensed Alcohol and Drug Counselor (LADC).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
- Bachelor's degree from an accredited institution
- Transcripts
- Personal statement
- Two letters of reference
- Updated resume or CV

Special Application Requirements:
International students interested in the master of professional studies in integrated behavioral health should contact the International Student and Scholar Service (http://www.isss.umn.edu) for information on visa status and academic requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 84

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 60 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** Satisfactory completion of a portfolio demonstrates the student's clinical conceptualization and practice skills through the following:
- A client case study that includes an assessment and treatment plan
- A videotaped treatment session with a mock client
- A philosophy of counseling statement outlining the student's theoretical orientation to counseling and specific applications of his/her counseling philosophy to the population she/he intends to serve
- Evaluations outlining areas of competence and skill as assessed by internship site supervisor
- Self-selected papers and projects from program coursework that demonstrate the student's mastery of knowledge and skills

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

In addition to course work, an 880-hour field placement is required to complete the degree. The credit and field placement requirements are designed to fulfill licensing requirements as defined in the Minnesota Statutes, section 148B.54, subdivision 2; and Minnesota Rules, part 2150.2500 to 2150.2660. As noted in the statute, "The national trend for master's programs in counseling is towards 60 semester credits." In order for a practitioner to be eligible for third party reimbursement for services, the practitioner must demonstrate a minimum of 60 semester graduate level credits in counseling coursework.

Students may take one or more courses per term and have up to five years to complete a master's degree. Students who wish to transfer graduate-level coursework from other institutions should contact the Graduate Programs office at cceinfo@umn.edu for information and assistance.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 60 semester credits required for the degree.

**Required Courses: 50 credits**

Required courses:
- ADDS 5011 - Foundations in Addiction Studies (2.0 cr)
- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- ADDS 5031 - Applied Psychopharmacology (2.0 cr)
- ADDS 5041 - Methods and Models I: Motivational Counseling (2.0 cr)
- ADDS 5051 - Methods and Models II: Cognitive Behavioral Therapy (2.0 cr)
- ADDS 5061 - Foundations of Group Work (3.0 cr)
- ADDS 5071 - Foundations of Co-occurring Disorders (2.0 cr)
- ADDS 5081 - Multicultural Foundations of Behavioral Health (3.0 cr)
- ADDS 5091 - Assessment and Treatment Planning I (3.0 cr)
- ADDS 5121 - Professional Seminar 1 (1.0 cr)
- IBH 6011 - Foundations in Differential Diagnosis (3.0 cr)
- IBH 6022 - Foundations of Psychological Assessment (2.0 cr)
- IBH 6031 - Methods and Models IV: Trauma and Anxiety, Assessment and Treatment Intervention (2.0 cr)
- IBH 6051 - Advanced Group Practice (2.0 cr)
- IBH 6061 - Applied Advanced Diagnostics I (2.0 cr)
- IBH 6071 - Advanced Professional Issues (3.0 cr)
- IBH 6081 - Human Lifespan Development and Behavioral Health (3.0 cr)
- IBH 6091 - Intersection of Career and Mental Health (2.0 cr)
- IBH 6101 - Family Dynamics and Therapy (3.0 cr)
- IBH 6111 - Research and Evaluation Methods (3.0 cr)
- IBH 6121 - Professional Seminar 2 (1.0 cr)
- IBH 8002 - Portfolio Seminar (1.0 cr)

**Required Internship: 4 credits**

A minimum of 2 credits/440 field hours of ADDS 5996 must be completed near the program's mid-way point. If a student enters the program with the Alcohol and Drug Counseling License, he/she will not take the ADDS 5996 internship. Instead, he/she will enroll in IBH 6996 for 4 credits (880 placement hours).
Take 1 - 2 course(s) totaling exactly 4 credit(s) from the following:

- ADDS 5996 - Internship in Behavioral Health (1.0 - 8.0 cr)
- IBH 6996 - Internship for Integrated Behavioral Health (1.0 - 4.0 cr)

**Elective Courses: 6 credits**

Electives must relate to counseling, human development, human services or must enhance students’ understanding of mental health, co-occurring disorders, substance use disorders or human behavior within a broader context. Electives not on this list must be pre-approved by the Director of Graduate Studies.

- ADDS 5996 - Internship in Behavioral Health (1.0 - 8.0 cr)
- IBH 6021 - Methods and Models III: Synthesis Seminar in Client Centered Care (2.0 cr)
- IBH 6032 - Advanced Multicultural Practice (1.0 cr)
- IBH 6041 - Prolonged Exposure Therapy for PTSD (2.0 cr)
- IBH 6222 - Adolescents and Co-occurring Substance Use and Mental Health Disorders (2.0 cr)
- IBH 6227 - Supervision Models and Methods in Integrated Behavioral Health (3.0 cr)
- IBH 6228 - Mental Health and Addiction Program Administration (2.0 cr)
- IBH 6229 - Crisis Assessment and Management (2.0 cr)
- IBH 6231 - Management of Eating Disorders (3.0 cr)
- IBH 6993 - Directed Study in Integrated Behavioral Health (1.0 - 3.0 cr)
- IBH 6994 - Directed Research in Integrated Behavioral Health (1.0 - 3.0 cr)
Twin Cities Campus
Liberal Studies M.L.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, Master of Liberal Studies Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108, (612-624-4000; fax: 612-626-2800)
Email: ccemls@umn.edu
Website: http://www.cce.umn.edu/mls

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Liberal Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting students. Please contact the College of Continuing Education for more information about the status of this program.

The graduate major in liberal studies (LS) offers an interdisciplinary curriculum that includes an introductory seminar, a choice of liberal studies seminars, a choice of electives from disciplines throughout the University, a final project preparation course, and a final project seminar. Although LS seminars from MLS are scheduled for early evenings and some Saturday mornings, most graduate-level courses offered during the day are also open to MLS students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary US institution or its foreign equivalent.

Other requirements to be completed before admission:
The faculty committee reviewing each application looks for indications that the student can succeed in graduate study, that there is a good "fit" between the MLS program and the student's stated educational objectives, and that the student can express him/herself well in writing. The faculty also looks for positive qualities and other experiences the student will bring to the program.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, two letters of reference, an updated resume, a three- to four-page written statement of purpose, and an additional writing sample of 10 to 20 pages. Application deadlines are in spring for summer term and fall semester admission, and in fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 84
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 563
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 84

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Information current as of December 22, 2016
Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The Plan C final project must be prepared as part of LS 8002 - Final Project for Graduate Liberal Studies and must be approved by at least two faculty members and the director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Courses: 7 credits

- LS 8001 Introduction to Interdisciplinary Inquiry should be taken during the first semester in the MLS program.
- LS 8101 Final Project Proposal Prep should be taken when a student has completed 12 to 15 credits.
- LS 8002 Final Project is taken during the final semester in the MLS program. No other courses should be taken concurrently with LS 8002.

- LS 8001 - Introduction to Interdisciplinary Inquiry (3.0 cr)
- LS 8101 - Final Project Proposal Prep: Pulling the Pieces Together (1.0 cr)
- LS 8002 - Final Project for Graduate Liberal Studies (3.0 cr)

Required Liberal Studies Seminars: 9 credits

Every semester, the MLS program offers unique seminars in a small-group setting on a wide range of interdisciplinary topics. Students must take at least 3 seminars for a total of 9 credits.

Courses are selected with the help of the student's graduate faculty advisor.

- LS 5100 - Liberal Studies Seminar (1.0 - 4.0 cr)
- LS 5950 - Special Topics (1.0 - 4.0 cr)

Electives: 14 credits

Electives can be chosen from graduate-level courses across the U of M. Additional liberal studies seminars or directed study may be taken as electives. Electives must come from at least two different departments and should reflect the interdisciplinary nature of the MLS.

Courses are selected with the help of the student's graduate faculty advisor.
Twin Cities Campus
Liberal Studies Minor
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
Email: ccemls@umn.edu
Website: http://www.cce.umn.edu/mls

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting students. Please contact the College of Continuing Education for more information about the status of this program.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Advanced Management Training for Clinician Leaders Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health
MMC 819, A395 Mayo Memorial Building
420 Delaware Street SE
Minneapolis, MN 55455
Phone: (612)626-3500
Fax: (612)624-4498
Email: sph-ssc@umn.edu
Website: http://www.sph.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 13
- This program requires summer semesters for timely completion.
- Degree: Adv Mgmt Training for Clin Leaders PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: APPLICATIONS FOR THIS CERTIFICATE ARE NOT CURRENTLY BEING ACCEPTED.
The Regents Certificate in Advanced Management Training for Clinician Leaders is intended for clinicians employed by integrated health systems who will take on critical and expanded roles as executives and managers. This one-year course of study will prepare clinician leaders for successful innovation in emerging forms of healthcare organizations, bring new healthcare leaders with clinical backgrounds into network relationships with other administrators, and consider new approaches to strategy and success in healthcare that are specific to integrated systems.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have at least two years experience in a U.S.-based healthcare organization that either has developed or is considering integrated system relationships. International applications will be considered on a case-by-case basis with special attention paid to the nature and structure of their employing organizations.

Special Application Requirements:
NOTE: APPLICATION ARE NOT CURRENTLY BEING ACCEPTED FOR THE CERTIFICATE PROGRAM.
Applicants must submit a letter of intent describing career interests and the relevance of the certificate to the applicant's personal development. One letter of recommendation from a person qualified to assess the applicant's academic work; clinical, public health or professional experience; or leadership potential in integrated health systems is required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The certificate is build on a cohort model and comprises 13 credits: five 2-credit courses, one 1-credit face-to-face course and a 2-credit face-to-face practicum. Students will be required to attend on-campus sessions twice during the program. The first on-campus session will be four days in length, during which students will complete a 1-credit course, PUBH 7571. The second session will be held at the end of the program over three days, during which students will present their capstone projects.

Requirements
The certificate requires 13 total credits. PUBH 7571, PUBH 7572, along with four brand-new courses and a practicum/capstone project (each offered as topics courses via PUBH 6570) make up the requirements for the program. Students complete PUBH 7571 while on campus during for four days at the start of the program, and will complete five courses online during the remaining 12 months. Students will present their capstone projects completed for the practicum during their final three days on campus.

- PUBH 7572 - Health Care Strategies in Competitive Markets (2.0 cr)
- PUBH 6570 - Topics: Healthcare Administration (1.0 - 4.0 cr)
Twin Cities Campus
Aging Studies Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Aging Studies PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Certificate on Aging is a 12-credit graduate level program with some courses offerings available online, as well as in a face-to-face format. The certificate is designed to increase knowledge and understanding in the multifaceted field of human aging. This interdisciplinary program provides students with the background and confidence necessary to meet the challenges of serving the aging population. The courses are offered through the Center on Aging within the Division of Health Policy and Management.

Aging studies at the University of Minnesota involves an interdisciplinary approach to gerontology for those individuals who hold at least a bachelor's degree. The interdisciplinary nature of the program embraces different backgrounds and interests, and is suitable for graduates from any major.

The primary purpose of aging studies is to prepare professionals for work in programs, businesses, organizations, and agencies that address the needs of an aging population. Examples include the following: hospitals, long-term care facilities, education, clinics, home health care agencies, hospice and end-of-life care organizations, insurance groups, counseling and social services, physician groups, financial planning, architecture and design, public policy makers, and nursing.

Accreditation
This program is accredited by CEPH

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students who have completed 16-semester credits/24-quarter credits (within the past 24 months) in an academic program in a recognized institution of higher learning in the U.S. do not need to submit the TOEFL as part of the application process.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

The Aging Studies Certificate will be designed by each admitted student in consultation with the director of graduate studies.

Suggested Coursework
Select coursework from the following list, or other courses in consultation with the director of graduate studies, to meet the 12-credit minimum.

Take 12 or more credit(s) from the following:
• FSOS 8105 - Family Gerontology (3.0 cr)
• GERO 5100 - Topics in Gerontology (0.5 - 4.0 cr)
• GERO 5110 - Biology of Aging (3.0 cr)
• GERO 5111 - Studying Aging and Chronic Illness (2.0 cr)
• GERO 5115 - Introduction to Geriatrics (2.0 cr)
• GERO 5125 - Gerontology Service Learning (3.0 cr)
• GERO 8020 - Seminar in Gerontology (2.0 cr)
• SW 5810 - Seminar: Special Topics (1.0 - 4.0 cr)
• SOC 8590 - Topics in Life Course Sociology (3.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• PA 5412 - Aging and Disability Policy (3.0 cr)
• GERO 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
Twin Cities Campus

Applied Biostatistics Postbaccalaureate Certificate

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware St, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 16
- This program requires summer semesters for timely completion.
- Degree: Applied Biostatistics PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Our Applied Biostatistics Certificate is designed for persons currently working as data managers or analysts, but who lack formal training in biostatistics and the science of uncertainty and would like to gain the corresponding technical, mathematical, and computational skills.

Our goal is to enhance one's understanding of key elements of database management and investigation, alert a student to key variables and trends, help a student judge their statistical significance, and improve a student's overall data evaluation and programming skills. Students will learn key aspects of study design, implementation and analysis for both observational and clinical studies.

14 of the 16 required credits are offered entirely online, throughout the calendar year. The remaining two credits are required and are offered face-to-face/in class instruction during a single week in early June as part of the Summer Public Health Institute, University of Minnesota, Twin Cities Campus.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission preferences and prerequisites:
- Applicants must hold a baccalaureate degree.
- Applicant should demonstrate strong written skills.
- The admissions committee looks closely at the applicant's work experience and grades in math and science.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of April 04, 2017
For detailed application requirements and instructions visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Course Curriculum
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 6431 - Topics in Hierarchical Bayesian Analysis (1.0 cr)
- PUBH 6432 - Biostatistical Methods in Translational and Clinical Research (1.0 cr)
Twin Cities Campus

Biostatistics M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 42
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biostatistics M.P.H. Program requires that students meet the Association of Schools of Public Health (ASPH) Core Competencies in five core public health areas, including administration, behavioral science, biostatistics, environmental health, and epidemiology, plus an additional requirement in ethics.

The master of public health (M.P.H.) program has different course requirements than the master of science (M.S.). In place of the four elective courses (one in health science and three in biostatistics), which are required for the M.S., the M.P.H. requires five public health courses. The M.P.H. program also requires students to complete a field experience, in addition to a written master's project like the M.S. Plan B written project. Unlike the M.S., the M.P.H. does not have a comprehensive written exam requirement. More detailed information is available in the Program Requirements section below.

Accreditation
This program is accredited by CEPH (Council on Education for Public Health).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
The admissions committee reviews applicants according to their personal statements, background and experience, record of academic achievement, demonstrated academic potential, letters of recommendation, compatibility of interests with program faculty, and other factors.

Test scores and GPAs provide competitive points of reference for admission but are not alone decisive in the admissions review.

Prospective applicants should have taken at least:
- Three semesters of calculus (including multivariable calculus)
- One semester of linear algebra

Experience with a programming language (eg. Java, C, Python) is helpful, but not required.

Preferred GRE performance expectations (test taken post-August 2011): 150 Verbal; 146 Quantitative

Special Application Requirements:
International applicants who have attended post-secondary institutions outside of the U.S. are also required to submit the following supporting documentation to SOPHAS.
World Education Services (WES) evaluation of foreign academic credentials. The University of Minnesota School of Public Health requires all applicants with foreign academic credentials to provide a WES course-by-course evaluation of those credentials. Note: Applicants with transcripts from Canadian schools are exempt from this requirement. Instead, applicants should have copies of their Canadian transcripts sent directly to SOPHAS.

Through special arrangements with SOPHAS, WES will deliver its credential evaluation report directly to SOPHAS by secure electronic transmission. This expedites the delivery of the evaluation report as well as images of the applicant's verified transcripts to SOPHAS and allows SOPHAS to process the report most efficiently. Go to http://www.wes.org/sophas for more information.

Note: Once WES receives the required documentation, it can complete an evaluation in seven business days or less, depending on the type of service requested. However, if additional research, correspondence, or verification is required, the evaluation will take longer. Students are recommended to start the process at least six weeks prior to the program deadline to ensure that their WES evaluation reports are complete by the deadline.

Proof of English Proficiency

Applicants whose native language is not English, or whose academic study was done exclusively at non-English speaking institutions, must prove English proficiency by providing either official Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) scores.

Official report of the scores should be sent directly to SOPHAS using designation code 5688 for the TOEFL or designation code SOPHAS for the IELTS.

Applicants must submit their test score(s) from the following:

- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 146
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 42 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Culminating Experience

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The culminating experience project demonstrates the student's familiarity with the tools of research or scholarship in the major, the capacity to work independently, and the ability to present the results of the investigation effectively. The master's project should involve a combined total of 120 hours of work.

MPH Program Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBH 7405</td>
<td>Biostatistics: Regression (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 7406</td>
<td>Advanced Regression and Design (4.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 7450</td>
<td>Survival Analysis (3.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
  or STAT 8101 - Theory of Statistics I (3.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
  or STAT 8102 - Theory of Statistics II (3.0 cr)
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6101 - Environmental Health (2.0 cr)
  or PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6201 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
students can complete final 9 credits by registering for 1 or both of the courses below
  PUBH 7494 - Culminating Experience: Biostatistics (1.0 - 3.0 cr)
  or PUBH 7496 - Biostatistics: Field Experience (1.0 - 6.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information
necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity
to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing
nations.

Developing countries are currently undergoing profound demographic changes--changes that are accompanied by shifts in patterns of
illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to
chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for
qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by
pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions
abroad. SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more
information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality
experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving
optimum health for all segments of society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite
Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups
in health indicators.

According to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and
genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes,
hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more
information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of
populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework
that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health
and medical care.

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Biostatistics M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biostatistics combines statistics, biomedical science, and computing to advance health research. Biostatisticians design, direct, and analyze clinical trials; develop new statistical methods; and analyze data from observational studies, laboratory experiments, and health surveys. This is an ideal field for students who have strong mathematical backgrounds and who enjoy working with computers, collaborating with investigators, and participating in health research. Students take courses in biostatistical methods, theory of statistics, clinical trials, statistical computing, categorical data, survival analysis, and health sciences.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.10.

Other requirements to be completed before admission:
For the M.S., prospective applicants should have taken at least three semesters of calculus (including multivariable calculus) and one semester of linear algebra. A year (two semesters) of coursework in undergraduate-level probability and mathematical statistics is recommended. Experience with a programming language (e.g., R, Java, C, Python) and exposure to applied statistics is helpful, but not required.

Special Application Requirements:
Students should apply for admission during fall semester only. New students are not admitted in spring semester.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 146
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 22 major credits and 9 to 11 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

A comprehensive written exam to be taken after finals of spring semester in year 1.

The Plan B project demonstrates the student's familiarity with the tools of research or scholarship in the major, the capacity to work independently, and the ability to present the results of the investigation effectively. The master's project should involve a combined total of 120 hours of work.

The Plan A project requires students to complete a thesis project. The required courses for the M.S. Degree Plan B do not prepare a student to write a thesis, that is, to do original research in biostatistics methodology. That is why nearly all students choose to do a written project (Plan B) rather than a thesis. Only students with an advanced background in mathematics or theoretical statistics should consider Plan A.

**Biostatistics M.S. Coursework (Plan B)**

- PUBH 7405 - Biostatistics: Regression (4.0 cr)
- PUBH 7406 - Advanced Regression and Design (4.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 7494 - Culminating Experience: Biostatistics (1.0 - 3.0 cr)
- STAT 5101 - Theory of Statistics I (4.0 cr)
  - or STAT 8101 - Theory of Statistics I (3.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
  - or STAT 8102 - Theory of Statistics II (3.0 cr)

**Biostatistics Electives**

3 Biostatistics elective courses (at least 8 credits)

- GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
- GIS 5571 - ArcGIS I (3.0 cr)
- or MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
- or MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
- or PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- or PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- or PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- or PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- or PUBH 7460 - Advanced Statistical Computing (3.0 cr)
- or PUBH 7465 - Biostatistics Consulting (3.0 cr)
- or PUBH 7470 - Statistics for Translational and Clinical Research (3.0 cr)
- or PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- or PUBH 8422 - Modern Nonparametrics (3.0 cr)
- or PUBH 8435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- or PUBH 8472 - Spatial Biostatistics (3.0 cr)
- or PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
- or STAT 5401 - Applied Multivariate Methods (3.0 cr)
- or STAT 5601 - Nonparametric Methods (3.0 cr)
- or WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)
- or WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

**Health Science Elective**

Students must complete at least 3 credits of a health science elective.

- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
or PBIO 5301 - Plant Genomics (3.0 cr)
or PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
or PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
or PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental Health (2.0 cr)
or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
or PUBH 6381 - Genetics in Public Health (2.0 cr)
or PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
Twin Cities Campus
Biostatistics Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12 to 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biostatistics combines statistics, biomedical science, and computing to advance health research. Biostatisticians design, direct, and analyze clinical trials, develop new statistical methods, and analyze data from observational studies, laboratory experiments, and health surveys. This is an ideal field for students who have strong mathematical backgrounds and who enjoy working with computers, collaborating with investigators, and participating in health research. Students take courses in biostatistical methods, theory of statistics, clinical trials, statistical computing, categorical data, survival analysis, and health sciences.

Minors are available for both University of Minnesota masters and doctoral level students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the biostatistics graduate minor is contingent upon prior admission to a master's or doctoral degree-granting program.

Students should first consult with their major program adviser about the advisability of a minor in biostatistics. Students will then need to contact the director of graduate studies (bstdgs@umn.edu). A biostatistics faculty member must be on the student's doctoral preliminary oral examination committee as well as masters and doctoral final oral examination committees.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Master's-level minor in Biostatistics
NOTE: One course may be taken S/N and all other courses must be taken A/F
Take 2 or more course(s) from the following:
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
• PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
• PUBH 7450 - Survival Analysis (3.0 cr)
• PUBH 7470 - Statistics for Translational and Clinical Research (3.0 cr)
• PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
• PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
  or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Doctoral

Doctoral Minor
14 credits are required for doctoral minor for non-statistics students. 12 credits required for doctoral minor for statistics students.

Doctoral-level minor in Biostatistics for Non-Statistics Students

Students should take the required set of two core courses (either 7405 and 7406, or 7401 and 7402) first, before choosing two additional courses from the list of elective courses below.

NOTE: One course may be taken S/N and all other courses must be taken A/F

Biostatistics Core

Biostat Core Option 1
  PUBH 7405 - Biostatistics: Regression (4.0 cr)
  PUBH 7406 - Advanced Regression and Design (4.0 cr)

or Biostat Core Option 2
  PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
  PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)

Electives

Take 2 or more course(s) totaling 6 or more credit(s) from the following:
• PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
• PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
• PUBH 7450 - Survival Analysis (3.0 cr)
• PUBH 7470 - Statistics for Translational and Clinical Research (3.0 cr)
• PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
• PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
  or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

-OR-

Doctoral-level minor Biostatistics for Statistics Students

NOTE: One course may be taken S/N and all other courses must be taken A/F

PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)

Take 2 or more course(s) totaling 6 or more credit(s) from the following:
• PUBH 8422 - Modern Nonparametrics (3.0 cr)
• PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
• PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
• PUBH 8462 - Advanced Survival Analysis (3.0 cr)
• PUBH 8472 - Spatial Biostatistics (3.0 cr)
• PUBH 8482 - Sequential and Adaptive Methods for Clinical Trials (3.0 cr)
Biostatistics Ph.D.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 59 to 67
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biostatistics combines statistics, biomedical science, and computing to advance health research. Biostatisticians design, direct, and analyze clinical trials; develop new statistical methods; and analyze data from observational studies, laboratory experiments, and health surveys. This is an ideal field for students who have strong mathematical backgrounds and who enjoy working with computers, collaborating with investigators, and participating in health research. Students take courses in biostatistical methods, theory of statistics, clinical trials, statistical computing, categorical data, survival analysis, and health sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.70.

Other requirements to be completed before admission:
At least three semesters of calculus (including multivariable) and one semester of linear algebra, and two semesters of undergraduate courses in probability and mathematical statistics are strongly recommended. Real analysis or an equivalent is recommended. Experience with programming language (e.g., R, Java, C) and exposure to applied statistics is helpful, but not required.

In addition to completing the SOPHAS application, applicants must submit the following directly to SOPHAS:
- Statement of purpose and objectives (an essay describing past education, experience, and current professional career objectives)
- Résumé or curriculum vitae
- Official postsecondary transcripts from all institutions attended, including previous study at the University of Minnesota (have transcripts sent directly from the institutions to SOPHAS)
- Three letters of recommendation from persons qualified to assess academic work; clinical, public health, or professional experience; and leadership potential

Special Application Requirements:
All admitted international Ph.D. applicants are required to provide a World Education Services (WES) document verification report prior to beginning the program.

Proof of English Proficiency
Applicants whose native language is not English, or whose academic study was done exclusively at non-English speaking institutions, must prove English proficiency by providing either official Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) scores. Official report of the scores should be sent directly to SOPHAS using designation code 5688 for the TOEFL or designation code SOPHAS for the IELTS. Scores must be less than two years old. The preferred minimum English language test scores for admission to the School of Public Health are listed below.

The English Language test requirement may be waived if an applicant can provide proof of one of the following:
- Completion of 16 semester credits/24 quarter credits (within the past 24 months) in an academic program at a recognized institution of
higher learning in the U.S. or Canada.
- An Educational Commission for Foreign Medical Graduates (ECFMG) certificate. Students should have an official or attested copy sent directly to the University of Minnesota School of Public Health at the address listed above.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 146

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
35 to 43 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.3 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

The PhD program usually requires three years of full-time study after the MS degree. Students entering the PhD program without an MS degree in mathematics or statistics will be required to take additional core coursework.

Required Coursework
Core Coursework
All students take the following 20 credits of core coursework:
PUBH 8401 - Linear Models (4.0 cr)
PUBH 8403 - Research Skills in Biostatistics (1.0 cr)
PUBH 8412 - Advanced Statistical Inference (3.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
STAT 8101 - Theory of Statistics 1 (3.0 cr)
STAT 8102 - Theory of Statistics 2 (3.0 cr)

Elective Coursework
All students take at least 3 elective courses for a total of 9 or more credits from the following biostatistics and statistics course lists. Courses are selected in consultation with the advisor.
Biostatistics Elective Courses
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7465 - Biostatistics Consulting (3.0 cr)
- PUBH 8422 - Modern Nonparametrics (3.0 cr)
- PUBH 8435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
- PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
- PUBH 8462 - Advanced Survival Analysis (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- PUBH 8482 - Sequential and Adaptive Methods for Clinical Trials (3.0 cr)
PUBH 8492 - Theories of Hierarchical and Other Richly Parametrized Linear Models (3.0 cr)

Statistics Elective Course
Students may select, in consultation with the advisor, an 8xxx-level course offered by the School of Statistics that is not among the core courses listed above.

STAT 8xxx

Biostatistics Topics Course
Students may select, in consultation with the advisor, any PUBH 84xx biostatistics topic course that is not among the core courses listed above.

Health Science Elective
Take 3 credits of PUBH health science electives offered by other divisions in the School of Public Health or other Academic Health Center programs.
PUBH 6xxx
PUBH 7xxx
PUBH 8xxx

Survival Analysis Course
Take PUBH 7450 as early as possible during the PhD program. Students who have taken a course equivalent to PUBH 7450 should confer with their advisor regarding a substitute course.

PUBH 7450 - Survival Analysis (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Curriculum for students without an MS in mathematics or statistics
Students without the MS in mathematics or statistics must take two additional core courses. Students also are strongly recommended to gain more background in real analysis by taking MATH 4603, Advanced Calculus I, in the fall of their first year. Students with a prior analysis course may choose instead, but are not required, to take MATH 5615 and MATH 5616 as an elective.

Additional Core Coursework
In addition to the standard curriculum outlined above, take the following two courses:

PUBH 7405 - Biostatistics: Regression (4.0 cr)
PUBH 7406 - Advanced Regression and Design (4.0 cr)
Twin Cities Campus
Clinical Research M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 38
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The field of clinical research is becoming increasingly complex and regulated. This has created a demand for formally trained clinical researchers. This program will prepare you to conduct patient-oriented research, including clinical trials and observational studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An advanced health professional degree, e.g. M.D., D.D.S., D.O., D.N.P., D.C., D.V.M., Pharm.D., Ph.D.; an advanced doctoral degree in a clinical biomedical field; or an advanced nursing degree.

Other requirements to be completed before admission:
Students must have completed or must be at an advanced stage of their clinical practice training and be affiliated with someone at the University of Minnesota who can provide advising and access to a clinical project. The admissions committee considers exceptions on an individual basis.

Special Application Requirements:
The M.S. has specific application requirements including an advanced health professional degree, and training sufficient to be eligible for a license to practice as supported in the form of an official transcript. One of the three required recommendation letters and a completed School of Public Health Recommendation form should be from the clinical director of training supporting the applicant's potential as a clinical researcher.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 25 major credits, 3 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 21 major credits and 7 to 11 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: There are two options for capstone project: 1) A manuscript, for which the student is the first author who contributes to the design and analysis presented, and which is to be submitted to a peer-reviewed journal in the student's field. The manuscript cannot be a review article; however meta-analysis and formal systematic reviews are allowed. 2) A grant proposal, for which the student is Principal Investigator (PI) at the standard national institute grant mechanism level of R21, R03 or higher (example, R01), to be submitted to the National Institute of Health (NIH). Students' choices regarding the topic and scope of their capstone project must be approved by the advisor and director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must complete both sessions of the University's Responsible Conduct of Research course, validated by ORTTA. Students also must complete the NIH's online training, Protection of Human Research Subjects, validated by electronic certificate upon successful completion.

Required Coursework

All students take the following courses:
- PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Plan Options

Plan A Requirements

The Plan A curriculum prepares the next generation of clinical researchers and principal investigators. It covers clinical trials, epidemiology, biostatistics, ethics, grant writing, and research methods. Students are trained to conduct patient-oriented, epidemiological, and behavioral research.

Plan A Coursework

Take the following courses for a total of 4 credits:
- PUBH 6303 - Clinical Research Project Seminar (2.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)

Outside Coursework

Take at least 3 credits in a related field to meet minimum course credit requirements.

Thesis Credits

Take at least 10 master's thesis credits.
- PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Requirements

The Plan B curriculum prepares the next generation of translational, clinical, and outcomes researchers. The flexible curriculum, determined through consultation with mentors and the director of graduate studies, includes a core of required courses covering clinical trials, epidemiology, and biostatistics, supplemented by elective courses in translational sciences, outcomes sciences, health services research, and other areas.

Plan B Coursework

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
  or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
  or PUBH 7415 - Introduction to Clinical Trials (3.0 cr)

Outside Coursework

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Information current as of April 04, 2017
Take at least 7 credits in a related field to meet minimum course credit requirements.

**Capstone Project**

Take 6 to 10 credits of PUBH 8394, in consultation with the advisor and director of graduate studies.

**PUBH 8394 - Culminating Experience: Clinical Research (1.0 - 10.0 cr)**
Twin Cities Campus
Clinical Research Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Clinical Research PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique environment for clinical research training as a national center of academic clinical research and having a substantial portfolio of clinical research within the Academic Health Center. This certificate is designed for clinicians and other health professionals who have at least five years of relevant experience and who want to learn how to design, implement, and interpret clinical research studies.

Of the 16 required credits, 11 are are offered entirely online.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants are required to have a baccalaureate degree and either a minimum of five years of relevant clinical research experience or GRE scores.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application requirements and instructions visit www.sph.umn.edu.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Analytical Writing: 3.5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Coursework**

- PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6303 - Clinical Research Project Seminar (2.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
Twin Cities Campus
Community Health Promotion M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Through coursework and fieldwork taken at the School of Public Health, students in community health promotion develop basic competencies in theory, health behavior and policy interventions, assessment methods, cultural competency, and management.

Each graduate should have the ability to:
- Use theories of behavior and social change to inform the planning and evaluation of health interventions
- Identify individual, community, and policy-level interventions that are effective in promoting healthy behaviors and social conditions
- Design and implement effective individual, community, and policy-level interventions targeting a variety of health behaviors
- Assess the health status of populations and communities
- Utilize appropriate data collection strategies and qualitative and quantitative methods to evaluate health interventions
- Identify the role of cultural, social, and behavioral factors in influencing health behaviors and status
- Develop and adapt approaches to solving health problems, taking into account cultural differences
- Communicate health information effectively both in writing and orally
- Advocate for public health programs and resources
- Collaborate with public health agencies and other constituency groups
- Coordinate and manage health programs/services
- Relate ethical considerations and values to one's professional practice

The M.P.H. in community health promotion is a good path for students planning for careers as public health practitioners or planning to pursue a Ph.D. degree in social and behavioral epidemiology, which is available in the School of Public Health.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have one year of community, social service or public health experience. An introductory course in statistics and three to four social and behavioral science courses are also required. The average undergraduate GPA for admitted applicants is a 3.5.

Special Application Requirements:
Applicants are admitted from a wide variety of academic backgrounds, including social and behavioral sciences (e.g., psychology, sociology, anthropology), the humanities, basic sciences (e.g., biology, nursing), and mathematics. There is no single appropriate undergraduate major; however, applicants should meet prerequisites by the time of admission.
Who should apply? Individuals who want skills to:
- influence policy and public opinion on health issues;
- develop and evaluate innovative community-based programs to prevent disease and injury;
- work with communities, health departments, and non-profit organizations and policymakers to create healthy living and working environments;
- work on issues related to specific population, including youth and disadvantaged populations.
And individuals who:
- have a variety of backgrounds, including those trained in basic sciences, social and behavioral sciences, and the humanities;
- want an M.P.H. degree;
- plan to pursue a Ph.D. degree in social and behavioral epidemiology at the University of Minnesota;
- have met the prerequisites listed below before admission.

Prerequisites for Admission
- Baccalaureate degree or higher from an accredited college or university
- College-level courses in the following areas:
  - Social and behavioral sciences (at least 3 courses)
  - Introductory statistics (1 course)
  - One year of paid or volunteer experience in a public health, social service, or community setting

Preferences for Admission
- Strong personal statement indicating why applicant is interested in pursuing a community health promotion degree
- Compatibility of interests with program faculty
- GPA of 3.0
- Combined GRE score of 300 and analytical writing score of 3.5
- TOEFL score of 600/250/100 for international applicants
- Strong reference letters

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 34 to 48 major credits and 0 to 14 credits outside the major. There is no final exam. A capstone project is required.
Capstone Project: Culminating experience of either needs assessment, program development, program evaluation, or research project.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Theory
- PUBH 6050 - Community Health Theory and Practice I (3.0 cr)
- PUBH 6051 - Community Health Theory and Practice II (3.0 cr)

Health Behavior and Policy Interventions
Take 8 or more credit(s) from the following:
Students must select one course from the following list:
  Take 1 or more course(s) from the following:
  - PUBH 6000 - Topics: Community Health Education (0.5 - 4.0 cr)
  - PUBH 6010 - Public Health Approaches to HIV/AIDS (3.0 cr)
  - PUBH 6055 - Social Inequalities in Health (2.0 cr)
  - PUBH 6085 - Alcohol and Tobacco: Ongoing Threats to Global Health (2.0 cr)

**Intervention Approaches**
Students must select at least two courses from the following list:
  Take 2 or more course(s) from the following:
  - PUBH 6025 - e-Public Health (2.0 cr)
  - PUBH 6045 - Skills for Policy Development (1.0 cr)
  - PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
  - PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
  - PUBH 6074 - Mass Communication and Public Health (3.0 cr)
  - PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
  - SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)

**Assessment Methods**
Take exactly 2 course(s) from the following:
  - PUBH 6034 - Evaluation (3.0 cr)
  - PUBH 6035 - Applied Research Methods (3.0 cr)

**Additional Assessment Methods**
Students must select one course from the following list:
  PUBH 6600 - Topics: Maternal and Child Health (0.5 - 4.0 cr)
  or PUBH 6415 - Biostatistical Methods II (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
  or PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)

**SPH Core Courses**

**Environmental Health**
  - PUBH 6101 - Environmental Health (2.0 cr)
  or PUBH 6102 - Issues in Environmental Health (2.0 cr)

**Epidemiology**
  - PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

**Ethics**
  - PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Management**
Take exactly 1 course(s) from the following:
  - PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

**Field Experience and Culminating Experience**
  - PUBH 7096 - Field Experience: Community Health Promotion (1.0 - 6.0 cr)
  - PUBH 7094 - Culminating Experience: Community Health Promotion (1.0 - 6.0 cr)

**Electives**
  Electives to total 48 credits.

**Joint- or Dual-degree Coursework:** Master of Social Work (MSW), Juris Doctorate (JD)
Student may take a total of 12 credits in common among the academic programs.

**Program Sub-plans**
A sub-plan is not required for this program.
Students may complete the program with more than one sub-plan.

**Health Disparities Interdisciplinary Concentration Area**
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:
Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole. Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined. Women from minority communities are less likely to receive sufficient prenatal care compared to other women. Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus

Environmental Health M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 42 to 52
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master's and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

The School of Public Health (SPH) and College of Biological Sciences (CBS) offer an early-admission opportunity for eligible University CBS students interested in completing the MPH Environmental Health degree. Interested CBS students should contact their college office or the SPH for more information.

Accreditation
This program is accredited by Council on Education for Public Health

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum qualifications include a baccalaureate degree with coursework in the basic sciences. Occupational health nursing/medicine applicants must have a relevant degree from an accredited school.

Required prerequisites

Program Course Prerequisites
All specialties require basic sciences. Industrial hygiene also requires demonstrable strengths in physics, chemistry (including organic chemistry), biology and math (including calculus). A microbiology background is preferred for the environmental infectious diseases specialty.

Other requirements to be completed before admission:
For more information visit www.sph.umn.edu

Special Application Requirements:
To be considered for admission to Environmental Health's Accelerated MPH program, prospective students must be in their junior year, and in good academic standing (3.25 minimum GPA) in one of the BS degree programs offered by the University's College of Biological
Sciences. In lieu of the GRE, applicants to the accelerated MPH program must complete an interview with environmental health admissions committee.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5
- GMAT
- MCAT
  - Verbal Reasoning score: 10
  - Physical Science score: 10
  - Biological Reasoning score: 10
  - Writing Sample score: 10
- LSAT
  - Law School Admission Test (LSAT) score: 140
- DAT
  - Score: 15

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 42 to 52 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: This requirement is met by registering for PUBH 7194 Culminating Experience: Environmental Health for a minimum of 3 credits. Results in a written paper and presentation and oral exam. Students choose from a broad set of project options including a Plan B style project. The project must be required to be relevant to the field of environmental health and should represent a minimum of 120 hours of work. Minimum program length is 42 credits.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Concentration Areas
General Program
Students looking for a program of study that does not fit precisely with the defined concentrations in the major may be admitted to this program. Emphasis is on the development of a broad, solid foundation, with a larger than usual number of elective credits to allow the student an opportunity to pursue their particular interests. It is occasionally possible for students to transfer into a different concentration after admission to the general program.

Public Health Core Courses
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Concentration Courses**
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)

**Electives**
Selected in consultation with adviser to meet the 42 credit minimum requirement.

-OR-

**Environmental and Occupational Epidemiology (EOE)**
Env Occ Epi strives to understand the causal impact of environment and occupation on human health. Public health interventions are most likely to be effective when disease and injury etiology is understood. Epidemiologists develop studies to identify factors that cause diseases and injuries -requiring knowledge of both subject matter and methods. Students may focus in one of three these areas: exposures related to cancer, exposures related to injury, or epidemiologic methods.

**Public Health Core Courses**
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core Courses**
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Concentration Program Courses**
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

**Elective Courses**
Select electives in consultation with adviser to meet the 42 credits requirement
Take exactly 0 course(s) totaling exactly 0 credit(s) from the following:
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6160 - Systems Toxicology (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6171 - [inactive] (3.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
- PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
- VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)

-OR-

**Environmental Health Policy**
This concentration provides broad, multidisciplinary training in environmental health issues, including occupational health, risk assessment, risk management, decision making, and policy analysis. Internship experiences are arranged with leading occupational and environmental health policy experts who assist students with synthesizing and applying their academic experiences to potential professional settings. Students participate in ongoing research.
Environmental Health Policy

Public Health Core Course Requirements

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses

- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Concentration Program Course Requirements

- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6116 - Environmental Law (1.0 cr)

Electives

Select electives in consultation with adviser.

Take exactly 0 course(s) totaling exactly 0 credit(s) from the following:

- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6726 - Medical Device Industry: Business and Public Policy (3.0 cr)
- PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)
- PUBH 6835 - Principles of Health Policy (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
- PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
- ANTH 5041 - Ecological Anthropology (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- PA 5001 - Intellectual Foundations of Public Action (1.5 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5032 - Regression Analysis (2.0 cr)
- PA 5033 - Multivariate Techniques (2.0 cr)
- PA 5035 - Survey Research and Data Collection (1.5 cr)
- PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
- PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
- PUBH 6683 - Understanding Health Care Quality (2.0 cr)
- PA 8790 - Advanced Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
- PA 5311 - Program Evaluation (3.0 cr)

-OR-

Environmental Infectious Diseases

This program explores the environmental factors associated with infectious diseases and the emergence of food-borne diseases in the United States and around the world. The environment and changing conditions have a great impact on the distribution and occurrence of infectious diseases. In evaluating the chain of infection, the environment may play a key role in reservoir maintenance. Coursework includes basic principles of infection control and predicting the impact of emerging infections.

Public Health Core Courses

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
  or VMED 5180 - Ecology of Infectious Disease (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
Public Health Core Courses

PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)

or

PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses

PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Cumulating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Concentration Courses

PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
VMED 5180 - Ecology of Infectious Disease (3.0 cr)

Recommended Electives

Select electives in consultation with adviser.

Take exactly 0 course(s) totaling exactly 0 credit(s) from the following:

- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
- VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
- FSCN 4121 - Food Microbiology (3.0 cr)
- BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
- MICB 4131 - Immunology (3.0 cr)
- MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
- MICB 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)

Global Environmental Health

Issues of water and air quality, food safety, and the effects of industrialization are examined, as well as major ecological problems such as deforestation and sustainable agriculture. Interactions between the physical environment and biological health risks are considered also, as the effects of globalization of trade and the rapid movement of populations from one part of the world to the other are important for the spread of disease globally.

Public Health Core Courses

PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

or

PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)

or

PUBH 6450 - Biostatistics I (4.0 cr)

Division Core Courses

PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Cumulating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Concentration Courses

PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6133 - Global Health Seminar (1.0 cr)
PUBH 72xx Topics: Globalization and Health (1 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)

Recommended Electives

Selected in consultation with adviser to meet the 42 credit minimum requirement.

Occupational and Environmental Health Nursing (OEHN)

Occupational and Environmental Health Nursing provides intensive training for nurses interested in the development, management and evaluation of health services, programs, and policies designed to promote health and prevent work-related injuries and disease.

Public Health Core Courses

PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Occupational and Environmental Health Nursing Courses
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

School of Nursing Courses
NURS 8170 (inactive) (3.0 cr)
NURS 8600 (inactive) (2.0 cr)

Recommended Electives
Select electives in consultation with adviser to meet the 42 credit minimum requirement.
Take exactly 0 course(s) totaling exactly 0 credit(s) from the following:
• PUBH 6034 - Evaluation (3.0 cr)
• PUBH 6055 - Social Inequalities in Health (2.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
• NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

-OR-

Occupational and Environmental Medicine
The Occupational and Environmental Medicine (OEM) residency program trains physicians who will improve the health and safety of workers. The program emphasizes a solid clinical basis for the practice of occupational medicine and the management of patients with work-related health problems, as well as the identification and remediation of occupational risks and hazards in the workplace.

Public Health Core Courses
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Concentration Courses
PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6387 - Cancer Epidemiology (2.0 cr)
PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
Select electives in consultation with adviser to meet the 42 credit minimum requirement.

-OR-

Regulatory Toxicology and Risk Assessment
Regulatory toxicology and risk assessment teaches students to think analytically about the biochemical mechanisms of toxicity, and how toxicology is used to protect human health through laboratory research, and the development of sound environmental policy and regulations. Strong background in the biological sciences, interest in laboratory research or environmental regulation and policy. Emphases: biological sciences, physiology, biochemistry, cellular and molecular biology, toxicology.

Public Health Core Courses
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)

Ethics Courses
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Concentration Courses
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6160 - Systems Toxicology (3.0 cr)
PUBH 6161 - Regulatory Toxicology (2.0 cr)
PUBH 8160 - Advanced Toxicology (2.0 cr)
PUBH 8161 - Current Literature in Toxicology (1.0 cr)

Electives
Selected in consultation with adviser to meet the 42 credit minimum requirement.

Joint- or Dual-degree Coursework: Master of Public Health and Juris Doctor (MPH/JDP). Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may complete the program with more than one sub-plan.

Industrial Hygiene
The Industrial Hygiene (IH) program is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment.


Industrial Hygiene
The Industrial Hygiene program is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical and biological agents; and the potential health threats to the community and the environment. Prepares well-qualified practitioners and researchers for an exciting career in industry, government organizations, and academic and research institutions.

School of Public Health Core Requirements
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Choose one of the following courses.
PUBH 6450 - Biostatistics I (4.0 cr)

Division Core Course Requirements
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Occupational Health and Safety Core Requirements
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

Industrial Hygiene Program Requirements
PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6174 - Control of Workplace Exposure (3.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)

Industrial Hygiene Electives
Select electives in consultation with adviser to meet the 52 credit minimum requirement.

Take 0 or more credit(s) from the following:

- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6116 - Environmental Law (1.0 cr)
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6132 - Air, Water, and Health (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6161 - Regulatory Toxicology (2.0 cr)
- PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 7220 - Personal Protective Equipment and Respiratory Protection (1.0 cr)
- PUBH 7260 - Ergonomics and the Prevention of Workplace Injuries (1.0 cr)
- CEGE 4561 - Solid Hazardous Wastes (3.0 cr)
- CEGE 5551 - Environmental Microbiology (3.0 cr)
- IE 5511 - Human Factors and Work Analysis (4.0 cr)
- IE 5513 - Engineering Safety (4.0 cr)
- KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
- ME 5113 - Aerosol/Particle Engineering (4.0 cr)
- ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
- PA 5721 - Energy and Environmental Policy (3.0 cr)

Accelerated M.P.H. Program

This sub-plan is limited to students completing the program under Plan C.

The School of Public Health and the College of Biological Sciences offer an early-admission opportunity for eligible University of Minnesota Bachelor of Science students also interested in completing the Master's of Public Health (MPH) Environmental Health degree. The Accelerated MPH Environmental Health sub-plan enables majors from CBS undergraduate programs to take 12 MPH credits during their senior (fourth) year, and to complete the MPH after a fifth year of full-time graduate student plus one summer. Interested CBS undergraduates should contact their CBS college adviser for more information. The MPH accelerated program sub-plan application deadline is during the spring of the student's junior year, and admission to the MPH accelerated program sub-plan is contingent on a formal admissions process. Check sph.umn.edu for specific application deadline and instructions. Students admitted to the accelerated program sub-plan must maintain timely degree progress to ensure the bachelor of science is awarded by the end of their fourth year. The MPH accelerated program sub-plan is open to students in the CBS Bachelor of Science programs.

Accelerated M.P.H. Program

Public Health Core Courses
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Accelerated MPH Concentration Courses
- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6700 - Foundations of Public Health (3.0 cr)
- PUBH 6100 Careers in Environmental Health

Electives
Selected in Consultation with adviser to meet the 42 credit minimum requirement

Global Health Interdisciplinary Concentration Area

The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.
Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area

The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020 and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:

- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area

The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., and includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Environmental Health M.S.
School of Public Health - Adm
School of Public Health

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33 to 56
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master’s and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

Applicants must indicate an interest in one of the following specialties within the major: the general environmental health, environmental health policy, environmental infectious diseases, environmental and occupational epidemiology, regulatory toxicology, occupational and environmental health nursing, occupational environmental medicine, occupational injury epidemiology and control, or industrial hygiene.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum requirements include a bacalaureate degree with coursework in the basic sciences. Each concentration requires different preparation: http://www.sph.umn.edu/programs/ehs/tracks/index.asp

Required prerequisites
Industrial Hygiene
In addition to program requirements - industrial hygiene requires demonstrable strengths in physics, chemistry (including organic chemistry), biology, and math (including calculus). One or two missing requirements may be completed upon enrollment.

Other requirements to be completed before admission:
Please visit www.sph.umn.edu for admission requirements.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5
• GMAT
• MCAT
  - Verbal Reasoning score: 10
  - Physical Science score: 10
- Biological Reasoning score: 10
- LSAT
- DAT
  - Score: 18

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 to 20 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 27 to 45 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is a master's project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

The M.S. program prepares students for specialized careers in environmental and occupational health. M.S. students receive a solid technical background in their disciplines and by graduation are proficient in applied or basic research.

The minimum credits required for graduation depend on the chosen specialty area. Most concentration areas require a two-year program. M.S. students have the option of completing a Plan A with a thesis or a Plan B project or Plan C.

Concentration Areas

Students may pursue a general program in environmental and occupational health, or focus in a concentration area with basic required courses, or pursue the industrial hygiene sub-plan.

Environmental Chemistry

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Environmental chemistry examines the interactions of pollutants with air, water, soil, and their exposures to humans and wildlife. The curriculum emphasizes the processes that control chemical behavior, transport, and fate as a function of environmental factors and chemical properties.

General Requirements

Thesis/dissertation will be taken for 10 credits
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Specialty Program Course Requirements
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)

**Proposed Electives**
Select electives in consultation with adviser.
Take 0 or more credit(s) from the following:
• CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
• CEGE 4561 - Solid Hazardous Wastes (3.0 cr)
• CEGE 8503 - Environmental Mass Transport (4.0 cr)
• CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
• CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
• EEB 4611 - Biogeochemical Processes (3.0 cr)
• PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
• WRS 8050 - Special Topics in Water Resources Science (1.0 - 3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)

-OR-

**Environmental and Occupational Epidemiology**
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Environmental and occupational epidemiology strives to understand the causal impact of environment and occupation on human health, because public health interventions are most likely to be effective when disease and injury etiology is understood. Epidemiologists develop studies to identify factors that cause diseases and injuries.

**General Core Requirements**
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core**
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
  or PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)

**Specialty Program Course Requirements**
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

**Proposed Electives**
Select electives in consultation with adviser.
Take 0 or more credit(s) from the following:
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6121 - Topics: Injury Prevention in the Workplace, Community, and Home (1.0 - 2.0 cr)
• PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
• PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
• PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
• PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
• PUBH 6173 - Exposure to Physical Agents (2.0 cr)
• PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
• PUBH 6343 - Epidemiologic Methods III (4.0 cr)
• PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
• PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
• PUBH 6387 - Cancer Epidemiology (2.0 cr)
• PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
• PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
• PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)

-OR-

**Environmental Health Policy**
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Environmental health policy provides broad, multidisciplinary training in environmental health issues, including occupational health, risk assessment, risk management, decision making, and policy analysis.

**General Requirements**
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6115 - Worker Protection Law (1.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)

Proposed Electives
Select electives in consultation with adviser.
Take 0 or more credit(s) from the following:
- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6080 - /na (2.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6726 - Medical Device Industry: Business and Public Policy (3.0 cr)
- PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)
- PUBH 6835 - Principles of Health Policy (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
- PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
- ANTH 5041 - Ecological Anthropology (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- PA 5001 - Intellectual Foundations of Public Action (1.5 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5032 - Regression Analysis (2.0 cr)
- PA 5033 - Multivariate Techniques (2.0 cr)
- PA 5035 - Survey Research and Data Collection (1.5 cr)
- PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
- PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
-OR-

Environmental Infectious Diseases
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
The Environmental Infectious Diseases (EID) specialty is concerned with the emergence of food-borne and infectious diseases in the United States and around the world. The environment, and changing conditions in the environment can have a great impact on the distribution and occurrence of infectious diseases. In evaluating the chain of infection, environment may play a key role in reservoir maintenance, as well as a route of transmission through food, water, and air.

General Requirements
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
or PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
Recommended Electives
Select electives in consultation with adviser.
Take 0 or more credit(s) from the following:

• PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
• PUBH 7210 - Topics: Global Food Systems (0.5 cr)
• PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
• VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
• VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
• FSCN 4121 - Food Microbiology (3.0 cr)
• FSCN 4122 - Food Fermentations and Biotechnology (2.0 cr)
• BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
• MICB 4131 - Immunology (3.0 cr)
• MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
• MICB 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)

-OR-

Exposure Science
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Students in the Exposure Science program study methods for the identification, measurement and simulation of human exposure and dose from single and multimedia environmental exposures. Students will receive training on various aspects of exposure analysis such as measurements and modeling; chemical, biological, and physical principles required to analyze exposure; mechanisms of exposure; development of molecular biomarkers; and genomic, proteomic, and metabolomic metrics for assessing exposure.

General Requirements
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6100 - Topics: Environmental Health (0.5 - 4.0 cr)
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)
PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)

Electives
Select electives in consultation with adviser.

-OR-

General Program in Environmental Health
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Students are admitted to the General Program in Environmental Health when they are looking for a program of study that does not fit precisely with the specialty tracks defined in the environmental health sciences major. Emphasis is on the development of a broad, solid foundation in environmental health, with a larger than usual number of elective credits to allow the student an opportunity to pursue their particular interests.

General Requirements
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 6777 - Thesis Credits: Master's (1.0 - 18.0 cr)
or PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)

Concentration Program Course Requirements
Choose at least two courses from each of the following Environmental Health focus areas.

Exposure
Take 2 or more course(s) from the following:

- PUBH 6190 - Environmental Chemistry (3.0 cr)
- PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
- PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
- VMED 5180 - Ecology of Infectious Disease (3.0 cr)

**Policy**

Check with adviser for other policy class options.

Take 2 or more course(s) from the following:

- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)

**Health Effects**

Take 2 or more course(s) from the following:

- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

**Electives**

Select electives in consultation with adviser.

-OR-

**Global Environmental Health**

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

The global environmental health track provides key information for individuals looking to work in the field of global environmental health either overseas or in the U.S. Issues of water and air quality, food safety, and the effects of industrialization are examined, as well as major ecological problems such as deforestation and sustainable agriculture.

**General Requirements**

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  - or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
  - or PUBH 6450 - Biostatistics I (4.0 cr)

**Division Core Courses**

- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
  - or PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)

**Specialty Program Course Requirements**

- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6132 - Air, Water, and Health (2.0 cr)
- PUBH 6133 - Global Health Seminar (1.0 cr)
- PUBH 72xx Topics: Globalization and Health (1 cr)
- PUBH 6390 - Topics: Epidemiology (0.5 - 4.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)

**Electives**

7-9 credits, selected in consultation with adviser.

-OR-

**Occupational and Environmental Health Nursing (OEHN)**

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Occupational and Environmental Health Nursing (OEHN) provides intensive training for nurses interested in the development, management and evaluation of health services, programs, and policies designed to promote health and prevent work-related injuries and disease.

**General Requirements**

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core Courses**

- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
- PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Specialty Program Course Requirements

PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
NURS 8600 (Inactive)(2.0 cr)
NURS 8170 (Inactive)(3.0 cr)

Recommended Electives
Select electives in consultation with adviser.
Take 3 or more credit(s) from the following:
• PUBH 6034 - Evaluation (3.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6348 - Writing Research Grants (2.0 cr)
• NURS 8100 (Inactive)(3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Industrial Hygiene
Industrial hygiene (IH) is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment.


Required Coursework
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

School of Public Health Core Requirements
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
Choose one of the following courses.
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Division of Environmental Health Sciences Core Requirements
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Culminating Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Occupational Health and Safety Core Requirements
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

Industrial Hygiene Program Requirements
PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6174 - Control of Workplace Exposure (3.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)

Industrial Hygiene Electives
Select electives in consultation with adviser.
Take 0 or more credit(s) from the following:
• PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
• PUBH 6115 - Worker Protection Law (1.0 cr)
• PUBH 6116 - Environmental Law (1.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6131 - Working in Global Health (2.0 cr)
• PUBH 6132 - Air, Water, and Health (2.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)
• PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 7220 - Personal Protective Equipment and Respiratory Protection (1.0 cr)
• PUBH 7260 - Ergonomics and the Prevention of Workplace Injuries (1.0 cr)
• CEGE 4561 - Solid Hazardous Wastes (3.0 cr)
• CEGE 5551 - Environmental Microbiology (3.0 cr)
• IE 5511 - Human Factors and Work Analysis (4.0 cr)
• IE 5513 - Engineering Safety (4.0 cr)
• KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
• ME 5113 - Aerosol/Particle Engineering (4.0 cr)
• ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
• PA 5721 - Energy and Environmental Policy (3.0 cr)
Twin Cities Campus
Environmental Health Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's minor requires a minimum of 6 graduate credits; the doctoral minor requires a minimum of 12 graduate credits. Courses for the minor must be selected from those offered by the School of Public Health.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admission to a University graduate program in a related discipline is required.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
Required Courses
Take the following three courses to meet the 6-credit minimum:
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Doctoral
Required EnvHlth Courses
Take the following three courses for 6 credits:
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Required Epi Courses
Take one of the two following courses for at least 3 credits:
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Required Biostats Courses
Take one of the two following courses for at least 3 credits:
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
Twin Cities Campus
Environmental Health Ph.D.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48 to 74
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master’s and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program’s training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

The Ph.D. brings students to a high level of academic competence through a combination of advanced coursework and research, and prepares students to assume leadership roles in the field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree with coursework in the basic sciences. Each specialty requires slightly different preparation. Industrial Hygiene requires physics, biology, chemistry, organic, and calculus.

Other requirements to be completed before admission:
For more information visit www.sph.umn.edu

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 4
- GMAT
- MCAT
  - Verbal Reasoning score: 10
  - Physical Science score: 10
  - Biological Reasoning score: 10
- LSAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
- Paper Based - Total Score: 600
  - IELTS
    - Total Score: 7
  - MELAB
    - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 to 50 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Concentration Areas

Environmental Chemistry
Environmental Chemistry examines the interactions of pollutants with air, water, soil, and their exposures to humans and wildlife. The curriculum emphasizes the processes that control chemical behavior, transport, and fate as a function of environmental factors and chemical properties. This concentration requires a minimum of 54 total course credits.

Environmental Chemistry Public Health Core Courses
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Concentration Program Courses
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)

Electives
Select electives in consultation with adviser to meet the 54 total credit minimum.
Take 1 or more course(s) from the following:
- CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
- CEGE 4561 - Solid Hazardous Wastes (3.0 cr)
- CEGE 8503 - Environmental Mass Transport (4.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
- WRS 8050 - Special Topics in Water Resources Science (1.0 - 3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)

-OR-

Environmental and Occupational Epidemiology
Environmental and occupational epidemiology strives to understand the causal impact of environment and occupation on human health, because public health interventions are most likely to be effective when disease and injury etiology is understood. This concentration requires a minimum of 53 total course credits.

Public Health Core Courses
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Concentration Program Courses
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
PUBH 8141 - Doctoral Seminar in Observational Inference (2.0 cr)
PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Electives
Select electives in consultation with adviser to meet the required minimum of 54 course credits
Take 1 or more course(s) from the following:
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6121 - Topics: Injury Prevention in the Workplace, Community, and Home (1.0 - 2.0 cr)
- PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 7400 - Topics: Biostatistics (0.5 - 4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 7460 - Advanced Statistical Computing (3.0 cr)
- PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
- OR -

Environmental Health Policy
Environmental health policy provides broad, multidisciplinary training in environmental health issues, including occupational health, risk assessment, risk management, decision making, and policy analysis. This concentration requires a minimum of 61 total course credits.

General Requirements
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Program Course Requirements
PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
PUBH 6115 - Worker Protection Law (1.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Electives
Select electives in consultation with adviser to meet the minimum of 61 total course credits.
Take 1 or more course(s) from the following:
- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6080 - Inactive (2.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)
• PUBH 6711 - Public Health Law (2.0 cr)
• PUBH 6724 - The Health Care System and Public Health (3.0 cr)
• PUBH 6726 - Medical Device Industry: Business and Public Policy (3.0 cr)
• PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)
• PUBH 6835 - Principles of Health Policy (2.0 cr)
• PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
• PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
• PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
• PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• ANTH 5041 - Ecological Anthropology (3.0 cr)
• ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
• PA 5001 - Intellectual Foundations of Public Action (1.5 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
• PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5032 - Regression Analysis (2.0 cr)
• PA 5033 - Multivariate Techniques (2.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5311 - Program Evaluation (3.0 cr)
• PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
• PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
• PA 5441 - Education Policy and the State Legislature (3.0 cr)

-OR-

Environmental Infectious Diseases
The study of Environmental Infectious Diseases is concerned with the emergence of foodborne and infectious diseases in the United States and around the world. The environment, and changing conditions in the environment can have a great impact on the distribution and occurrence of infectious diseases. In evaluating the chain of infection, environment may play a key role in reservoir maintenance, as well as a route of transmission through food, water, and air. Minimum 63 total course credits.

Public Health Core Courses
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
• PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
• PUBH 6104 - Environmental Health Effects (2.0 cr)
• PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
• PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Concentration Program Courses
• PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
• PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
• PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
• VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)

Recommended Electives
Select electives in consultation with adviser to meet the minimum required 63 total course credits.
Take 1 or more course(s) from the following:
• PUBH 6381 - Genetics in Public Health (2.0 cr)
• PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
• PUBH 6711 - Public Health Law (2.0 cr)
• PUBH 7210 - Topics: Global Food Systems (0.5 cr)
• PUBH 7214 - Principles of Risk Communication (1.0 cr)
• VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
• FSCN 4121 - Food Microbiology (3.0 cr)
• FSCN 4122 - Food Fermentations and Biotechnology (2.0 cr)
• MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
• MICA 8003 - Immunity and Immunopathology (4.0 cr)
• MICA 8010 - Microbial Pathogenesis (3.0 cr)
-OR-

**Occupational and Environmental Health Nursing**

Occupational and Environmental Health Nursing provides intensive training for nurses interested in the development, management and evaluation of health services, programs, and policies designed to promote health and prevent work-related injuries and disease. This concentration requires a minimum of 68 total course credits.

**Public Health Core Courses**

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core Courses**

- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Concentration Program Courses**

- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)

**Recommended Electives**

Select electives in consultation with adviser to meet the required minimum of 68 total course credits.

Take 1 or more course(s) from the following:

- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)

-OR-

**Environmental Physiology**

This is a trans-disciplinary program emphasizing new perspectives on the study of how humans, as complex heterogeneous biological systems, respond and adapt to their environment. Such study is required to understand the role of the environment in injury and disease, and to shape future technologies and policy for monitoring and protecting human health. Requires a minimum of 52 total course credits.

**Public Health Core Courses**

- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Concentration Program Courses**

- PUBH 8163 - Toxicology (5.0 cr)
- PUBH 8165 - Current Topics in Toxicology (1.0 cr)
- PUBH 8166 - Experiences in Toxicology Research (3.0 cr)
- PHS 5101 - Human Physiology (5.0 cr)
- BIOL 4004 - Cell Biology (3.0 cr)
- BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
  - or BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)

**Recommended Electives**

Select electives in consultation with adviser to fulfill the requirement of 52 total course credits.

Take 1 or more course(s) from the following:

- ANSC 8344 - Mechanisms of Hormone Action (2.0 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6160 - Systems Toxicology (3.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)

- OR -

Occupational Injury Prevention Research Training

Occupational Injury Prevention Research Training (OIPRT), in concert with programs in Occupational Medicine, Occupational Health Nursing, and Industrial Hygiene, among others, is part of the nationally funded Midwest Center for Occupational Health and Safety. This program provides a multifaceted approach to advanced academic and research training, with a primary goal to prevent and control occupational injuries. This concentration requires a minimum of 74 total course credits.

Epidemiology Course Requirements

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)

Biostatistics Course Requirements

- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

Environmental Health Sciences Core Course Requirements

- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

OIPRTTP Course Requirements

See main website for more information: http://sph.umn.edu/

- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6121 - Topics: Injury Prevention in the Workplace, Community, and Home (1.0 - 2.0 cr)
- PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8100 - Topics: Applied Analyses of Occupational Health Data (1.0 - 4.0 cr)
- PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)

Thesis Credit Requirement

24 thesis credits required.

- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Electives

Electives chosen in consultation with advisor to meet the minimum required 74 course credits.

Take 1 or more course(s) from the following:

- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 7405 - Biostatistics: Regression (4.0 cr)
- PUBH 7406 - Advanced Regression and Design (4.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
- GRAD 8102 - Practicum for Future Faculty (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6116 - Environmental Law (1.0 cr)
- PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6344 - Completing the Culminating Experience: Secondary Data Analysis (2.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
• PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
• PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
• PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
• KIN 5122 - Applied Exercise Physiology (3.0 cr)
• KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)

-OR-

Occupational Health Services Research and Policy
The OHSRP training program is an innovative collaboration between the Division of Environmental Health Sciences and the Division of Health Policy and Management. The program prepares researchers that will help meet the demand for more rigorous evaluation of workplace policies and programs designed to reduce the nation’s burden of occupational illness and injury and to protect and promote the well-being of the American workforce. This concentration requires a minimum of 74 total credits.

Public Health Core Curriculum
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
• PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
• PUBH 6104 - Environmental Health Effects (2.0 cr)
• PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
• PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)

Supporting Coursework in Health Policy and Management
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
• PUBH 6855 - Medical Sociology (3.0 cr)
• PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
• PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)

Potential Electives
Select electives in consultation with advisor to meet the required minimum of 74 total credits.
Take 1 or more course(s) from the following:
• PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
• PUBH 6810 - Survey Research Methods (3.0 cr)
• PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
• PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
• PUBH 6835 - Principles of Health Policy (2.0 cr)
• PUBH 6724 - The Health Care System and Public Health (3.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
• PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Industrial Hygiene
Industrial hygiene is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment.

Required Coursework
The Industrial Hygiene program is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical and biological agents; and the potential health threats to the community and the environment. Requires a minimum of 63 total credits.

Public Health Core Courses
• PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
• PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
• PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
• PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
• PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Choose one of the following courses.
• PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

**Environmental Health Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBH 6103</td>
<td>Exposure to Environmental Hazards (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6104</td>
<td>Environmental Health Effects (2.0 cr)</td>
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<tr>
<td>PUBH 6105</td>
<td>Environmental and Occupational Health Policy (2.0 cr)</td>
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<tr>
<td>PUBH 7194</td>
<td>Culminating Experience: Environmental Health (1.0 - 5.0 cr)</td>
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<tr>
<td>PUBH 7196</td>
<td>Field Experience: Environmental Health (1.0 - 5.0 cr)</td>
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</table>

**Occupational Health and Safety Core Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>PUBH 6130</td>
<td>Occupational Medicine: Principles and Practice (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6150</td>
<td>Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6170</td>
<td>Introduction to Occupational Health and Safety (3.0 cr)</td>
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**Industrial Hygiene Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>PUBH 6172</td>
<td>Industrial Hygiene Applications (2.0 cr)</td>
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</tr>
<tr>
<td>PUBH 6173</td>
<td>Exposure to Physical Agents (2.0 cr)</td>
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<tr>
<td>PUBH 6174</td>
<td>Control of Workplace Exposure (3.0 cr)</td>
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<tr>
<td>PUBH 6175</td>
<td>Environmental Measurements Laboratory (2.0 cr)</td>
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<tr>
<td>PUBH 6192</td>
<td>Measurement and Properties of Air Contaminants (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6193</td>
<td>Advanced Topics in Human Exposure Science (2.0 cr)</td>
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</tbody>
</table>

**Industrial Hygiene Electives**

Select electives in consultation with adviser.

Take 1 or more course(s) from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBH 6112</td>
<td>Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>PUBH 6115</td>
<td>Worker Protection Law (1.0 cr)</td>
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<tr>
<td>PUBH 6116</td>
<td>Environmental Law (1.0 cr)</td>
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<tr>
<td>PUBH 6120</td>
<td>Injury Prevention in the Workplace, Community, and Home (2.0 cr)</td>
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<tr>
<td>PUBH 6131</td>
<td>Working in Global Health (2.0 cr)</td>
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<tr>
<td>PUBH 6132</td>
<td>Air, Water, and Health (2.0 cr)</td>
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<tr>
<td>PUBH 6140</td>
<td>Occupational and Environmental Epidemiology (2.0 cr)</td>
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<tr>
<td>PUBH 6161</td>
<td>Regulatory Toxicology (2.0 cr)</td>
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<tr>
<td>PUBH 6176</td>
<td>Hazardous Materials and Waste Management (2.0 cr)</td>
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<tr>
<td>PUBH 6182</td>
<td>Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)</td>
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<tr>
<td>PUBH 6190</td>
<td>Environmental Chemistry (3.0 cr)</td>
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<tr>
<td>PUBH 6415</td>
<td>Biostatistical Methods II (3.0 cr)</td>
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<tr>
<td>PUBH 6451</td>
<td>Biostatistics II (4.0 cr)</td>
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<tr>
<td>PUBH 7220</td>
<td>Personal Protective Equipment and Respiratory Protection (1.0 cr)</td>
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<tr>
<td>PUBH 7260</td>
<td>Ergonomics and the Prevention of Workplace Injuries (1.0 cr)</td>
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<tr>
<td>CEGE 4561</td>
<td>Solid Hazardous Wastes (3.0 cr)</td>
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<tr>
<td>CEGE 5551</td>
<td>Environmental Microbiology (3.0 cr)</td>
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</tr>
<tr>
<td>IE 5511</td>
<td>Human Factors and Work Analysis (4.0 cr)</td>
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<tr>
<td>IE 5513</td>
<td>Engineering Safety (4.0 cr)</td>
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<tr>
<td>KIN 5001</td>
<td>Foundations of Human Factors/Ergonomics (3.0 cr)</td>
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<tr>
<td>ME 5113</td>
<td>Aerosol/Particle Engineering (4.0 cr)</td>
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<tr>
<td>ME 5133</td>
<td>Aerosol Measurement Laboratory (4.0 cr)</td>
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<tr>
<td>PA 5721</td>
<td>Energy and Environmental Policy (3.0 cr)</td>
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</table>

**Course Group 1**
Twin Cities Campus
Epidemiology M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 42 to 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Epidemiology is the science that describes quantitative trends in health and disease for populations, with application in the biological, environmental, behavioral, and social sciences. Epidemiologists generally collaborate with multidisciplinary teams of health professionals, such as physicians, laboratory scientists, exercise physiologists, nutritionists, statisticians, veterinarians, and behavioral scientists.

Epidemiologists analyze public health trends, design and implement studies, and interpret study results for policy and program development. Beyond investigation into the causes of disease, epidemiologists also develop intervention strategies to prevent disease and promote health. Epidemiologists work at both the individual and community levels to translate medical and laboratory data into population trends.

Students complete a 48-credit curriculum for the standard program. Many epidemiology and other health-related graduate-level courses are available as electives. These allow students to develop a specialty emphasis in either specific public health topics or methodological areas. The 48-credit curriculum includes 22 Epidemiology core course credits, 8 SPH core course credits, 8 credits of biostatistics, and elective credits. An alternative, 42-credit curriculum is offered for students who have completed M.D., D.D.S., D.V.M., or Ph.D. work in a related field. The 42-credit curriculum includes 18 Epidemiology core course credits, 8 SPH core course credits, 8 credits of biostatistics, and elective credits. The standard and alternate programs require a final examination.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum qualifications include a baccalaureate degree with coursework in the basic sciences. Occupational health nursing/medicine applicants must have a relevant degree from an accredited school.

Other requirements to be completed before admission:
For more information visit www.sph.umn.edu

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

- IELTS
  - Total Score: 7

- MELAB
  - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 18 to 22 major credits and 24 to 26 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Culminating Experience

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses

Epidemiology Core Courses (18 credits)

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
- PUBH 7394 - Culminating Experience: Epidemiology (1.0 - 6.0 cr)
- PUBH 7396 - Field Experience: Epidemiology (1.0 - 5.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
  or PUBH 6420 - Introduction to SAS Programming (1.0 cr)

"Epi of" Courses

- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
  or PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6605 - Reproductive and Perinatal Health (2.0 cr)

Biostatistics Courses (8 credits)

- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

Public Health Core (8 credits)

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
  or PUBH 6101 - Environmental Health (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Basic Science Course (4 credits)

Not required for students with a prior-earned doctorate in a health-related discipline. Nurses or other health professionals may be
exempt.
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
Electives (8-10 credits)
10 credits required for the standard program.
8 credits required for the accelerated program.

Program Sub-plans
A sub-plan is not required for this program.
Students may complete the program with more than one sub-plan.

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes--changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Course Group 0

Public Health Policy Interdisciplinary Concentration Area
PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can chose courses that emphasize:
- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more
information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus

Epidemiology M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master’s
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly into the master of science program; it is available only by special arrangement with the program. Students interested in a master's degree in epidemiology should apply for the master of public health (M.P.H.) degree through the School of Public Health (SPH). For more information on the M.P.H. program, visit the SPH website at www.sph.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Please visit www.sph.umn.edu for admission requirements.

Special Application Requirements:
Students are not admitted directly into the master of science program; it is available only by special arrangement with the program. Students interested in a master's degree in epidemiology should apply for the master of public health (M.P.H.) program through the School of Public Health (SPH). For more information on the M.P.H. degree, visit the SPH website at www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 22 major credits and 8 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: A master's project is required, equivalent to approximately 4 semester credits.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

These requirements apply only to students admitted by special arrangement with the program; students are not admitted directly into the master's program. Students interested in a master's degree in epidemiology should apply for the master of public health (MPH) program through the School of Public Health (SPH). For more information on the MPH degree, please visit the SPH website.
Twin Cities Campus
Epidemiology Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The minors in epidemiology are open to students in master's and doctoral programs that allow a minor, and who want to take some focused coursework in epidemiology. For the doctoral minor, there is the expectation that an aspect of epidemiology is incorporated into the student's doctoral thesis, and a requirement that an epidemiology faculty member represent the minor on the student's preliminary oral and final oral committees.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the epidemiology graduate minor is contingent upon prior admission to a University of Minnesota master's or doctoral degree-granting program. Students should first consult with their major program advisor about the advisability of a minor in epidemiology. They will then need to contact the program level assistants about the minor and how to get approval to complete it. For the master's minor, please contact Shelley Cooksey at cooks001@umn.edu; for the doctoral minor, please contact Andrea Kish at kish@umn.edu.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Courses
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
Take 2 or more credit(s) from the following:
• PUBH 6381 - Genetics in Public Health (2.0 cr)
Doctoral

Doctoral Minor Options
The doctoral minor can be completed in one of two ways: Option 1 is for students with prior epidemiology training; Option 2 is for students without prior epidemiology training.

Option 1
Option 1 is for students with prior training in epidemiology.

Required Coursework
Take the following courses for a total of 10 credits:
- PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
- PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)

Electives
Take at least 2 credits in an epidemiology- or biostatistics-related area, as approved by the epidemiology director of graduate studies.
- PUBH 5xxx
- PUBH 6xxx
- PUBH 7xxx
- PUBH 8xxx

-OR-

Option 2
Option 2 is for students without prior training in epidemiology.

Required Coursework
Take the following 3 courses for at least 10 credits:
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)

Electives
Take at least two credits in an epidemiology- or biostatistics-related area, as approved by the epidemiology director of graduate studies.
- PUBH 5xxx
- PUBH 6xxx
- PUBH 7xxx
- PUBH 8xxx
Twin Cities Campus

Epidemiology Ph.D.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 61
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The epidemiology PhD program is designed for students interested in research and teaching careers in the health sciences. Students select one of two formal tracks: clinical/biological epidemiology (CBE) or social/behavioral epidemiology (SBE). The two tracks, each with a minimum of 61 credits, emphasize advanced epidemiologic design, methodology, and analytic skills.

The social/behavioral epidemiology track focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment. The clinical/biological epidemiology track focuses on the etiology of diseases, particularly cardiovascular, cancer, genetics, and infectious diseases. A detailed description of the details related to each track may be obtained online or by contacting the major coordinator at epichstu@umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For the doctoral program, applicants must have completed or be about to complete a master's degree in a related field.

Special Application Requirements:
Because of the program's strong emphasis on methodology, quantitative aptitude is very important. This can be demonstrated by scoring at or above the 70th percentile on the quantitative section of the GRE, along with satisfactory grades in college-level quantitative courses. At least three recommendations (form and separate letter) from faculty and/or work supervisors with knowledge of the applicant's scholastic and professional capabilities and potential, and a statement of goals and objectives (letter of intent) for seeking a career in epidemiology are also required.

In addition to the above materials, applicants for the Ph.D. program must submit a separate essay (statement of research interests) beyond what is required for the SOPHAS application process that provides evidence of their potential to conduct original research in a specific epidemiologic area and, if possible, that indicates an interest in particular methodologies or study designs. Serious doctoral applicants are encouraged to contact the major coordinator at epichstu@umn.edu before applying. Students begin their studies in the fall semester. Applications must be completed by December 1 of the year prior to beginning the doctoral program for scholarship consideration; the final deadline is February 1.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
- Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
37 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may select one of two formal tracks; both have an applied perspective that emphasizes study design, measurement, quantitative analysis, and data interpretation. Social/behavioral epidemiology focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment. Clinical/biological epidemiology focuses on the biological causes of diseases, especially determinants of cardiovascular disease, cancer, infectious diseases, and genetic epidemiology.

The PhD program includes a minimum curriculum of 61 credits. Students must pass written and oral preliminary examinations, serve as a teaching assistant for one semester, write and defend a dissertation, and prepare a first-authored manuscript for publication.

Required Coursework
Take the following courses for a total of 13 credits:
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
- PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)

Take one of the following teaching courses for at least 1 credit:
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
  or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Clinical/Biological Epidemiology
Clinical/biological epidemiology focuses on the biological causes of diseases, especially determinants of cardiovascular disease, cancer, infectious diseases, and genetic epidemiology.

Clinical/Biological Track
A minimum of 23 credits is required.

Biological Methods/Statistics Requirement (6 credits minimum)
Take one of the following required courses:
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
  or PUBH 6363 - Design and Analysis of Group-Randomized Trials in Epidemiology (3.0 cr)
Choose additional credits from the following to complete the biological methods/statistics requirement:

- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 6915 - Nutrition Assessment (2.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8141 - Doctoral Seminar in Observational Inference (2.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Content Area Requirement (4 credits minimum)**

Take at least 4 credits from the following:

- PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)

**Additional Credits (13 credits minimum)**

Select courses in consultation with the advisor. Courses can include biological methods/statistics courses listed above not used to satisfy the biological methods/statistics requirement, or other appropriate courses.

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**Social/Behavioral Epidemiology**

Social/behavioral epidemiology focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment.

**Social/Behavioral Track**

A minimum of 23 credits is required.

**Behavioral Methods/Statistics Requirement (6 credits minimum)**

Take one of the following required courses:

- PUBH 6363 - Design and Analysis of Group-Randomized Trials in Epidemiology (3.0 cr)
- or PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)

Choose additional credits from the following to complete the Behavioral Methods/Statistics requirement:

Take 1 or more course(s) from the following:

- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 6915 - Nutrition Assessment (2.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Content Area Requirement (4 credits minimum)**

Take at least 4 credits from the following:

- PUBH 6333 - Principles of Human Behavior I (2.0 cr)
- PUBH 6334 - Human Behavior II (2.0 cr)

**Additional Credits (13 credits minimum)**

Select courses in consultation with the advisor. Courses can include biological methods/statistics courses listed above not used to satisfy the biological methods/statistics requirement, or other appropriate courses.
Twin Cities Campus
Gerontology Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The gerontology minor is available to master's (M.A. and M.S.) and doctoral students. The minor provides a multidisciplinary foundation in gerontology for the master's minors and a more intensive preparation in aging for Ph.D. minors. Past students who have minored in gerontology have majored in many departments, including but not limited to: curriculum and instruction (adult education); communication disorders; dentistry; design, housing, and apparel; family medicine and community health; family social science; journalism and mass communication; kinesiology; nursing; psychology; social work; and sociology. The program of courses is tailored in advance, with consultation between the student and the director of graduate studies of the gerontology minor.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the gerontology minor is contingent upon prior admission to a master's or doctoral degree-granting program.

Students should first consult with their major program adviser about the advisability of a minor in gerontology. They will then need to contact the director of graduate studies, Dr. Robert Kane at kanex001@umn.edu, for minor information and to design their course program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's and doctoral minors are developed in consultation with, and should be approved in advance by, the director of graduate studies for gerontology. The master's minor requires at least 8 credits, including GERO 5105 - Multidisciplinary Perspectives on Aging (3 cr), or an alternative course approved by the director of graduate studies. The doctoral minor requires at least 12 credits.

Courses are ordinarily taken from a designated course list provided by the Center on Aging and annually updated by the minor program. Students are welcome to identify and propose to the director of graduate studies additional courses on aging that might fulfill the minor requirements.

Graduate Program Requirements
Master's Minor
Take 8 or more credit(s) from the following:
• FSOS 8105 - Family Gerontology (3.0 cr)
• GERO 5100 - Topics in Gerontology (0.5 - 4.0 cr)
• GERO 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
• GERO 5110 - Biology of Aging (3.0 cr)
• GERO 5111 - Studying Aging and Chronic Illness (2.0 cr)
• GERO 5115 - Introduction to Geriatrics (2.0 cr)
• GERO 5125 - Gerontology Service Learning (3.0 cr)
• GERO 8021 - Application of Proteomics to Aging (1.0 cr)
• GERO 8022 - Fostering a Career in Aging Research (1.0 cr)
• GERO 8023 - Aging Policy Seminar (2.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• SW 5810 - Seminar: Special Topics (1.0 - 4.0 cr)

-OR-

Doctoral Minor
Take 12 or more credit(s) from the following:
• FSOS 8105 - Family Gerontology (3.0 cr)
• GERO 5100 - Topics in Gerontology (0.5 - 4.0 cr)
• GERO 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
• GERO 5110 - Biology of Aging (3.0 cr)
• GERO 5111 - Studying Aging and Chronic Illness (2.0 cr)
• GERO 5115 - Introduction to Geriatrics (2.0 cr)
• GERO 5125 - Gerontology Service Learning (3.0 cr)
• GERO 8021 - Application of Proteomics to Aging (1.0 cr)
• GERO 8022 - Fostering a Career in Aging Research (1.0 cr)
• GERO 8023 - Aging Policy Seminar (2.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• SW 5810 - Seminar: Special Topics (1.0 - 4.0 cr)
Twin Cities Campus
Global Health Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN  55455 (612-626-3500 OR 1-800-774-8636; FAX 612-624-4498.
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Global Health PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The global nature of public health is increasingly apparent and recognized by all including the United Nations, individual nations, and numerous non-governmental agencies (NGOs). Public Health students and professionals also recognize this need and many aspire to careers in global health. The certificate program will leverage Minnesota faculty skills and international connections to provide career-building experiences for our graduate (MS, PhD) and professional (MPH) students.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must hold a baccalaureate degree.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application instructions and requirements visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Global Health Certificate Requirements

PubH 6390 -- Topics in Epidemiology: Foundations of Global Health (2.0 cr)
PubH 7200 -- Topics in Public Health Practice: Global Health Certificate Capstone Seminar (1.0 cr)
   PUBH 6131 - Working in Global Health (2.0 cr)
   PUBH 7296 - Field Experience: Public Health Practice (0.5 - 8.0 cr)

8 credits of electives

Students must complete a minimum of 8 elective credits. Below is an approved list, but other global health related courses may be considered. Please consult with the Global Health certificate program staff about seeking elective approval.

PUBH 6085 - Alcohol and Tobacco: Ongoing Threats to Global Health (2.0 cr)
PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)
PUBH 6290 - International Humanitarian Crisis Simulation (1.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6601 - Born a Girl: Global Women's Health (1.0 cr)
PUBH 6605 - Reproductive and Perinatal Health (2.0 cr)
PUBH 6686 - Global Reproductive Health (2.0 cr)
PUBH 6730 - International Comparative Health Systems (2.0 cr)
PUBH 6807 - Global Health Relief, Development, and Religious and Non-Religious NGOs (3.0 cr)
PUBH 6906 - Global Nutrition (2.0 cr)
PUBH 7262 - Globalization and Health (1.0 cr)
PA 5451 - Immigration, Health and Public Policy (3.0 - 4.0 cr)
**Twin Cities Campus**  
**Health Care Administration M.H.A.**  
*School of Public Health - Adm*  
*School of Public Health*

Link to a [list of faculty](#) for this program.

**Contact Information:**  
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)  
Email: sph-oasr@umn.edu  
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 42 to 60  
- This program requires summer semesters for timely completion.  
- Degree: Master of Healthcare Administration

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The full-time master of healthcare administration (M.H.A.) program is appropriate for applicants with limited or no healthcare work experience, or individuals who wish to make a career change from industries other than health care. Now ranked second in the nation by U.S. News & World Report, the program is accredited by the CAHME.

The program's consistently high rankings are a reflection of many factors—an outstanding faculty of researchers and practitioners, location in one of the nation's centers of healthcare innovation, an extraordinary alumni association, and a track record of educating outstanding leaders for the healthcare industries.

**Accreditation**  
This program is accredited by Commission on Accreditation of Healthcare Management Education (CAHME)

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:  
Full-time program applicants should have a strong commitment to managing people and resources to create and sustain outstanding healthcare services and organizations. Strong quantitative and communication skills are essential; prior experience in health care is not required.

Visit SPH for detailed application requirements at [www.sph.umn.edu](http://www.sph.umn.edu)

**Special Application Requirements:**  
For the executive program: At least three years of management or clinical leadership experience in a healthcare organization is required. The program reserves the right to require the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT) as a part of the admissions process.

For the full-time program: To prepare for the program's rigorous curriculum, the faculty highly recommends the following coursework prior to matriculation:  
- Statistics  
- Accounting  
- Microeconomics  
- Finance

Applicants must submit their test score(s) from the following:
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

- **IELTS**
  - Total Score: 7

- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

**Plan C:** Plan C requires 42 to 60 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Please see website for information: www.sph.umn.edu

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

**Required Courses**

- PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
- PUBH 6556 - Health and Health Systems (3.0 cr)
- PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
- PUBH 6562 - Information Technology in Health Care (2.0 cr)
- PUBH 6535 - Managerial Accounting for Health Services (3.0 cr)
- PUBH 6547 - Health Care Human Resources Management (2.0 cr)
- PUBH 6557 - Health Finance I (3.0 cr)
- PUBH 6555 - Topics in Health Economics (2.0 cr)
- PUBH 6568 - Health Finance II (3.0 cr)
- PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
- PUBH 6558 - Interprofessional Teamwork in Health Care (2.0 cr)
- PUBH 6564 - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
- PUBH 6553 - Health Care Management Ethics (1.0 cr)
- PUBH 6596 - Legal Considerations in Health Services Organizations (2.0 cr)

**Advanced Problem Solving or New Product Design (Full-time MHA students only)**

Students choose between the full-time or executive MHA program. 42 credits are required for the Executive MHA program, and 60 required for the full-time program. Students in the full-time program have the option of choosing the Advanced Problem Solving or New Product Design EMPHASIS with the consent of their adviser.

**Executive MHA**

The Executive MHA is specifically designed for practicing executives, physicians, and other healthcare professionals seeking to advance their management and leadership capabilities. This is a 42-credit, 25-month program.

- PUBH 7565 - Health Care Delivery, Design & Innovation (2.0 cr)
- PUBH 7556 - Health and Health Systems (2.0 cr)
- PUBH 7551 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 7535 - Managerial Accounting for Health Services (3.0 cr)
PUBH 7566 - The Henry Capstone: Core Concepts in Managing Health Care Organizations (2.0 cr)
PUBH 7536 - Health Finance I (3.0 cr)
PUBH 7576 - Legal Considerations in Health Services Organizations (2.0 cr)
PUBH 7568 - Interdisciplinary Teamwork in Health Care (2.0 cr)
PUBH 7569 - Health Care Policy (1.0 cr)
PUBH 7541 - Statistics for Health Management Decision Making (3.0 cr)
PUBH 7537 - Health Finance II (3.0 cr)
PUBH 7564 - Private Purchasers of Health Care (2.0 cr)
PUBH 7547 - Health Care Human Resource Management (2.0 cr)
PUBH 7555 - Topics in Health Economics (2.0 cr)
PUBH 7562 - Information Technology in Health Care (2.0 cr)
PUBH 7571 - Organizational Integration in Health Care Delivery (2.0 cr)
PUBH 7572 - Health Care Strategies in Competitive Markets (2.0 cr)
PUBH 7573 - Managing the Embedded Medical Practice (2.0 cr)
PUBH 7553 - Health Care Management Ethics (1.0 cr)
PUBH 6570 - Topics: Healthcare Administration (1.0 - 4.0 cr)

-OR-

Full-time MHA
This program is appropriate for applicants with limited or no healthcare work experience or individuals who wish to make a career change. This is a 60-credit, two-year program.

**Year 1: An Introduction to Healthcare Administration**
PUBH 6544 - Principles of Problem Solving in Health Services Organizations (3.0 cr)
PUBH 7596 - Clerkship in Health Care Administration (2.0 cr)
Electives (2-4 cr) - can take up to 4 elective credits during Year I

**Year II: Advanced Courses and Specialization in Healthcare Administration**
PUBH 6832 - Economics of the Health Care System (3.0 cr)
PUBH 6568 - Interprofessional Teamwork in Health Care (2.0 cr)
ENTR 6041 - Initiating New Product Design and Business Development (2.0 - 4.0 cr)
PUBH 6554 - Healthcare Strategy and Marketing (2.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
Electives (2-4 cr) - can take up to 4 elective credits during Year II
ENTR 6041 - Initiating New Product Design and Business Development (2.0 - 4.0 cr)
or PUBH 6577 (2 cr) Advanced Problem Solving.

**Joint- or Dual-degree Coursework:** Master of Healthcare Administration (MHA) and Master of Business Administration (MBA)
Student may take a total of 24 credits in common among the academic programs.

**Program Sub-plans**
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

**Online/Executive MHA Program**

Saudi Arabia
Twin Cities Campus
Health Equity Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, 420 Delaware Street SE, Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor is intended for highly motivated students who are interested in addressing the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and disadvantaged social groups, both in the U.S. and globally, as well as experiencing unequal quality of and access to healthcare. The minor supports the missions of the University of Minnesota, School of Public Health, and Academic Health Center by emphasizing education, practice in the community, and promoting public health.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Declaring this minor is contingent upon prior admission to a University master’s or doctoral degree-granting program.

Students should first consult with their program advisor, then contact the Health Equity director of Graduate Studies regarding requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Capstone Seminar
All students pursuing the health equity minor must complete the following capstone seminar:
- Take exactly 1 course(s) totaling exactly 1 credit(s) from the following:
  - PUBH 6772 - Health Disparities Capstone Seminar (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's Coursework
Students must select coursework in consultation with their academic advisor and the Health Equity director of Graduate Studies.
Take 6 or more credit(s) from the following:
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6855 - Medical Sociology (3.0 cr)

Doctoral

Coursework
Students must select coursework in consultation with their academic advisor and the Health Equity director of Graduate Studies.
Take 11 or more credit(s) from the following:
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6855 - Medical Sociology (3.0 cr)
Health Services Research, Policy, and Administration M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS-HSRPA program enables students to obtain the knowledge and skills for careers as health analysts and researchers with which to develop the evidence that is used in research, clinical, business, and policy environments; examine the causes and correlations of health outcomes; and analyze quality and costs in organizational and policy contexts, such as public reporting and payment policies.

The program includes a core of courses that are foundational to research and analytics, and has a generous number of elective credits that can be applied to a specialization enabling students to tailor much of the coursework to their individual interests and career goals.

The specializations are: health intelligence and analytics; cost effectiveness; health care quality improvement/operations research; health services research and evaluation; health policy; health economics; social determinants of health; public health informatics. Students may also create their own specialization in consultation with their advisor.

The program requires a minimum of 34 credits, that can be completed in one to two years depending on the specialization.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 19 to 23 major credits and 11 to 15 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** There are two options for completing the master's project: 1) An industry-specific project where the student works on a project with a local organization and presents their findings. 2) Independent research conducted on a relevant topic of interest, with the guidance of the academic advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Good math skills are essential. Previous coursework in algebra, statistics, or other quantitative coursework is recommended.

**Core Requirements**

The core curriculum includes 19 to 23 credits of coursework and Plan B project credits.

Take 19 - 23 credit(s) from the following:

**Coursework**

- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- or PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- or PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)

**Plan B Project**

Take 2 to 5 Plan B project credits, in consultation with the advisor.

PUBH 7894 - MS in Health Services Research, Policy, and Administration Plan B Project (1.0 - 5.0 cr)

**Specialization Areas**

Students choose from the following specialization areas, or design and propose their own specialization area, in consultation with their advisor. Remaining credits to meet minimum credit requirements or to address other areas of interest are also chosen in consultation with the advisor.

Take 11 - 15 credit(s) from the following:

**Health Intelligence and Analytics**

Take exactly 6 credit(s) from the following:

- PUBH 6813 - Managing Electronic Health Information (2.0 cr)
- PUBH 6814 - Data and Information for Population Health Management (2.0 cr)
- PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)

**Cost Effectiveness**

Take exactly 8 credit(s) from the following:

- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)

**Health Care Quality Improvement/Operations Research**

Take 6 or more credit(s) from the following:

- PUBH 6560 - Operations Research and Quality in Health Care (3.0 cr)
- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6561 - Quantitative Methods Applied to Health Administration Problems (2.0 cr)
- PUBH 6571 - Leading Performance Improvement in Health Care (2.0 cr)
- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)

**Health Services Research and Evaluation**

Take 6 or more credit(s) from the following:

- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
• PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
• PUBH 6810 - Survey Research Methods (3.0 cr)
• PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
• PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)

• Health Policy
  Take 6 or more credit(s) from the following:
  • PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
  • PUBH 6711 - Public Health Law (2.0 cr)
  • PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
  • PUBH 6835 - Principles of Health Policy (2.0 cr)
    or PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
  • PUBH 6832 - Economics of the Health Care System (3.0 cr)
    or PUBH 6555 - Topics in Health Economics (2.0 cr)

• Health Economics
  Take 6 or more credit(s) from the following:
  • PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
  • PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)
  • PUBH 6832 - Economics of the Health Care System (3.0 cr)
    or PUBH 6555 - Topics in Health Economics (2.0 cr)

• Social Determinants of Health
  Take 6 or more credit(s) from the following:
  • PUBH 6055 - Social Inequalities in Health (2.0 cr)
  • PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
  • PUBH 6281 - Immigrant Health Issues (3.0 - 4.0 cr)
  • PUBH 6675 - Women's Health (2.0 cr)
  • PUBH 6911 - Health Disparities Research: Measures, Methods, and Data (2.0 cr)
  • CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
  • PUBH 6855 - Medical Sociology (3.0 cr)
  • PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)

• Public Health Informatics
  Take 6 or more credit(s) from the following:
  • HINF 5430 - Health Informatics I (3.0 cr)
  • PUBH 6876 - Public Health Systems Analysis and Design (2.0 cr)
  • PUBH 6877 - Public Health Systems Analysis and Design - Practicum (2.0 cr)
  • PUBH 6880 - Introduction to Public Health Informatics (2.0 cr)
  • PUBH 6025 - e-Public Health (2.0 cr)

Joint- or Dual-degree Coursework: Joint Degree Program with Law and MS in Health Services Research, Policy, and Administration (JD/MS)Student may take a total of 8 credits in common among the academic programs.
Twin Cities Campus
Health Services Research, Policy, and Administration Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in health services research, policy, and administration (HSRP&A) is available as a minor to other M.S. and Ph.D. students across the University. HSRP&A emphasizes a population health orientation research and policy perspective and analytic methods related to health policy and healthcare systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Required prerequisites
Course Group 1

Other requirements to be completed before admission:
Admission to the health services research, policy, and administration graduate minor is contingent upon prior admission to a master's or doctoral degree-granting program. Students enrolled in graduate programs throughout the University are eligible for this minor.

Students should first consult with their major program adviser about the advisability of a minor in health services research, policy, and administration. They will then need to contact the director of graduate studies, Dr. Kathleen Call at callx001@umn.edu or director of graduate studies assistant, Maureen Andrew at andre031@umn.edu for minor information.

Special Application Requirements:
The master's minor in health services research, policy, and administration is 6 credits and will be individually tailored via consultation with the HSRP&A program director.

The Ph.D. minor is 12 credits and has some specific course requirements. Both the master's and doctoral minor require approval by the HSRP&A program director.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Ph.D. and M.S. Minor Required Coursework
The HSRP&A minor coursework must be chosen from within that major from the following course number sequences: PUBH 65xx,
PUBH 67xx, PUBH 68xx, or PUBH 88xx.

The master's minor requires 6 credits and is individually tailored with the advice and approval of the HSRP&A program director. The Ph.D. minor requires 12 credits, of which 2 courses are prescribed below. The remaining credits can be selected from other HSRP&A courses.

PUBH 6556 - Health and Health Systems (3.0 cr)
   or PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
   or PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
Health Services Research, Policy, and Administration Ph.D.

School of Public Health

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

Program Type: Doctorate

Requirements for this program are current for Fall 2016
Length of program in credits: 69 to 82
This program does not require summer semesters for timely completion.
Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health services research is a multidisciplinary field of study. Health services researchers examine how social factors, government policies, financing systems, organizational structures, and personal behaviors affect access to needed care, the quality of care provided, and the cost of care delivery. The focus of research is broad and includes individuals, families, providers, healthcare organizations, communities, and populations. The field of health services research is ultimately interested in both "health," understood as health status and well-being, as well as "health care," understood as the effective delivery of healthcare services.

The doctoral program in health services research, policy, and administration is primarily for students interested in academic careers or senior research positions in government or the private sector. The core curriculum is a multidisciplinary examination of the social, political, and economic forces that affect the organization, financing, and delivery of health care services. The emphasis is on theory, modeling, and quantitative methods. Coursework is complemented by the student's involvement with faculty on health services research projects, through weekly academic research seminars, doctoral colloquia, and conference presentations.

Students come from a variety of educational backgrounds, including decision sciences, economics, political science, sociology, business, engineering, and public affairs. Strong quantitative skills are essential.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Preferred GRE scores from exams taken before August 1, 2012 are: Verbal: 600, Quantitative: 600, Analytical Writing: 5.0. Minimum GRE scores taken after Aug. 1, 2012 are: 300 (combined verbal and quantitative), and 4.0 Analytical Writing.

The PhD program requires prerequisites in calculus and statistics. Applicants who have not completed the prerequisites, but are otherwise qualified for admission, are required to take relevant courses at the University or another accredited institution before beginning the program.

Special Application Requirements:
Please visit www.sph.umn.edu for admission requirements

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

## Program Requirements

33 to 46 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

### Required Coursework

Take all of the following core courses, including the biostatistics or econometrics series, for a total of 31 credits.

- **PUBH 8810** - Research Studies in Health Care (3.0 cr)
- **PUBH 8811** - Research Methods in Health Care (3.0 cr)
- **PUBH 8830** - Writing for Research (2.0 cr)
- **PUBH 8831** - Writing for Research (2.0 cr)
- **PUBH 6832** - Economics of the Health Care System (3.0 cr)
- **PUBH 6855** - Medical Sociology (3.0 cr)
- **PUBH 6742** - Ethics in Public Health: Research and Policy (1.0 cr)
- **PUBH 8801** - Health Services Policy Analysis: Theory (3.0 cr)
- **PUBH 8341** - Advanced Epidemiologic Methods: Concepts (3.0 cr)

#### Biostatistics and Econometrics Options

Complete the 31-credit core course requirement by taking the biostatistics or econometrics series.

**Biostatistics**
- To complete the biostatistics series, take the following courses for 8 credits:
  - **PUBH 7401** - Fundamentals of Biostatistical Inference (4.0 cr)
  - **PUBH 7402** - Biostatistics Modeling and Methods (4.0 cr)

**or Econometrics**
- To complete the econometrics series, take the following courses for 8 credits:
  - **APEC 8211** - Econometric Analysis I (4.0 cr)
  - **APEC 8212** - Econometric Analysis II (4.0 cr)

### Thesis Credits

Take at least 24 doctoral thesis credits.

- **PUBH 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)

### Concentration Areas

#### Multidisciplinary Social Science

**Required Concentration Coursework**
- **PUBH 8805** - Sociological Theory in Health Services Research (3.0 cr)
- **APEC 5151** - Applied Microeconomics: Firm and Household (3.0 cr)

**Required Theory Course**

Choose a theory course from the list below, in consultation with your advisor.
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
or PUBH 8821 - Health Economics II (3.0 cr)
or APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
or SOC 8701 - Sociological Theory (4.0 cr)
or SOC 8721 - Theories of Social Psychology (3.0 cr)
or PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
or PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
or PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)

Supporting Program Requirement
Take at least 12 outside credits in consultation with the advisor and concentration faculty.

-OR-

Health Organizations and Management Science
Required Concentration Coursework
Take 6 - 8 credit(s) from the following:
• MGMT 8301 - Seminar in Organizational Behavior (4.0 cr)
• MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
• SCO 8745 - Research on Quality Management (3.0 cr)
• PUBH 8894 - Directed Research: Health Services Research, Policy, and Administration (1.0 - 8.0 cr)
• HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
• IDSC 8721 - Behavioral Decision Theory (3.0 cr)

Required Methods Foundation Course
Take one of the following methods foundations courses:
SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
or HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)

Supporting Program Requirement
Take at least 12 outside credits in consultation with the advisor and concentration faculty.

-OR-

Health Decision Science
Required Concentration Coursework
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)

Additional Coursework
Take 2 or more credit(s) from the following:
• IDSC 8721 - Behavioral Decision Theory (3.0 cr)
• IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)

Supporting Program Requirement
Take at least 12 outside credits from the list below, or other outside coursework, in consultation with the advisor and concentration faculty.
IE 5112 - Introduction to Operations Research (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)

-OR-

Sociology of Health and Illness
Required Concentration Coursework

Theoretical Foundations Courses
Take 6 or more credit(s) from the following:
• PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
• SOC 8701 - Sociological Theory (4.0 cr)
• SOC 8731 - Sociology of Knowledge (3.0 cr)
• SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
• MGMT 8302 - Seminar in Organizations Theory (4.0 cr)

Supporting Program Requirements
Take at least 12 outside credits in consultation with the advisor and concentration faculty. At least 8 credits must be from an area of specialization, and at least 4 credits must be advanced methodology coursework.

Specialization Courses
Take at least 8 credits from the following list:
SOC 8735 - Sociology of Culture (3.0 cr)
SOC 8590 - Topics in Life Course Sociology (3.0 cr)
SOC 8390 - Topics in Political Sociology (3.0 cr)
SOC 8101 - Sociology of Law (3.0 cr)
SOC 8290 - Topics in Social Stratification (3.0 cr)
SOC 8501 - Sociology of the Family (3.0 cr)
SOC 8221 - Sociology of Gender (3.0 cr)

Advanced Methodology Courses
Take at least 4 credits from the following list:
PSY 8881 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
PUBH 6811 - Health Disparities Research: Measures, Methods, and Data (2.0 cr)
POL 8126 - Qualitative Methods (3.0 cr)
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

-OR-

Clinical Outcomes Research

Required Concentration Coursework
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)

Supporting Program Requirement
Take at least outside 12 credits in consultation with the advisor and area of concentration faculty.
Take 12 or more credit(s) from the following:
• PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
• PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
• PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
• PUBH 6810 - Survey Research Methods (3.0 cr)
• PUBH 7450 - Survival Analysis (3.0 cr)

-OR-

Health Policy and Analysis

Required Concentration Coursework
PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)

Supporting Program Requirement
Take at least outside 12 credits in consultation with the advisor and concentration faculty. Students can choose to complete the supporting program requirement one of two ways: a methods focus or a topic-specific focus.

Methods Focus
Students choosing this option are strongly encouraged to take PUBH 6845 and PUBH 8804.
Take 12 or more credit(s) from the following:
• PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
• PUBH 6810 - Survey Research Methods (3.0 cr)
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
• PUBH 6813 - Measurement of Health-Related Social Factors (3.0 cr)
• PUBH 6811 - Health Disparities Research: Measures, Methods, and Data (2.0 cr)
• PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
• PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

or Topic-specific Focus
Take courses in focus areas such as LTC, economics, health disparities, or ethics. Approval of the concentration faculty is required prior to taking the courses.

-OR-

Health Economics

The health economics concentration requires prerequisites in calculus, statistics, and microeconomics. Consult with the advisor and concentration faculty about satisfying this requirement.

Required Concentration Coursework
Take the following coursework, including one microeconomics series.
PUBH 8821 - Health Economics II (3.0 cr)
Required Microeconomics Series

**Applied Microeconomics**
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)

**or Microeconomic Analysis**
- ECON 8001 - Microeconomic Analysis (2.0 cr)
- ECON 8002 - Microeconomic Analysis (2.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)

**or Microeconomic Theory**
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)

**Supporting Program Requirement**
Take at least 12 outside credits in consultation with the advisor and concentration faculty. At least 8 of the 12 credits must be from the methods coursework list.

Take 12 or more credit(s) including 1 or more sub-requirements(s) from the following:

**Methods Coursework**
Choose at least two courses from the options below. Multi-course sequences count as one course, e.g. APEC 8211 must be taken with 8212. ECON 8205, must also include 8206, 8207, and 8208. ECON 8117 must also include 8118.

Take 2 or more course(s) totaling 8 or more credit(s) from the following:
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)
- HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
- ECON 8117 - Noncooperative Game Theory (2.0 cr)
- ECON 8118 - Noncooperative Game Theory (2.0 cr)
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)

**Additional Supporting Program Coursework**
Take additional outside coursework as needed to complete the 12-credit supporting program requirement, in consultation with the advisor and concentration faculty.

Take 0 or more course(s) from the following:
- ECON 8xxx
- APEC 8xxx
- PUBH 8862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)

**Joint- or Dual-degree Coursework:** Joint Degree with Law & PhD in Health Services Research, Policy & Administration (JD/PhD)Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Management Fundamentals Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Management Fundamentals PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The management fundamentals certificate is specifically designed for employed executives, physicians, and other healthcare professionals seeking to advance their management and leadership capabilities.

Accreditation
This program is accredited by Commission on Accreditation of Healthcare Management.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission to the certificate is decided by the M.H.A. faculty with the advice and counsel of an admissions committee. Admission to the certificate requires the following:
- a bachelor's degree from an accredited college or university
- at least two years experience in a healthcare organization
- current employment in a healthcare organization which affords the opportunity to apply the assignments in the coursework, or an agreement with such an organization in which the applicant is not employed
- a letter of intent describing career interests and the relevance of the certificate to the applicant's personal development

In addition, as noted in the SPH Catalog, applicants whose native language is not English or whose education was completed exclusively at an institution(s) whose language of instruction was not in English must prove English proficiency.

Because the coursework in Certificate 1 is the same as that of the executive M.H.A., some enrollees in the certificate may decide to pursue the executive M.H.A. after completing the first or second semester of the certificate. Students interested in that option will be required to meet the requirements for admission to the executive M.H.A.

Note: All students in the management fundamentals certificate will be expected to bring a personal computer to the on-campus sessions.

Other than the admission requirements, there are no prerequisites.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 50 major credits and 10 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The capstone project for the MHA program builds upon the coursework throughout the program. Students integrate and synthesize the knowledge, attitudes and skills acquired in the curriculum and apply them to the resolution of a significant management problem in a healthcare organization. The capstone project also provides one of the last opportunities in the MHA program for students to further develop and demonstrate their leadership and team competencies, and receive constructive feedback on these competencies, prior to graduation.

MHA students have three options to choose from as they complete their capstone requirement: (1) the Advanced Problem Solving course; (2) the Carlson Consulting Enterprise Experiential Learning Program; and (3) the New Product Development course.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Required Coursework

- PUBH 6562 - Information Technology in Health Care (2.0 cr)
- PUBH 6556 - Health and Health Systems (3.0 cr)
- PUBH 6535 - Managerial Accounting for Health Services (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6557 - Health Finance I (3.0 cr)
- PUBH 6568 - Interprofessional Teamwork in Health Care (2.0 cr)
Twin Cities Campus
Maternal and Child Health M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 42 to 48
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While the name of the program, Maternal and Child Health (MCH), may suggest that a focus only on mothers and children, the MPH in maternal and child health program is dedicated to improving the health of youth and families too. The program is especially interested in socially vulnerable populations and the environments, behaviors, and policies that affect their long-term health and well-being.

Students come from a variety of backgrounds, but share a common interest in social justice and public health principles. Graduates quickly assume leadership roles in nonprofit organizations, research settings, state and local public health agencies, and healthcare organizations.

The program has a standard, on-campus curriculum (with the option of an epidemiology emphasis) and an online curriculum.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Prefer at least one year's work or volunteer experience in a clinical, community-based, public health or managed-care agency/program that focuses on women, children, adolescents, and/or families.

Also prefer a basic understanding of physiological and/or psychological human development as demonstrated by coursework, experience, and/or referenced readings.

Applicants to the advanced standing (online) track must hold either an advanced degree (e.g., MS, MD, MA, MSW) or have 3-5 years of experience directly related to maternal and child health.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C**: Plan C requires 42 to 48 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project**: See department for more details.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Please visit www.sph.umn.edu for the current curriculum options available.

**Standard Program -- Scientific Basis Coursework**

Select at least 8 credits from the following list, in consultation with the advisor.

Take 8 or more credit(s) from the following:

- **PUBH 6686** - Global Reproductive Health (2.0 cr)
- **PUBH 6695** - Reproductive and Perinatal Health (2.0 cr)
- **PUBH 6606** - Children's Health: Issues, Programs, and Policies (2.0 cr)
- **PUBH 6607** - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
- **PUBH 6613** - Children and Youth With Special Health Care Needs (2.0 cr)
- **PUBH 6675** - Women's Health (2.0 cr)
- **PUBH 6902** - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- **PUBH 6903** - Child and Adolescent Nutrition (2.0 cr)
- **PUBH 6906** - Global Nutrition (2.0 cr)
- **PUBH 6123** - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- **PUBH 6950** - From Kid to Community: Personal, Social and Environmental Influences on Youth Obesity (2.0 cr)
- **PUBH 6955** - Using Policy to Address Child and Adolescent Obesity Prevention (1.0 cr)
- **PA 5451** - Immigration, Health and Public Policy (3.0 - 4.0 cr)

**Standard Program -- Required Methodological and Analytical Skills Course**

Take one of the following two courses, in consultation with the advisor.

- PUBH 6034 - Evaluation (3.0 cr)
- or PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)

**Standard Program -- Additional Methodological and Analytical Skills Coursework**

Take at least 3 courses from the following list, in consultation with the advisor.

Take 4 - 11 credit(s) from the following:

- **PUBH 6035** - Applied Research Methods (3.0 cr)
- **PUBH 6325** - Data Processing with PC-SAS (1.0 cr)
- **PUBH 6342** - Epidemiologic Methods II (3.0 cr)
- **PUBH 6420** - Introduction to SAS Programming (1.0 cr)
- **PUBH 6451** - Biostatistics II (4.0 cr)
- **PUBH 7400** - Topics: Biostatistics (0.5 - 4.0 cr)
- **PUBH 6617** - Practical Methods for Secondary Data Analysis (3.0 cr)
- **PUBH 6636** - Qualitative Research Methods in Public Health Practice (2.0 cr)
- **PUBH 6765** - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- **PUBH 6806** - Principles of Public Health Research (2.0 cr)
- **PUBH 6810** - Survey Research Methods (3.0 cr)
- **PUBH 6845** - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 6910 - Critical Review of Research in Public Health Nutrition (1.0 cr)
- PUBH 6914 - Community Nutrition Intervention (3.0 cr)

Standard Program -- Grant Writing Course
Take one of the following courses:
PUBH 6673 - Grant Writing for Public Health (1.0 cr)
or NURS 5925 - Grant Writing and Critique (1.0 cr)

Standard Program -- Foundation Course
Take one of the following courses:
PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)
or PUBH 6655 - Principles and Programs in Maternal and Child Health (2.0 cr)

Standard Program -- Management Policy or Advocacy Skills Coursework
Take one course from the following list, in consultation with the advisor.
Take 1 or more course(s) from the following:
PUBH 6045 - Skills for Policy Development (1.0 cr)
PUBH 6056 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6074 - Mass Communication and Public Health (3.0 cr)
PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)
PUBH 6571 - Leading Performance Improvement in Health Care (2.0 cr)
PUBH 6700 - Foundations of Public Health (3.0 cr)
PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
PUBH 6895 - Introduction to Project Management for Health Professionals (2.0 cr)
PUBH 6807 - Global Health Relief, Development, and Religious and Non-Religious NGOs (3.0 cr)
PUBH 6835 - Principles of Health Policy (2.0 cr)

Standard Program -- Public Health Core Coursework
Environmental Health
Take one of the following courses:
PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental Health (2.0 cr)

Epidemiology
Take one of the following courses:
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Biostatistics
Take one of the following courses:
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Ethics
Take one of the following courses:
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Management
Take exactly 1 course(s) from the following:
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Standard Program -- Field and Culminating Experience
Take at least 2 credits of PUBH 7696, and 1-2 credits of PUBH 7694.
PUBH 7696 - Field Experience: Maternal and Child Health (1.0 - 4.0 cr)
PUBH 7694 - Culminating Experience: Maternal and Child Health (1.0 - 4.0 cr)

Standard Program -- Electives
Take elective credits, in consultation with the advisor, to meet the 48-credit requirement.

Joint- or Dual-degree Coursework: J.D./M.P.H.-Maternal and Child Health M.S.W./M.P.H.-Maternal and Child Health
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may complete the program with more than one sub-plan.

Online

Online Program -- Required Coursework

Scientific Basis Courses
Take 6 or more credit(s) from the following:
- PUBH 6686 - Global Reproductive Health (2.0 cr)
- PUBH 6606 - Children's Health: Issues, Programs, and Policies (2.0 cr)
- PUBH 6613 - Children and Youth With Special Health Care Needs (2.0 cr)
- PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)

Methodological and Analytical Skills -- Required Course
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)

Additional Methods Courses
Take 3 credits in consultation with the advisor.
Take 3 or more credit(s) from the following:
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6400 - Topics: Biostatistics (0.5 - 4.0 cr)

Management and Communication Skills Courses
Take the following two courses:
- NURS 5925 - Grant Writing and Critique (1.0 cr)
- PUBH 6655 - Principles and Programs in Maternal and Child Health (2.0 cr)

Additional Management and Communications Courses
Take 3 credits from the following list, in consultation with the advisor:
Take 3 or more credit(s) from the following:
- PUBH 6700 - Foundations of Public Health (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)

Culminating and Field Experience Courses
Take 1 to 2 credits of PUBH 7694 and 2 credits of PUBH 7696.
- PUBH 7696 - Field Experience: Maternal and Child Health (1.0 - 4.0 cr)
- PUBH 7694 - Culminating Experience: Maternal and Child Health (1.0 - 4.0 cr)

Electives
Take elective credits, in consultation with the advisor, to meet the 42-credit minimum. Elective credits can include courses offered during the School of Public Health's Summer Institute.

Public Health Core Courses
Take the following required courses:
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6101 - Environmental Health (2.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity and mortality experienced by minority cultural and social groups in the US, as well as unequal quality of and access to healthcare. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota’s ranking as one of the nation’s healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, Interdisciplinary Concentrations Coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps MPH majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- Understanding community dynamics
- Developing advocacy skills for public health

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Information current as of April 04, 2017
Analyzing legal and policy structures
Evaluating and implementing policies and programs
Influencing community health
Motivating and educating stakeholders and decision-makers
Using policy as prevention strategy
Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, Interdisciplinary Concentrations Coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Molecular and Systems Toxicology, PhD
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN 55455. (612-626-3500 OR 1-800-774-8636, FAX 612-624-4498).
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 53
- This program requires summer semesters for timely completion.
- The PhD research project can occur at any of the University of Minnesota coordinate campuses.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program is an interdisciplinary major offering the Ph.D. degree housed in the Division of Environmental Health Sciences within the School of Public Health. All requirements of the University of Minnesota School of Public Health must be completed within a seven-year time frame degree completion. A master's degree is not required for completion of the Ph.D. in Molecular and Systems Toxicology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

B.A. or B.S. in basic sciences from an accredited institution of higher education required.

Other requirements to be completed before admission:
Basic chemistry through organic chemistry, biochemistry, and cell biology.

Special Application Requirements:
Physiology course recommended before starting program.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
23 credits are required in the major.
6 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Current topics in toxicology (PubH 8165) must be taken for 1 credit each over two separate terms.

Required Courses
- PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
- PUBH 6164 - Toxicological Analysis (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8163 - Toxicology (5.0 cr)
- PUBH 8165 - Current Topics in Toxicology (1.0 cr)
- PUBH 8166 - Experiences in Toxicology Research (3.0 cr)

Minimum of six credits of electives

Electives
Selected in consultation with academic advisor
Twin Cities Campus
Public Health Administration and Policy M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 42 to 44
- This program requires summer semesters for timely completion.
- PCAS Data Entry
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Health Administration and Policy (PHAP) program offers a core curriculum centering on managing organizations to improve the health of certain populations. Throughout the program, there is a strong emphasis on developing effective communication skills and the ability to work well with various cultures and communities.

To receive this degree, students will need to complete the curriculum, a field experience, and a master's project. Graduates pursue public health careers in a variety of settings including non-profit organizations, state and local public health agencies, and healthcare companies.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Preferred GRE performance expectations (test taken post August 2011): A combination of 300 on the quantitative and verbal sections of the test and a score of 3.5 on the analytical writing assessment. Some programs may have higher preferred minimum scores. Check specific programs for details.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5
- GMAT
- MCAT
- LSAT
  - Law School Admission Test (LSAT) score: 150

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
Program Requirements

Plan C: Plan C requires 42 to 44 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Culminating Experience

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Required SPH Core Courses

M.P.H. Core Courses

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6101 - Environmental Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)

PHAP Core Courses

- PUBH 6700 - Foundations of Public Health (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 7796 - Field Experience: Public Health Administration and Policy (2.0 cr)
- PUBH 7784 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)
- PUBH 7794 - Master's Project: Public Health Administration and Policy (2.0 - 3.0 cr)
- PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)

Specialty Areas (includes concentrations, emphasis)

Students must complete 7 credits within one specialty area. NOTE: If a student chooses an interdisciplinary concentration, a specialty area need not be chosen.

Management

For this area, PUBH 6727 is a required course; remaining credits will be chosen along with the advisor from a list of courses.

- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)

Analysis

For this area, PUBH 6717, 6811, 6845 and 6852 are required courses; remaining credits will be chosen along with the advisor from a list of courses.

- PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6811 - Health Disparities Research: Measures, Methods, and Data (2.0 cr)
- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
Policy
For this area, PUBH 6711 and 6835 are required courses; remaining credits will be chosen along with the advisor from a list of courses.

PUBH 6711 - Public Health Law (2.0 cr)
PUBH 6835 - Principles of Health Policy (2.0 cr)

-OR-

General Health Policy and Management
For this area, PUBH 6726 and 6835 are required courses; remaining credits will be chosen along with the advisor from a list of courses.

PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6835 - Principles of Health Policy (2.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Executive Public Health Administration and Policy
This sub-plan is limited to students completing the program under Plan C.

The e-PHAP degree is a 42 credit program designed to be completed in 25 months. It is designed for working public health professionals who are in, or would like to move into, leadership or managerial roles in organizations that provide core public health functions. Students enrolled in the program will spend 17 days on campus where they will complete four intensive (7 credits total) in-person courses that include an online component. The remainder of the program is delivered in an online environment.

Three years of professional public health experience.

ePHAP Core Courses
These courses are required for students enrolled in the Executive Public Health Administration and Policy program, along with the required M.P.H core courses (14 credits), plus two credits of electives.
Course will review how to use and understand data to help make decision within a public health organization. First time offered fall 2014. Syllabus currently in development. Course is two credits.
PUBH 6700 - Foundations of Public Health (3.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
PUBH 6835 - Principles of Health Policy (2.0 cr)
PUBH 7796 - Field Experience: Public Health Administration and Policy (2.0 cr)
Course will review how to lead an organization through changes determined via evaluating program effectiveness. First time offered fall 2015. Syllabus currently in development. Course is two credits.
This course will address basic concepts of public health law and the legal bases for the existence and administration of public health programs. First time offered spring 2015. Syllabus currently in development. Course is two credits.
PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more
Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
Public Health Policy Interdisciplinary Concentration (PHPIC) coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- understanding community dynamics
- developing advocacy skills for public health
- analyzing legal and policy structures
- evaluating and implementing policies and programs
- influencing community health
- motivating and educating stakeholders and decision-makers
- using policy as prevention strategy
- eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Arizona State University
The Public Health Administration & Policy (PHAP) program hosted by Arizona State University is a 44 credit program designed to be completed by students located in the Phoenix area in a hybrid format. Students earn a University of Minnesota MPH degree, by taking a combination of online classes from the University of Minnesota and in-person classes at the Arizona State University Campus.

The program is targeted to students in Phoenix and the surrounding area interested in working with government agencies, nonprofits, or private health care organizations that seek to advance public health. This program prepares students to:
- Lead, manage and evaluate public health programs and agencies
- Design and implement research to guide evidence-based decision-making
- Evaluate and inform public policy that impacts population health

MPH Core
Students will be required to take the MPH core courses for a total of 14 credits.
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

PHAP Core
Students will be required to take the PHAP Core courses for a total of 17 credits.
PUBH 6700 - Foundations of Public Health (3.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)
PUBH 7784 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)
PUBH 7794 - Master's Project: Public Health Administration and Policy (2.0 - 3.0 cr)
PUBH 7796 - Field Experience: Public Health Administration and Policy (2.0 cr)

**General Health Policy and Management Specialty Area**
These courses are required for students enrolled in the Public Health Administration and Policy program located at Arizona State University. Students will choose an additional 3 credits (for a total of 7) to complete the specialty area from the University of Minnesota approved by the advisor and program coordinator.
PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
PUBH 6835 - Principles of Health Policy (2.0 cr)

**Electives**
Students will take 6 elective credits from the University of Minnesota that have been approved by the advisor and program coordinator.

**JD/MPH with William Mitchell College of Law**
The University of Minnesota (UMN) School of Public Health (SPH) created a Joint Degree Program through which qualified students may combine a Master of Public Health (MPH) in Public Health Administration & Policy (PHAP) with a Juris Doctor (JD) degree from William Mitchell College of Law (WMCL JD).

The PHAP MPH degree requires 44 credits, 12 of which may include approved WMCL course credits. The JD requires 83 credits, 12 of which may include approved SPH course credits. Each institution will be entitled to make determinations about which courses from the other program will count towards that institutions degree requirements. Allowing cross-counted (double-counted) transfer credits to fulfill requirements in each degree program will have the effect of reducing the length of the overall joint degree program by two semesters. Careful attention to the content of courses that cross count will ensure that neither institution comprises the core competencies of their individual programs.

**MPH Core**
(PUBH 6020 and PUBH 6751 and (PUBH 6101 or PUBH 6102 ) and (PUBH 6320 or PUBH 6341 ) and (PUBH 6414 or PUBH 6450 )
and (PUBH 6741 or PUBH 6742 ) )
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**PHAP/WMCL Core**
PUBH 6700 - Foundations of Public Health (3.0 cr)
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 6835 - Principles of Health Policy (2.0 cr)
PUBH 7784 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)
PUBH 7794 - Master's Project: Public Health Administration and Policy (2.0 - 3.0 cr)
PUBH 7796 - Field Experience: Public Health Administration and Policy (2.0 cr)

**Electives**
Remaining courses are a combination of PubH courses with 12 credits transferred from William Mitchell College of Law.
Twin Cities Campus
Public Health Core Concepts Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Public Health Core Concepts PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program offers an opportunity to gain the knowledge and skills to understand, assess, and manage population health in public health, health care, and human services settings. Many students will use their public health knowledge and skills to enhance effectiveness and opportunities in their current work or career path. Population science is an increasingly valued area of expertise in many health and human service organizations. It will help prepare public health workers and others to respond to emerging public health issues.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission preferences and prerequisites:
- Applicants must hold a baccalaureate degree.
- Applicant should demonstrate strong written skills.
The admissions committee looks closely at the applicant's work experience and grades in math and science.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application requirements and instructions visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
Internet Based - Total Score: 100
Paper Based - Total Score: 600

IELTS
- Total Score: 7

MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
The public health core concepts certificate curriculum is the same as the core content taught in the School of Public Health's MPH degree programs. All six courses are available in online and in-person formats. Students will be able to register, receive materials, interact with faculty and fellow students, and complete this program without traveling to the campus. If completing coursework online, internet access is required.

PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
or PUBH 6101 - Environmental Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
Twin Cities Campus
Public Health Food Protection Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 14
- This program requires summer semesters for timely completion.
- Degree: Public Health Food Protection PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public health certificate in food protection is part of the public health practice major. It provides formal training in public health. This training will help prepare public health workers and others to respond to incidences of bio-terrorism, infectious disease outbreaks, and other emerging public health issues. Students typically complete the curriculum by attending at least two Public Health Institutes (PHI), held in May/June of each year.

Many students will use their public health knowledge and skills to enhance effectiveness and opportunities in their current work or career paths. Population science is an increasingly valued area of expertise in many health and human service organizations.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must hold a baccalaureate degree.

Special Application Requirements:
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application instructions and requirements visit www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
- Total Score: 7
  - MELAB
    - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- PUBH 7213 - Applications of Microbiology to Food Systems Monitoring (1.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- PUBH 7215 - Food Safety: Risk Assessment and Risk Management (1.0 cr)
- PUBH 7233 - Food System Defense: Vulnerabilities in the Food System (1.5 cr)
- PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
  or PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)

Elective Courses
Students select 5-6 additional credits from an approved list to complete the required 14 certificate credits. Courses at the Public Health Institute are topical and will change from year to year. Please consult the program staff for appropriate courses.
Twin Cities Campus
Public Health Informatics M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN 55455  (612-626-3500 OR 1-800-774-8636; fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 43
• This program does not require summer semesters for timely completion.
• Courses are available both on campus and in a hybrid format where students attend classes remotely using WebEx or similar technology.
• Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Information is key to effective public health administration. Surveillance systems provide information on infectious disease tracking, disease clusters, food-borne outbreaks, and injuries. Environmental monitoring systems provide information on health risks such as toxic chemicals or airborne pollutants. Registries contain information on vital statistics such as birth, death, and immunization. E-Public Health integrates information from electronic health records to use in improving population health.

Students pursuing the MPH in Public Health Informatics (MPH-PHI) learn how to manage public health information systems, including vital statistics systems, online analytical processing tools, immunization registries, population health surveillance, community health information networks, and more.

The MPH-PHI is offered both in-person and fully online. This program will prepare you to:

- Understand the significance of the various public health information systems and how to leverage these systems to improve health of the public
- Conceive, design, develop, implement, and use IT by applying informatics skills to population health
- Manage information systems within an organization or network of organizations
- Create state-of-the-art solutions at the intersection of informatics and global public health

Accreditation
This program is accredited by CEPH (Council on Education for Public Health)

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
All application materials are submitted directly to SOPHAS;
Statement of purpose and objectives: Provide an essay describing your past education, experience, and current professional career objectives. You are encouraged to comment on any or all of the following: plans you have to use your education and training; the needs and/or challenges you perceive as important in your field of study; and any personal qualities, characteristics, and skills you believe will enable you to be successful in your chosen field of study.
Resume or CV
Official post-secondary transcripts from all US institutions attended (must be sent directly from the institutions to SOPHAS). This
includes previous study at the University of Minnesota.
Three letters of recommendation from persons qualified to assess your academic work; clinical, public health, or professional experiences; or leadership potential in public health.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 43 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The purpose of the master's project is to enable students to demonstrate: familiarity with the tools of research and scholarship in the field of public health informatics; the ability to work independently; the ability to plan and carry out a systematic investigation related to a public health issue; and the ability to effectively present, in written and oral form, the results of their investigation.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Required Coursework

M.P.H. Core Coursework
Students must satisfy competency requirements in the six core areas of public health - administration, behavioral science, biostatistics, environmental health, epidemiology, and ethics.

Take 15 credits of MPH core courses from the following list:

Administration
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Behavioral Science
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)

Biostatistics
- PUBH 6450 - Biostatistics I (4.0 cr)

Environmental Health
- PUBH 6101 - Environmental Health (2.0 cr)
  or PUBH 6102 - Issues in Environmental Health (2.0 cr)

Ethics
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Epidemiology
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Public Health Informatics Core Coursework
Take 21 credits of PHI core courses from the following list:
- HINF 5430 - Health Informatics I (3.0 cr)
Elective Credits
Take at least 7 elective credits from the following list. Other graduate-level courses, including courses from outside the School of Public Health, can be taken with prior approval of the program director. Students are strongly encouraged to take PUBH 6805, as most PHI-related work is related to projects.

Take 7 or more credit(s) from the following:
• PUBH 6805 - Introduction to Project Management for Health Professionals (2.0 cr)
• PUBH 6705 - Community Health Assessment (3.0 cr)
• PUBH 6025 - e-Public Health (2.0 cr)
• PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
• PUBH 7108 - Population Health Informatics (2.0 cr)
• HINF 5431 - Health Informatics II (3.0 cr)
• HINF 5520 - Clinical Informatics and Patient Safety (2.0 cr)
• HINF 5540 - Interprofessional Health Informatics (2.0 cr)
• NURS 5116 - Consumer Health Informatics (1.0 cr)

Program Sub-plans
A sub-plan is not required for this program. Students may complete the program with more than one sub-plan.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the US, as well as unequal quality of and access to health care. Achieving optimum health for all segments of society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an MPH, includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care. PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps MPH majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

Understanding community dynamics
Developing advocacy skills for public health
Analyzing legal and policy structures
Evaluating and implementing policies and programs
Influencing community health
Motivating and educating stakeholders and decision-makers
Using policy as prevention strategy
Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
**Twin Cities Campus**

Public Health Informatics Post-Baccalaureate Certificate

*School of Public Health - Adm*

School of Public Health

Link to a list of faculty for this program.

**Contact Information:**
School of Public Health, MMC 819 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)

Email: sph-oasr@umn.edu

Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Courses are available both on campus and in a hybrid format where students attend classes remotely using WebEx or similar technology.
- Degree: Public Health Informatics PostBaccalaureate Cert

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The certificate in public health informatics (Cert-PHI) is a 9-12 month program designed to prepare professionals for leadership positions that bridge information technology and public health.

Students who complete the certificate will be able to implement and manage public health information systems, including: vital statistics systems, online analytic processing tools that support decision-making, immunization registries, population health surveillance, community health information networks, and electronic public health data interchange.

This certificate is awarded upon successful completion of 12 credits. We expect students who complete the Cert-PHI to have expanded and supplemented their current domain knowledge in a way that opens up new corridors of discovery and employment for them.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Baccalaureate degree or higher

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.0 is required for students to remain in good standing.

In addition to the required courses specified below, Cert- PHI students are strongly encouraged to take the following course as most work in PHI involves projects:

PUBH 6805 - Project Management for Health Professionals (2.0 cr).

Required Coursework

HINF 5430 - Health Informatics I (3.0 cr)
PUBH 6813 - Managing Electronic Health Information (2.0 cr)
PUBH 6814 - Data and Information for Population Health Management (2.0 cr)
PUBH 6876 - Public Health Systems Analysis and Design (2.0 cr)
PUBH 6877 - Public Health Systems Analysis and Design - Practicum (2.0 cr)
PUBH 6880 - Introduction to Public Health Informatics (2.0 cr)
Twin Cities Campus

Public Health Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-ask@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in public health is available only to students enrolled in master's and doctoral programs outside of the School of Public Health. Students enrolled in master's and doctoral programs within the School of Public Health are not eligible for this minor because the requirements of the public health minor are part of their major field of study.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the public health graduate minor is contingent upon prior admission to a master's or doctoral degree-granting program at the University of Minnesota. Students enrolled in graduate programs within the School of Public Health are not eligible for this minor.

Students should first consult with their major program adviser about the advisability of a minor in public health. They will then need to contact the director of graduate studies, Kristin Anderson, PhD, MPH (ander116@umn.edu or 612-624-1818) or plan level coordinator, Carol Francis (franc004@umn.edu or 612-624-6952), for minor information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.
Masters
The masters minor coursework must be selected from graduate courses offered by the School of Public Health in each of the following disciplines: biostatistics, epidemiology, and environmental health. The minimum GPA for coursework applied to the Public Health minor is 3.0.

Core Requirements
Take at least 8 credits from the following:
- **Biostatistics**
  - PUBH 6414 - Biostatistical Literacy (3.0 cr)
  - or PUBH 6450 - Biostatistics I (4.0 cr)
- **Epidemiology**
  - PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  - or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- **Environmental Health**
  - PUBH 6101 - Environmental Health (2.0 cr)
  - or PUBH 6102 - Issues in Environmental Health (2.0 cr)

Doctoral
The doctoral minor coursework must be selected from graduate courses offered by the School of Public Health in each of the following disciplines: biostatistics, epidemiology, and environmental health.

If students have already taken comparable graduate-level courses in these disciplines, other public health courses, with the public health advisor and director of graduate studies, can be used to complete the minor. The minimum GPA for coursework applied to the Public Health minor is 3.0.

Core Requirements
Take at least 8 credits from the following:
- **Epidemiology**
  - PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  - or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- **Biostatistics**
  - PUBH 6414 - Biostatistical Literacy (3.0 cr)
  - or PUBH 6450 - Biostatistics I (4.0 cr)
- **Environmental Health**
  - PUBH 6101 - Environmental Health (2.0 cr)
  - or PUBH 6102 - Issues in Environmental Health (2.0 cr)

Electives
To meet 14-credit minimum credit requirement select remaining credits from the following course list and in consultation with the public health advisor or director of graduate studies.

Take 6 or more credit(s) from the following:
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
**Twin Cities Campus**  
**Public Health Nutrition M.P.H.**  
*School of Public Health - Adm*  
*School of Public Health*

Link to a list of faculty for this program.

**Contact Information:**  
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)  
Email: sph.oasr@umn.edu  
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- **Program Type:** Master's  
- **Requirements for this program are current for Fall 2016**  
- **Length of program in credits:** 44 to 64  
- **This program requires summer semesters for timely completion.**  
- **Degree:** Master of Public Health

Along with the program-specific requirements listed below, please read the [General Information](http://www.sph.umn.edu) section of the catalog website for requirements that apply to all major fields.

The Public Health Nutrition (PHN) program is designed to meet the needs of students who want graduate training in health promotion, disease prevention, program development, and nutrition interventions.

The program's faculty are internationally recognized for research in obesity prevention, child and adolescent nutrition, eating disorder prevention, nutrition epidemiology, and nutrition intervention.

**Coordinated Master's Program (CMP):**  
In addition to the traditional public health nutrition degree, the program offers the opportunity to gain expertise in a concentrated area of study such as epidemiology, global health, alternative medicine, health policy, and disability policy. It also offers a coordinated master's program. Please note that the coordinated master's program requires that students have their own transportation during the academic year and summer session, since many sites are not located on public transportation routes.

**Full- and Part-time Program:**  
Students may pursue the M.P.H. on a full-time or part-time basis, but should note that the majority of the courses are offered only during the day. (Note: The Coordinated Master's Program must be taken on a full-time basis.)

**Accreditation**  
This program is accredited by Council on Education for Public Health (CEPH) & Commission on Accreditation for Dietetics Education.

**Program Delivery**  
This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:

The following courses are required for admission: one general biology course with lab; two general chemistry classes with labs; one organic chemistry; one biochemistry; one human nutrition course; and one social science course. In addition, CMP applicants must also complete one physiology course; one microbiology course with lab; one intro to nutrition course; one intro to food science course; one food systems/service management course. All courses MUST be complete before starting the program. If students are currently completing the prerequisites while they are applying, they must indicate on their application materials how their prerequisites will be completed before they start the program.

Preferred GRE performance expectations (test taken post August 2011): A combination of 300 on the quantitative and verbal sections of the test and a score of 3.5 on the analytical writing assessment. Some programs may have higher preferred minimum scores. Check specific programs for details.
**Special Application Requirements:**
Students applying for the Coordinated Master's Program track go through a two-step process for admission. The first is to be admitted to the M.P.H. degree program. After all CMP applications submitted prior to the Dec. 1 CMP application deadline have been reviewed and admission decisions made, the applicant will receive an email questionnaire and will undergo a phone interview. The top eight candidates will be selected to fill the eight available CMP spots. Students not selected for the CMP may not start the standard track and later transfer to the CMP.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 150
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 44 to 64 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

**Capstone Project:** Culminating Experience

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Public Health Nutrition Core**
- **PUBH 6901** - Foundations of Public Health Nutrition Leadership (2.0 cr)
- **PUBH 6914** - Community Nutrition Intervention (3.0 cr)
- **PUBH 6915** - Nutrition Assessment (2.0 cr)
- **PUBH 6933** - Nutrition and Chronic Diseases (2.0 cr)
- **PUBH 7994** - Culminating Experience: Public Health Nutrition (1.0 - 6.0 cr)
- **PUBH 7996** - Field Experience: Public Health Nutrition (1.0 - 6.0 cr)

**Tracks**

**Standard Track**

**Lifecycle Courses**
Take 2 or more course(s) from the following:
- **PUBH 6902** - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- **PUBH 6903** - Child and Adolescent Nutrition (2.0 cr)
- **PUBH 6904** - Nutrition and Aging (2.0 cr)
- **PUBH 6906** - Global Nutrition (2.0 cr)

**Research Methods**
- **PUBH 6910** - Critical Review of Research in Public Health Nutrition (1.0 cr)

**Research Methods Options**
Take 3 or more credit(s) from the following:
- **PUBH 6034** - Evaluation (3.0 cr)
- **PUBH 6035** - Applied Research Methods (3.0 cr)
- **PUBH 6325** - Data Processing with PC-SAS (1.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 6420 - Introduction to SAS Programming (1.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)
• PUBH 6705 - Community Health Assessment (3.0 cr)
• PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
• PUBH 6806 - Principles of Public Health Research (2.0 cr)
• PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
• PUBH 6389 - Nutritional Epidemiology (2.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

Public Health Core
PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Electives
Students must take enough graduate-level electives to fulfill minimum credit requirements in order to graduate. Students without a nutrition/dietetics background must take PUBH 6355 - Pathophysiology, PUBH 6905 - Nutrition for Public Health Promotion and Disease Prevention, and FSCN 4621 - Nutrition and Metabolism.

- OR -

Coordinated Master's Program
Lifecycle Courses
Students who already have a nutrition/dietetics undergraduate degree need to select two of the following four courses. Students who do NOT have a nutrition/dietetics undergraduate degree must choose PUBH 6902, PUBH 6903, and PUBH 6904.
Take 2 - 3 course(s) from the following:
• PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
• PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 6906 - Global Nutrition (2.0 cr)

Research Methods
PUBH 6910 - Critical Review of Research in Public Health Nutrition (1.0 cr)

Research Methods Options
Take 3 or more credit(s) from the following:
• PUBH 6034 - Evaluation (3.0 cr)
• PUBH 6035 - Applied Research Methods (3.0 cr)
• PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
• PUBH 6420 - Introduction to SAS Programming (1.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)
• PUBH 6705 - Community Health Assessment (3.0 cr)
• PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
• PUBH 6806 - Principles of Public Health Research (2.0 cr)
• PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
• PUBH 6389 - Nutritional Epidemiology (2.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

Field Experience/Nutrition Practicum
CMP students take four credits of PUBH 7996 in addition to the following:
PUBH 6995 - Community Nutrition Practicum (8.0 cr)
PUBH 6996 - Clinical Nutrition Practicum (9.0 cr)

Public Health Core
Environmental Health
PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental Health (2.0 cr)

Epidemiology
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Biostatistics
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Ethics
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Administration/Management
Take 2 or more credit(s) from the following:
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Electives
CMP students who do not have a nutrition/dietetics undergraduate degree must take FSCN 4621 - Nutrition and Metabolism or FSCN 4612 - Advanced Nutrition AND FSCN 4665 - Medical Nutrition Therapy I, AND FSCN 4666 - Medical Nutrition Therapy II and enough graduate-level elective credits to fulfill the minimum required to graduate. Students with a nutrition/dietetics undergraduate degree must take 8-12 graduate-level elective credits to fulfill 60 total credits.

-OR-

Nutritional Epidemiology Track

Lifecycle courses
PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
or PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
or PUBH 6904 - Nutrition and Aging (2.0 cr)
or PUBH 6906 - Global Nutrition (2.0 cr)

Nutrition Science
Only students who do not have an undergraduate degree in nutrition/dietetics need to take the following nutrition science courses.
FSCN 4621W - Nutrition and Metabolism [WI] (4.0 cr)
PUBH 6905 - Nutrition for Public Health Promotion and Disease Prevention (2.0 cr)

Epidemiology and Biostatistics Core
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6390 - Topics: Epidemiology (0.5 - 4.0 cr)
PUBH 6389 - Nutritional Epidemiology (2.0 cr)
PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

“Epi of” Courses
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
or PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
or PUBH 6387 - Cancer Epidemiology (2.0 cr)

Public Health Core

Environmental Health
PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental Health (2.0 cr)

Ethics
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Administration/Management
Take 1 or more course(s) from the following:
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may complete the program with more than one sub-plan.

Coordinated Option
The Coordinated Masters Program (CMP) in public health nutrition provides both a master of public health degree in public health nutrition and the didactic coursework and supervised practice components for registration eligibility and entry into dietetics practice. The program accepts eight students each year. The CMP provides a public health nutrition concentration area that focuses on rural and disadvantaged populations. Supervised practice experiences are integrated throughout the 24-month program utilizing sites both within and outside of Minnesota. Students complete a total of 1,200 hours of supervised practice. Upon successful completion of the program...
Global Health Interdisciplinary Concentration Area

The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area

The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:

- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area

The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the healthcare system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- understanding community dynamics
- developing advocacy skills for public health
- analyzing legal and policy structures
- evaluating and implementing policies and programs
- influencing community health
- motivating and educating stakeholders and decision-makers
- using policy as prevention strategy
- eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Arizona State University
This sub-plan is limited to students completing the program under Plan C.

Public Health Nutrition Core
Students take PubH 6901, 6914 and 6933 from the U of MN as part of the nutrition core in addition to PubH 69XX nutrition assessment course (to be developed)

Research Methods
Students will take three research methods credits that are approved by the advisor and program coordinator. Students are also required to take PubH 6910 and PubH 7994 from the U of MN.

Electives
Students will take elective credits from the U of MM that have been approved by the advisor and program coordinator.

additional nutrition science courses for non-nutrition/dietetics undergrad majors
PubH 69XX: Human Pathophysiology (3 cr)
PubH 69XX: Advanced Macronutrient Metabolism (3 cr)
Twin Cities Campus
Public Health Postbaccalaureate Certificate in Performance Improvement
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Performance Improvement PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

NOTE: APPLICATIONS FOR THIS CERTIFICATE ARE NOT CURRENTLY BEING ACCEPTED.

The public health certificate in performance improvement trains students to understand and apply quality improvement methods at both the systems and organizational level. The program will provide the tools needed in order to achieve and maintain high process performance.

The certificate provides participants with hands-on knowledge about how to improve processes in their respective organizations. By so doing, best practices will be diffused, and process performance will improve public health services.

This certificate addresses concerns voiced by the National Board of Public Health Examiners, the Public Health Accreditation Board, and the Council on Education for Public Health to provide more educational opportunities in performance improvement to working public health professionals.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
NOTE: APPLICATIONS FOR THIS CERTIFICATE ARE NOT CURRENTLY BEING ACCEPTED.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework

- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- PUBH 6780 - Advanced Performance Improvement Methods in Public Health (2 cr)
- PUBH 6780 - Public Health Process Improvement Project - Practicum (3 cr)
- PUBH 6780 - Performance Management and Transformational Change (2 cr)

Students choose 2 elective credits with their advisor.
Twin Cities Campus
Public Health Practice M.P.H.
School of Public Health - Adm
School of Public Health

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 42
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in public health practice brings together the science and the art of public health, addressing public health as a broad social enterprise that seeks to extend the benefits of current knowledge in ways that will have the maximum impact on the health status of populations.

The school offers academic programs at the master's level that prepare students to be leaders and practitioners in the application of public health principles in agencies delivering preventive health services and public health programs.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Please visit www.sph.umn.edu for admission requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80
  - Speaking test score: 0

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 42 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Each student must complete a culminating experience in which they synthesize and integrate knowledge acquired in coursework and other learning experiences and apply theory and principles in a context that reflects an aspect of professional practice. The culminating experience must be used as a means by which faculty judge whether the student has mastered the body of knowledge and can demonstrate proficiency in the required competencies through written and oral presentation.

Students are expected to demonstrate familiarity with the tools of applied research or scholarship in public health practice, the ability to work independently, and the ability to apply skills learned in coursework by completing a Research Paper, Systematic Literature Review, Consultative Report, Grant Proposal. Students also have the option of taking the Certificate Public Health exam (CPH) instead of completing a project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Applicants must have an advanced degree or be admitted or enrolled in a DDS, MPP, MURP, LAW, PHARMD, DVM, MD, CMU or DNP program.

Core Courses
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6299 - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)

Epidemiology
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- or PUBH 6342 - Epidemiologic Methods II (3.0 cr)

Biostatistics
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- or PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6451 - Biostatistics II (4.0 cr)

Ethics
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Environmental Health
- PUBH 6101 - Environmental Health (2.0 cr)
- or PUBH 6102 - Issues in Environmental Health (2.0 cr)

M.P.H. Culminating Experience
- PUBH 7294 - Master’s Project: Public Health Practice (0.5 - 4.0 cr)

Field Experience
- PUBH 7296 - Field Experience: Public Health Practice (0.5 - 8.0 cr)

Electives
Students have the opportunity to choose their elective courses based on their career goals and interests. Students are required to choose at least one class from each of the four public health practice domains as established by the APHA Council on Linkages. Minimum of 19 credits

Specialty areas (includes concentrations, dual degree programs)
Students applying to a dual degree program must be admitted to both schools that are listed as official sub-plans. Students have the option to add a concentration area or minor.

DDS/MPH Dual Degree
This dual degree will provide students with a unique opportunity in the Upper Midwest to integrate dentistry and the practice of public health to identify and solve community health problems in areas of oral health. Students are required to take SPH core courses:
- PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.
  -OR-
MPP/MPH or MURP/MPH Dual Degree
This dual degree will provide students with a unique opportunity in the Upper Midwest to gain in-depth training in the planning, public policy, and the public health arenas at the master's level. Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.

-OR-

PharmD/MPH Dual Degree
This dual degree will provide students with a unique opportunity in the Upper Midwest to make significant contributions in areas such as health education and prevention of disease in our state and nation. Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.

-OR-

JD/MPH Dual Degree
This dual degree will provide students with a unique opportunity in the Upper Midwest to make significant contributions between the legal and health-care delivery systems in our state and nation. Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.

-OR-

MD/MPH Dual Degree
This dual degree will provide students with a deeper understanding of population-based science and the cultural and environmental factors that affect patients. Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.

-OR-

DVM/MPH Dual Degree
This dual degree will provide students with credentials to work at the interface of human wellness and animal health. Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.

-OR-

Global One Health-CMU
The School of Public Health is collaborating with Chiang Mai University in Northern Thailand to provide their students with a U of MN TC Master of Public Health degree, Executive Program in Public Health Practice. Students are required to have an advanced degree and to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102.

-OR-

DNP/MPH Dual Degree
This dual degree will provide students with a unique opportunity in the Upper Midwest to provide advanced nursing care as leaders of interprofessional health care teams, emphasizing population-focused practice and quality improvement to impact patient outcomes. Students are required to take SPH core courses: PubH 6751, PubH 6020, PubH 6299, PubH 6320 or 6341 or PubH 6342, and PubH 6414 or PubH 6450 or PubH 6451, and PubH 6741 or PubH 6742, and PubH 6101 or PubH 6102.

Joint- or Dual-degree Coursework:
- DDS/MPH Public Health Dentistry Dual Degree Program, MPP/MPH Public Health Public Policy Dual Degree Program, MURP/MPH Public Health Urban and Regional Planning Dual Degree Program, PharmD/MPH Public Health Pharmacy Dual Degree Program, LAW/MPH Public Health Law Dual Degree Program, MD/MPH Public Health Medicine Dual Degree Program, DVM/MPH Veterinary Public Health Dual Degree Program, Global One Health - CMU, DNP/MPH Public Health Doctor of Nursing Practice
Student may take a total of 14 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Executive Program in Public Health Practice
This sub-plan is limited to students completing the program under Plan C.

This program builds on the student's work and educational experience. It is possible to complete all work for the M.P.H. degree in 16 months, with 42 graduate credits. On average, students complete the program in three years.
Attending the Public Health Institute during the May Session is a unique opportunity for students from multiple disciplines to connect and immerse themselves in emerging public health issues.

EPPHP is a flexible curriculum that students may tailor to their career and practice. Some established focus areas are:

- Cultural competency
- Food protection
- Preparedness, response, and recovery
- Public health leadership
- Global health*
- Health disparities*
- Public health policy*
- Complementary and alternative medicine*

*These are established interdisciplinary concentrations and the name of the concentration will be listed on the student's transcript.

Students must complete and submit a proposal form; please refer to the website for full information.

Students are required to complete the core curriculum, M.P.H. culminating experience, field experience, and elective courses chosen to meet their academic and career interests.

Required courses

Our hybrid executive MPH offers a flexible curriculum that students can tailor to fit their career and practice goals. Online classes comprise the core curriculum, with elective options online or in person at the yearly Public Health Institute.

The program is designed for health professionals with an advanced degree, such as an MD, DDS, D.V., PharmD, PhD, MS, or public health professional with significant work experience who have completed a Public Health Core Concept Certificate.

PUBH 6299 - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)

PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 7294 - Master's Project: Public Health Practice (0.5 - 4.0 cr)
PUBH 7296 - Field Experience: Public Health Practice (0.5 - 8.0 cr)

Students may choose up to 24 credits of elective classes.

Public Health Dentistry

This sub-plan is limited to students completing the program under Plan C.

This dual degree will provide students with a unique opportunity in the Upper Midwest to integrate dentistry and the practice of public health to identify and solve community health problems in areas of oral health.

Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102, and PUBH 7294, and PUBH 7296, and PUBH 6299.

Course Group 1

This dual degree will provide students with a unique opportunity in the Upper Midwest to integrate dentistry and the practice of public health to identify and solve community health problems in areas of oral health.

PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6102 - Issues in Environmental Health (2.0 cr)
PUBH 6414 - Biostatistical Literacy (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6299 - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)
PUBH 7296 - Field Experience: Public Health Practice (0.5 - 8.0 cr)

Student may choose up to 23 credits of electives and may transfer up to 14 credits from a school of dentistry upon approval of the program director.

Public Health Medicine

The Public Health Medicine (PHM) program prepares medical students to have a deeper understanding of population-based science
and the cultural and environmental factors that affect patients.

The classroom requirements of the M.P.H. are completed during a 12-month sabbatical (May through May) from medical school while enrolled full time in the School of Public Health. Most students begin the M.P.H. program after year two of medical school.

Students must complete the basic curriculum, the courses below, and approved electives to meet the required 42-credit minimum.

Students must register for the master's project and field experience while enrolled in the program. They may choose to complete these during their time at the SPH or after returning to medical school. A public health medicine setting is required for field placement but may be double counted for clinical rotation with adviser approval.

**Public Health Medicine**

- PUBH 6299 - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6210 - Public Health Medicine Seminar (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Take 2 or more course(s) from the following:

- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)

Students must take 10.5 to 11.5 elective credits that are approved by their adviser.

**Public Health Nursing Practice**

This sub-plan is limited to students completing the program under Plan C.

The Public Health Nursing Practice (DNP/MPH) dual degree program provides training in nursing practice and community health.

Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102 and PUBH 7294 and PUBH 7296.

**Required**

As a graduate student pursuing a DoDNP/MPH, you seek to lead, deliver and improve patient-centered care by bringing the latest evidence-based knowledge to clinical practice and protect, restore and promote public health. With approval, you may use up to 14 credits of DNP credits towards the MPH and 12 credits of the Public Health courses towards the DNP.

**Public Health Public Policy**

This sub-plan is limited to students completing the program under Plan C.

The Public Policy/Public Health (MPP/MPH) dual degree program provides training in planning, public policy, and in the public health arenas.

Students are required to take SPH core courses: PUBH 6751, PUBH 6020, PUBH 6299, PUBH 6320 or PUBH 6341 or PUBH 6342, and PUBH 6414 or PUBH 6450 or PUBH 6451, and PUBH 6741 or PUBH 6742, and PUBH 6101 or PUBH 6102 and PUBH 7296.

**Required**

As a graduate student pursuing a Public Policy, you seek to advance the common good; as a School of Public Health student, you seek to protect, restore and promote health. Together, the dual degrees provide the skills to create significant change. With approval, you may use up to 14 credits of MPP courses toward the MPP, and 12 credits of Public Health courses toward the MPP.

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6299 - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)
Public Health Urban and Regional Planning
This sub-plan is limited to students completing the program under Plan C.

The Master Urban & Regional Planning/Master Public Health (MURP/MPH) dual degree program provides training in planning, public policy, and in the public health arenas.

As a graduate student pursing Urban Regional Planning degree, you seek to advance the common good; as a School of Public Health student, you seek to protect, restore and promote health. Together, the dual degrees provide the skills to create significant change.

With approval, you may use up to 14 credits of MURP courses toward the MPH, and 12 credits of Public Health courses toward the MURP.

The dual degree in Master Urban & Regional Planning/Master Public Health (MURP/MPH) provides training in planning, public policy, and in the public health arenas.

**Required**
The dual degree in Master Urban & Regional Planning/Master Public Health (MURP/MPH) provides you with training in planning, public policy, and in the public health arenas. With approval, you may use up to 14 credits of MURP courses toward the MPH, and 12 credits of Public Health courses toward the MURP.

**PUBH 6299** - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)
**PUBH 6020** - Fundamentals of Social and Behavioral Science (3.0 cr)
**PUBH 6102** - Issues in Environmental Health (2.0 cr)
**PUBH 6320** - Fundamentals of Epidemiology (3.0 cr)
**PUBH 6414** - Biostatistical Literacy (3.0 cr)
**PUBH 6741** - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
**PUBH 6751** - Principles of Management in Health Services Organizations (2.0 cr)
**PUBH 7296** - Field Experience: Public Health Practice (0.5 - 8.0 cr)

Students may choose up to 23 credits of elective courses and may transfer up to 14 credits from a Master of Public Policy program with approval from the director.

Veterinary Public Health
The Veterinary Public Health D.V.M./M.P.H. dual degree program is part of the public health practice program. It allows students to combine veterinary studies with a public health degree, giving them the credentials to work at the interface of human wellness and animal health, spanning agriculture and food industry concerns, emerging infectious diseases, and other public health issues.

There are formal MOUs with the following Colleges of Veterinary Medicine: Cornell University, Purdue University, Western University of Health Science and Ross University.

The program in public health practice brings together the science and the art of public health. It addresses public health as a broad social enterprise that seeks to extend the benefits of current knowledge in ways that will have the maximum impact on the health status of populations.

The program offers academic study at the master's level that prepares students to be leaders and practitioners in the application of public health principles in agencies delivering preventive health services and public health programs. The major emphasizes the importance and applications of basic scientific knowledge to current societal problems and concerns.

Up to 14 credits may be transferred into the M.P.H. from a school of veterinary medicine upon approval of the adviser and program director. Each of the elective curriculum options outlined below addresses the need for students to have coursework in the following four domains: public health policy and system development, community intervention, assessment and basic sciences, and program management and communications.

D.V.M./M.P.H. students are also required to take one course to fulfill the veterinary public health competencies: biostatistics, surveillance, infectious disease epidemiology, zoonoses, and environmental health.

**Required**
**PUBH 6299** - Public Health Is a Team Sport: The Power of Collaboration (1.0 cr)
**PUBH 6020** - Fundamentals of Social and Behavioral Science (3.0 cr)
**PUBH 6102** - Issues in Environmental Health (2.0 cr)
The University of Minnesota, School of Public Health (SPH) recognizes the need for more global presence in the MPH curriculum and for more opportunities for students across the world to share learning experiences. The SPH is collaborating with Chiang Mai University (CMU) in northern Thailand to provide CMU students with a University of Minnesota Master of Public Health degree in Public Health Practice. This is a distance program offered at a new site.

For admission requirements go to www.sph.umn.edu.

Course Group 0
Global One Health - Chiang Mai University (CMU) is designed for Chiang Mai University students with an advanced degree to earn MPH degrees from UMN and CMU within two years. Students will complete 25 credits with the UMN and 17 credits with CMU.

- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Literacy (3.0 cr)
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6102 - Issues in Environmental Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6904 - Nutrition and Aging (2.0 cr)

Students may transfer up to 17 credits from Chiang Mai University with approval of the program director.

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration (HDIC) addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota’s ranking as one of the nation’s healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. According to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.
SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the healthcare system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- understanding community dynamics
- developing advocacy skills for public health
- analyzing legal and policy structures
- evaluating and implementing policies and programs
- influencing community health
- motivating and educating stakeholders and decision-makers
- using policy as prevention strategy
- eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Public Health Preparedness, Response, and Recovery Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, A395 Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636, Fax: 612-624-4498)
Email: sph-oasr@umn.edu
Website: http://www.sph.umn.edu

- **Program Type:** Post-baccalaureate credit certificate/licensure/endorsement
- **Requirements for this program are current for Fall 2016**
- **Length of program in credits:** 12
- **This program requires summer semesters for timely completion.**
- **Degree:** Public Hlth Prepared/Response/Recovery PBacc Cert

Along with the program-specific requirements listed below, please read the [General Information](http://www.sph.umn.edu) section of the catalog website for requirements that apply to all major fields.

The public health certificate in preparedness, response, and recovery (PHCert-PRR) is a program in the public health practice major. This training will help prepare public health workers and others to respond to incidences of bio-terrorism, infectious disease outbreaks, and other emerging public health issues. Students typically complete the curriculum by attending at least two Public Health Institutes (PHI), held in May/June of each year.

**Accreditation**
This program is accredited by Council on Education for Public Health (CEPH)

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must hold a baccalaureate degree.

**Special Application Requirements:**
Applicants must submit to SOPHAS Express, a centralized online application service:
- Completed SOPHAS Express application and application fee, designating the University of Minnesota School of Public Health
- Personal statement describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- One letter of recommendation
- Unofficial transcripts of record from each college/university where a degree was earned. (If admitted, official transcripts will need to be sent directly to the School of Public Health.)
- Resume or C.V.

For detailed application requirements and instructions visit [www.sph.umn.edu](http://www.sph.umn.edu).

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
All students take the following 4 courses for 4 credits:
- PUBH 7223 - Concepts of Disaster Behavioral Health (1.0 cr)
- PUBH 7227 - Incident Management Systems: The Public Health Role (1.0 cr)
- PUBH 7221 - Planning for Urgent Threats (1.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)

Students must take at least one course from the following:
- PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
- PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)

Electives
Students select remaining credits from an approved list to complete the certificate’s 12-credit minimum. Courses at the Public Health Institute are topical and will change from year to year. Please consult the program staff for appropriate courses.
- PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- PUBH 7237 - Using Risk Analysis Tools: Estimating Food Safety on the Farm to Table Continuum (1.0 cr)
Twin Cities Campus

Additional Licensure Other

Curriculum & Instruction, Educational Psychology, Family Social Science, Kinesiology, School of, Organizational Leadership, Policy and Development

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
CEHD Office of Teacher Education
275 Peik Hall
159 Pillsbury Dr SE
Minneapolis, MN 55455
612-625-5060
Email: ote@umn.edu
Website: http://www.cehd.umn.edu/future/graduate/teach/additional/default.html

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2016
• Length of program in credits: 19 to 24
• This program requires summer semesters for timely completion.
• Degree: College of Education Additional Licensure

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The additional licensure program offers a variety of courses specifically designed to address the competencies required by the state for various teaching and administrative licenses. Additional licenses are added to a current five-year, full-time professional Minnesota teaching license. Courses are offered throughout the year with evening courses offered during fall, spring, and summer semesters, and day courses offered during the summer semester. Students who enroll in the program are generally practicing teachers. They complete the program in an average of one to two years.

Accreditation
This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
This program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students must complete all coursework with a grade of S or C or better.

Required courses
Required courses are specific to the individual Additional Licensure sub-plan programs listed.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

- Adult Basic Education
- Director of Community Education
- Director of Special Education
- Early Childhood Special Education
- Parent and Family Education
- Principal K-12
- School Counseling K-12
- School Psychologist
- Superintendent K-12
**Twin Cities Campus**

**Additional Licensure Teaching**
*Curriculum & Instruction, Educational Psychology, Family Social Science, Kinesiology, School of, Organizational Leadership, Policy and Development*

**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**
CEHD Office of Teacher Education, 275 Peik Hall, 159 Pillsbury Dr SE, Minneapolis, MN 55455 612-625-5060.
Email: ote@umn.edu
Website: http://www.cehd.umn.edu/future/graduate/teach/additional/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 19 to 24
- This program requires summer semesters for timely completion.
- Degree: College of Education Additional Licensure

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The additional licensure program offers a variety of courses specifically designed to address the competencies required by the state for various teaching and administrative licenses. Additional licenses are added to a current five-year, full-time professional Minnesota teaching license. Courses are offered throughout the year with evening courses offered during fall, spring, and summer semesters, and day courses offered during summer semester. Students who enroll in the program are generally practicing teachers. They complete the program in an average of one to two years.

**Accreditation**
This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
Other requirements to be completed before admission:
This program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

Students must complete all coursework with a grade of S or C or better.

**Required courses**
Required courses are specific to the individual Additional Licensure sub-plan programs listed.

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.
Academic and Behavioral Strategist

The professional development program in special education offers a program of study that leads to K-12 licensure as an Academic Behavioral Strategist (ABS) and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings with students who have mild to moderate disabilities. Graduates of the program are student-centered, collaborative professionals who implement evidence-based instructional interventions with fidelity to improve learner outcomes. The program incorporates maximizing learner expectations and learning opportunities including cultural and social diversity. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with developmental disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

ABS Licensure Required Courses
EPSY 4613, 5604, 5605, 5611, 5614, 5616, 5617, 5618, 5619, 5657, 5704, 5705 and 5741

Agricultural Education 5-12

Autism Spectrum Disorders licensure

The professional development program in special education offers a program in Autism Spectrum Disorders (ASD) that leads to Birth-12 licensure and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings including home and school based programs with children who have been identified with ASD and their families. Graduates are prepared to assess, analyze, and provide intervention and remediation of academic, social and communicative challenges for students with ASD. This program focuses on the implementation of evidence-based practices, specialized educational services, and outcomes that add value to the learning and development of infants, children and adults with ASD from diverse cultural backgrounds.

ASD Licensure Required Courses
EPSY 4613, 5611, 5614, 5616, 5618, 5621, 5622, 5625, 5631, 5632, 5633, 5661, 5662, 5663, 5664, 5681, 5705, 5742

Chemistry Education 9-12
Comm Arts/Lit Educ 5-8/9-12
Comm Arts/Lit Education 5-8

Computer, Keyboarding & Related Technology Applications K-12

Deaf and Hard of Hearing

Developmental and Adaptive Physical Education

Developmental Disabilities

Early Childhood Educ Birth-Gr3

Earth & Space Science Ed 9-12

Emotional and Behavioral Disorders
New student applications to Emotional and Behavioral Disorders are not being accepted.

English as a Second Lang K-12

Health Education

The master of education (MEd)/additional licensure program is designed for current licensed teachers who would like to add health to their teaching license. Students will also have the option of completing their MEd while in the additional licensure program. The program can be completed within a 12-month period. Courses are required to be taken in the summer, fall and spring semesters. A large portion of the program is delivered via on-line courses and/or hybrid courses and is scheduled outside of teaching and coaching hours.

Required Kinesiology Courses
KIN 5201 - Health Education Foundations (3.0 cr)
KIN 5202 - Current Issues in Health (2.0 cr)
KIN 5203 - Health Media, Consumerism, and Communication (2.0 cr)
KIN 5204 - Methods in Health Education (3.0 cr)
KIN 5205 - Health Education Curriculum (3.0 cr)
KIN 6201 - Clinical Experience I: Health Education (1.0 - 4.0 cr)
KIN 6202 - Clinical Experience II: Health Education (2.0 - 6.0 cr)

**Prerequisites**
The following prerequisites are needed for the Health Education additional licensure. Proof of CPR/First Aid certified. Comparable courses from other universities may be submitted for possible approval.

KIN 3001 - Lifetime Health and Wellness [SOCS] (3.0 cr)

PUBH 3001 - Personal and Community Health (2.0 cr)

Learning Disabilities K-12

Life Science Education 9-12

Mathematics Education 5-8

Mathematics Education 5-8/9-12

Oral/Aural

Physical Education K-12

Physics Education 9-12

Reading

Science Education 5-8

Social Studies Educ 5-8/9-12

Teacher Coordinator of Work-based Learning

Visual Arts Education K-12

WorldLang/Cultures: Japanese K-12

WorldLang/Cultures: Arabic K-8

WorldLang/Cultures: Arabic K-12

WorldLang/Cultures: Chinese K-12

WorldLang/Cultures: French K-8

WorldLang/Cultures: French K-12

WorldLang/Cultures: German K-8

WorldLang/Cultures: German K-12

WorldLang/Cultures: Hebrew K-8

WorldLang/Cultures: Hebrew K-12

WorldLang/Cultures: Italian K-8

WorldLang/Cultures: Italian K-12

WorldLang/Cultures: Japanese K-8

WorldLang/Cultures: Latin K-8

WorldLang/Cultures: Latin K-12
Twin Cities Campus  
Adult Education M.Ed.  
Organizational Leadership, Policy and Development  
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:  
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455  
(612-624-1006; fax: 612-624-3377)  
Email: olpd@umn.edu  
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 34  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in adult education (AdEd), is a specialized academic area of the Human Resource Development program in the Department of Organizational Leadership, Policy, and Development. AdEd graduate programs prepare individuals to work with adults in a variety of roles, such as program developers, teachers, advisers, administrators, and managers in a variety of formal and informal settings, such as educational institutions, business and industry, community agencies, healthcare organizations, continuing and professional education, and adult basic education.

Program Delivery  
This program is available:  
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission  
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:  
When applying online, applicants should complete Statements #1 & 2 (Statement #1 should indicate if student is in a special cohort). Filling out statement #3 optional. Applicants must also submit a résumé and personal statement (limit two pages) describing career goals and rationale for interest in the M.Ed. program. Two letters of recommendation from individuals who can attest to the applicant's potential are also required. Admissions are done on a rolling basis with the following deadlines: March 1 (Summer), July 1 (Fall), November 1 (Spring).

International applicants must submit score(s) from one of the following tests:  
• TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
• IELTS  
  - Total Score: 6.5  
• MELAB  
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan C:** Plan C requires 24 major credits and 10 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Required Courses**

Students must complete at least 34 credits, including the following courses:

- **OLPD 5296** - Field Experience in Adult Education
  (3 credits are required and no more than 6 credits may be applied toward the program)
- **OLPD 5201** - Strategies for Teaching Adults (3.0 cr)
- **OLPD 5202** - Perspectives of Adult Learning and Development (3.0 cr)
- **OLPD 5204** - Designing the Adult Education Program (3.0 cr)
- **OLPD 5296** - Field Experience in Adult Education (1.0 - 6.0 cr)
- **OLPD 5607** - Organization Development (3.0 cr)
- **OLPD 5801** - Survey: Human Resource Development and Adult Education (3.0 cr)
- **OLPD 5819** - Evaluating and Using Research in Organizations and Education (3.0 cr)

One additional 3 credit Adult Education course with adviser approval

Up to 10 credits of electives courses with adviser approval to equal the 34 credits needed for this program. The appropriate elective courses may vary depending on whether the student is also pursuing a license as reflected by their optional sub-plan.

Note on **OLPD 5296** Field Experience in Adult Education: 3 credits are required and no more than 6 credits may be applied toward the program.

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Adult Basic and Continuing Education**

This sub-plan reflects students who are also pursuing licensure in addition to the degree. For the purposes of the MEd, the course requirements are the same as described above, but participation in this sub-plan will influence which elective courses an adviser may approve to equal the 34 credits needed for this program.

**Rochester**

All sub-plans have the same curriculum requirements. New students are not being admitted to this sub-plan. Courses may be taken on the Twin Cities campus.
Twin Cities Campus
Adult Education Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organization Leadership, Policy, and Development, 330 Wulling Hall 3345A, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Adult Education PBacc Certificate Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in adult education (AdEd), is a specialized academic area of the Human Resource Development program track in the Department of Organizational Leadership, Policy, and Development. AdEd graduate programs prepare individuals to work with adults in a variety of roles, such as program developers, teachers, advisers, administrators, and managers in a variety of formal and informal settings, such as educational institutions, business and industry, community agencies, healthcare organizations, continuing and professional education, and adult basic education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students who possess a U.S. bachelor's degree (or international equivalent). Applications are reviewed on an ongoing basis and may be submitted at any time.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.
Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

**Required Coursework**
- OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
- OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
- OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)

Students should enroll for a minimum of 4 credits of OLPD 5296 or OLPD 5696
- OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)
- or OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)

**Electives**
Only if needed to meet 14 credit minimum
- OLPD 5607 - Organization Development (3.0 cr)
- or Additional OLPD courses with adviser approval to make total credits earned equal at least 14 credits.
Twin Cities Campus

Adult Literacy Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
The Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Adult Literacy PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The adult literacy certificate is designed to prepare teachers, administrators, trainers, and counselors in the broad political, social, economic, and theoretical aspects of adult literacy in a global environment.

Program Delivery
This program is available:
* completely online (all program coursework can be completed online)

Prerequisites for Admission
Other requirements to be completed before admission:
U.S. bachelor's degree or international equivalent.

Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students. Students may pursue the certificate alone or concurrently with a UM master's or doctoral degree program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The adult literacy certificate requires a minimum of 14 credits. Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Adult Literacy
minimum of 6 credits from modules below

Module 1
OLPD 5211 - Introduction to the Undereducated Adult (1.0 cr)
OLPD 5212 - Introduction to Adult Literacy in the Workplace (1.0 cr)
OLPD 5213 - Introduction to Adult Literacy in the Community (1.0 cr)
or Module 2
OLPD 5224 - Formal Assessment of Adult Literacy (1.0 cr)
OLPD 5225 - Informal Assessment of Adult Literacy (1.0 cr)
OLPD 5226 - Advanced Assessment of Adult Literacy (1.0 cr)
or Module 3

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Information current as of January 20, 2017
OLPD 5233 - Methods of Teaching Beginning Adult Literacy (1.0 cr)
OLPD 5234 - Methods of Teaching Intermediate Adult Literacy (1.0 cr)
OLPD 5235 - Methods of Teaching Advanced Adult Literacy (1.0 cr)

Adult Education
minimum 3 credits
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
or OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)

Field Experience
minimum 3 credits
OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)

Electives
Minimum 2 credits. Other courses may be taken with program advisor approval.
CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
or CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
or CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
or CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
or CI 5662 - Second Language Curriculum Design (3.0 cr)
Twin Cities Campus
Advanced Practices in Second Language Teaching Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota’s Advanced Practices in Second Language Teaching Certificate program is designed for teachers of foreign languages and English as a second/foreign language and is offered by the Department of Curriculum and Instruction in partnership with the Center for Advanced Research on Language Acquisition (CARLA) Summer Institute Program.

Courses are offered on the Twin Cities campus, typically during the last three weeks in July. The certificate may be completed independently or in conjunction with a master of education (M.Ed) degree in second languages and cultures education at the University of Minnesota.

Although the University certificate does not lead to teaching licensure or state certification, it adds value to a pre-service or in-service teacher’s academic program and professional life. Completion of the advanced practices in second language teaching certificate indicates successful participation in a set of internationally recognized, high-quality summer institutes for language teaching and provides a vehicle for teachers to receive tangible recognition of preparation in advanced language teaching practices and methodologies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one page personal statement discussing your experience teaching languages and the ways this certificate program will contribute to your professional development. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (6 credits)
If CI 5660: Special Topics is selected, student must take "Using the Web for Communicative Language Learning" for 2 credits.

- CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
- CI 5622 - Second Language Acquisition Basics for Teachers (2.0 cr)
- LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)
  or CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Elective Courses (6 credits)
If CI 5660: Special Topics is selected, student may take any CARLA summer institute that is offered as a special topics course for 2 credits.

Take 3 or more course(s) totaling 6 or more credit(s) from the following:

- CI 5623 - Improving Language Learning: A Practical Course in Styles- and Strategies-based Instruction (2.0 cr)
- CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
- CI 5625 - Developing Assessments for the Second Language Classroom (2.0 cr)
- CI 5626 - Developing Learners' Sociocultural Competence (2.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
Twin Cities Campus
Agricultural Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Master of education (M.Ed.)/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards of the Minnesota Board of Teaching.

The agricultural education initial licensure program at the University of Minnesota is designed to help students become accomplished professional educators who can help students succeed in the classroom. The program prepares inquiring, analytical, and reflective professional educators who can teach in the classroom and lead in the schools.

Students enter a 12- to 15-month program integrating educational theory with classroom practice. Working closely with experienced teachers, students observe firsthand the daily rewards and pressures of their profession.

Flexibility is an important advantage of this program. Students may enroll in any semester and are welcomed into the entire agriculture education program, building valuable professional support. A second advantage is that most program credits may be applied toward completion of the M.Ed. degree. Students have five years to complete their degree, beginning with the first course(s) used in the program, and must maintain a 2.80 minimum overall grade point average (GPA).

This program includes two components: initial licensure and the M.Ed. degree. After successfully completing licensure requirements and appropriate work experience, students are recommended for state licensure to teach agricultural education in grades 5-8 and 7-12. This program may also provide initial preparation for Minnesota State College and Universities (MnSCU) licensure in farm business management education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

Relevant professional experience or a relevant undergraduate major is also required.

Other requirements to be completed before admission:
Candidates for both plans must have at least one year of professional experience before the degree is awarded.

Special Application Requirements:
In addition to other required materials, when applying online applicants must submit Statements #1 and 2, a résumé and two letters of recommendation from individuals who can attest to the student's potential in the field. Admissions is done on a rolling basis with the following semestersly deadlines: March 1 (Summer), July 1 (Fall), and November 1 (Spring)

International applicants must submit score(s) from one of the following tests:
TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
IELTS
- Total Score: 6.5
MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 15 major credits and 15 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. 
Students may not complete the program with more than one sub-plan.

License

After successfully completing licensure requirements and appropriate work experience, students are recommended for state licensure to teach agricultural education in grades 5-8 and 7-12. This program may also provide initial preparation for Minnesota State College and Universities (MnSCU) licensure in farm business management education.

Please see OLPD website for more information about Licensure requirements in addition to the M.Ed.
http://www.cehd.umn.edu/OLPD/grad-programs/licensure.html

Required Courses

AFEE 5995 - Integrating Paper - Master of Education: Agricultural and Extension Education (1.0 - 5.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
6 credits minimum in additional AFEE courses credits in consultation with adviser: At least 2 credits from each of the following three areas: curriculum; methods; and program planning/organization/management
18 credits in agricultural, food, and environmental sciences or related fields of study credits in consultation with adviser (A maximum of 12 credits of AFEE 5220: Special Topics in Agriculture Education and Extension (1-3 cr) may be applied to this requirement.)
AFEE 5290 - Seminar: Current Issues in Agricultural Education and Extension (1.0 - 3.0 cr)
or AFEE 5280 - Current Issues for the Beginning Agricultural Education Teacher (1.0 - 3.0 cr)
or Equivalent course chosen in consultation with an adviser
Electives
in consultation with adviser, if needed to meet 30 credit degree requirement

Professional Studies

This sub-plan is for individuals who are interested in agri-industry training and development, sales and sales management, extension service, or other areas of agriculturally based business.

With guidance from faculty advisers, students choose at least 30 semester credits that may include coursework, independent study, internships, workshops, school-based experiences, and an integrating paper. Students can also enroll in courses offered during the summer and at off-campus school sites.

Required Courses

AFEE 5995 - Integrating Paper - Master of Education: Agricultural and Extension Education (1.0 - 5.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
10 credits selected from the following two areas credits in consultation with adviser: methods and program planning/organization/management
12 credits in agricultural, food, and environmental sciences or related fields of study credits in consultation with adviser
(A maximum of 8 credits of AFEE 5220: Special Topics in Agriculture Education and Extension (1-3 cr) may be applied to this requirement.)
AFEE 5290 - Seminar: Current Issues in Agricultural Education and Extension (1.0 - 3.0 cr)
or an equivalent course chosen in consultation with an adviser
Electives
Electives in consultation with adviser, if needed, to meet 30 credit degree requirement
Twin Cities Campus
Applied Developmental Psychology Postbaccalaureate Certificate
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373).
Email: borde021@umn.edu

Program Type: Post-baccalaureate credit certificate/licensure/endorsement
Requirements for this program are current for Fall 2016
Length of program in credits: 21
This program does not require summer semesters for timely completion.
Degree: Appl Developmental Psychology PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in applied developmental psychology allows graduate students to study and experience applications of developmental science issues, policies, and problems concerning children and child development at the local, state, and national level. Through the combination of theory and field experience, students learn how to help solve pressing real-life problems and to improve the lives of children. The 21-credit program explores such topics as ethical issues in applied developmental psychology; media and children's programming; nutrition and hunger; accidents and safety issues; children in the judicial system; the design and role of children's museums; and the development of children's toys, games, and recreational activities. Professionals in this field need to develop an in-depth understanding of how public policy affects children's lives, how to make pure research comprehensible and practical without losing its complexity, and how to work in interdisciplinary teams.

Program Delivery
This program is available:
via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to this program is currently suspended.

Special Application Requirements:
Admission is based primarily on the applicant's academic record, GRE scores, and research experience.

International applicants must submit score(s) from one of the following tests:

• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

CPSY 8360 Section 7 (2 cr) gives an overview of applied developmental science problems and provides a framework for the second two components of the program. CPSY 8301 (4 cr) and 8302 (4 cr) are the core courses in developmental psychology covering biological, cognitive, and social aspects of development. They are fundamental to understanding the developmental perspective. CPSY 8996 (5 cr) integrates and applies information learned in coursework. The course is individually designed based on each student's prior experience and interests. Students focus on practical and/or public policy applications of developmental research in settings such as the Search Institute, the Minnesota Children's Museum, the guardian ad litem program in the local courts, the Center for 4-H Youth Development, and the National Institute on Media and the Family. This field experience may be taken in one to three semesters or a summer session, but must be at least 5 credits and total 188 hours. A major paper describing the field experience and integrating relevant basic research literature with practical availability taking place in the field setting is expected. Electives (6 cr) may include 5xxx or 8xxx courses approved by the training directors and chosen to complement the student's area of interest.

Required Courses
Students must take CPSY 8360 for 2Cr. and CPSY 8996 for 5 Cr.
- CPSY 8360 - Special Topics in Developmental Psychology (1.0 - 3.0 cr)
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8996 - Directed Field Experiences in Child Psychology (1.0 - 6.0 cr)

Electives (6 cr) may include 5xxx or 8xxx courses approved by the training directors and chosen to complement the student's area of interest.
Twin Cities Campus
Autism Spectrum Disorders Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241).
Email: sped-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/certificate/Autism.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Autism Spectrum Disorder Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

New student applications to the Autism Spectrum Disorders Certificate are not being accepted as the curriculum is being revised.

The certificate program in autism spectrum disorders (ASD) is designed to prepare teachers and related service personnel to design and deliver services to children and youth with ASD and their families.

ASD are developmental disorders of neurobiological origin that can affect intellectual functioning, social abilities, and language and communication skills.

This 13-credit program offers specialized training in methods of assessment, intervention, and treatment evaluation. This program offers professional development opportunities for autism resource specialists, public and private social service agency staff, personnel at public and private schools, treatment facility personnel, and psychology and education professionals.

Program Delivery
This program is available:
  - via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
International students wishing to complete the certificate must be admitted to a degree program at the University of Minnesota, Twin Cities. Graduate applicants must have a minimum 2.80 GPA in an undergraduate degree and 3.00 in graduate coursework from accredited institutions.

Special Application Requirements:
All applicants must submit the following materials:
- Two letters of recommendation on letterhead stationery from individuals who can address the applicant's abilities to work in a professional context with this population
- Typed goal statement (no more than one page)
- Completed application
- Transcripts from all postsecondary institutions attended or currently attending, except the University of Minnesota. For students not currently in a University of Minnesota program, transcripts must be received from the issuing school in a sealed and stamped envelope.
- Foreign transcript evaluation (if applicable) from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
Internet Based - Reading Score: 19
Paper Based - Total Score: 550

IELTS
- Total Score: 6.5

MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

All coursework must be completed for the certificate. Students will have a maximum of four years to do so from the moment of admission. Students must maintain a minimum 3.00 GPA in certificate coursework to remain in the program.

Required Coursework
Students must complete the following coursework (13 credits).

EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
EPSY 5633 - Module 3: Speech-generating Devices and High-Tech AAC (1.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorders (3.0 cr)
Twin Cities Campus
Child Psychology M.A.
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 154 Child Development Building, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373)
Website: http://www.cehd.umn.edu/icd

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Institute of Child Development does not offer admission for this master's degree. Students may choose to complete this master's degree (Plan B) during their progress toward the Ph.D. See the Child Psychology Ph.D for more information.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Note: The Institute of Child Development does not offer admission for this master's degree. Students may choose to complete this master's degree (Plan B) during their progress toward the Ph.D. See the Child Psychology Ph.D. for more information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 22 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.
Capstone Project: The Plan B project is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Major Courses
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8304 - Developmental Research Methods (3.0 cr)
- CPSY 8307 - Prelim Seminar (1.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Special Topics and Advanced Seminars (4 credits)
Take 4 or more credit(s) from the following:
• CPSY 8360 - Special Topics in Developmental Psychology (1.0 - 3.0 cr)
• CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
• CPSY 8660 - Advanced Developmental Psychology (1.0 - 4.0 cr)

Plan B Project Credits
Take 8 or more credit(s) from the following:
• CPSY 8994 - Research Problems in Child Psychology (1.0 - 6.0 cr)
Child Psychology Minor

Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Email: icdapply@umn.edu
Website: http://www.cehd.umn.edu/icd

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students majoring in other fields may complete a doctoral minor in child psychology. Contact the Institute of Child Development for more information.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Please contact the child psychology director of graduate studies prior to declaring this minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Required Courses
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8996 - Directed Field Experiences in Child Psychology (1.0 - 6.0 cr)
Remaining credits can be taken from CPSY 4xxx (subject to their major program's approval) or CPSY 8xxx courses.
Twin Cities Campus

Child Psychology Ph.D.

Institute of Child Development

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 154 Child Development Building, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373).
Email: icdapply@umn.edu
Website: http://www.cehd.umn.edu/icd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD in child psychology focuses primarily on training for research in normal human development, and most students take positions in academic or research settings. The goal of the program is to train all students for careers in research and college teaching in child psychology, and to prepare students in the collaborative program options for careers in applied areas of child psychology, as well. General program students may choose to specialize in an area such as cognitive neuroscience, language, learning, personality, memory, perception, psychobiology, or social development. Students interested in clinical research may specialize in developmental psychopathology and clinical science through participation in the developmental psychopathology and clinical science (DPCS) training program. DPCS training is a cooperative effort between the Institute of Child Development and the Department of Psychology to instruct leaders in research and teaching. DPCS training draws on the unique strengths of each program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
The equivalent of three semester (or four quarter) courses in psychology and one course in statistics are required.

New students are normally admitted in fall semester. Application deadline is December 1st of the preceding year. Applicants must submit, via the online application system, a departmental application for graduate work, scores from the General Test of the GRE that are less than five years old, three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of unofficial transcripts, and a clearly written statement of career interests, goals, and objectives. The three letters of recommendation also must be received by the deadline. The TOEFL should be submitted when applicable. Official transcripts are only required if an offer of admission is made. For full application instructions see: http://www.cehd.umn.edu/icd/FutureStudents/CPSY/Graduate/.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
44 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD degree usually requires five years of graduate work. Major program components include coursework, research activities, and teaching experience. Coursework requirements are specialization specific, but all students are required to take 44 credits in the major and 24 thesis credits.

Each student specializes in an area such as social and personality development, learning, cognitive development, cognitive neuroscience, language development, psychobiology, or perceptual development.

Major Program Coursework
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
- CPSY 8304 - Developmental Research Methods (3.0 cr)
- CPSY 8307 - Prelim Seminar (1.0 cr)
- CPSY 8321 - Seminar in Teaching Developmental Psychology (1.0 cr)
- CPSY 8322 - Apprenticeship in Teaching Developmental Psychology (1.0 - 3.0 cr)

Special Topics and Advanced Seminars (5 credits minimum)
- Take 5 or more credit(s) from the following:
  - CPSY 8360 - Special Topics in Developmental Psychology (1.0 - 3.0 cr)
  - CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
  - CPSY 8660 - Advanced Developmental Psychology (1.0 - 4.0 cr)

Statistical Analysis
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Research Credits (14 credits minimum)
- Take 14 or more credit(s) from the following:
  - CPSY 8994 - Research Problems in Child Psychology (1.0 - 6.0 cr)

Additional Credits as Needed, Selected with Adviser

Thesis Credits
- Take exactly 24 credit(s) from the following:
  - CPSY 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Clinical Physiology and Movement Science Minor
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
400 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-624-4370; fax: 612-624-1314)
Email: jkonczak@umn.edu
Website: http://ccms.umn.edu/Programs.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's or doctoral minor in clinical physiology and movement science is an innovative free-standing graduate minor that is available to University of Minnesota graduate students. Offering a uniquely interdisciplinary program in a new, emerging field of study, the minor is designed for graduate students in clinical, engineering, nursing, public health, and medical fields who are interested in the clinical aspects of physiology and movement science. The interdisciplinary coursework combines physiology and movement science with clinical skills for research and the diagnosis and assessment of disease conditions. Developed by faculty with rich collective expertise from across the University, the minor offers students a choice of two tracks: clinical physiology or clinical movement science.

The minor is attractive to graduate students seeking a Ph.D. or master's degree in kinesiology, rehabilitation sciences, and the speech and hearing sciences; in biomedical or mechanical engineering; in the School of Nursing; in the School of Public Health; or seeking a combined M.D./Ph.D. who have an interest in a variety of medical fields such as neurology, neurosurgery, otolaryngology, orthopedics, and pediatrics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students wishing to pursue this graduate minor must be currently enrolled in a graduate degree program at the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

CPMS 5101 Introduction to Clinical Physiology and Movement Science is a required core course for all students seeking the minor. KIN 5987 Professional Skills and Grant Writing for Health Sciences, 2 credits, is also required for a Ph.D. minor, unless an equivalent course has been taken or the student can document previous grant writing experience.

Additional elective courses are selected in consultation with the faculty advisor and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the minor. Courses chosen will depend on the background and goals of the student. Students can select one of two tracks: clinical physiology or clinical movement science.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Clinical Movement Science (Master's)

Required Courses
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

Electives
Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed.
Take 4 or more credit(s) from the following:
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- OT 5393 - Functional Anatomy and Kinesiology (4.0 cr)
- OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
- OTOL 8239 - Oto-neurology (1.0 - 2.0 cr)
- OTOL 8244 - Seminar: Current Literature (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Advanced Kinesiology (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)

Clinical Movement Science (Doctoral)

Required Courses
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

Electives
Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed.
Take 7 or more credit(s) from the following:
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
Clinical Physiology (Master's)

**Required Courses**

- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

**Electives**

Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed. Take 6 or more credit(s) from the following:

- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- OT 5393 - Functional Anatomy and Kinesiology (4.0 cr)
- OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
- OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
- OTOL 8244 - Seminar: Current Literature (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Advanced Kinesiology (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
Clinical Physiology (Doctoral)

Required Courses

- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

Electives

Electives are chosen in consultation with the advisor. NURS 8173 and SAPH 8173 are cross-listed. Take 9 or more credit(s) from the following:

- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- CPMS 5201 - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- CPMS 8201 - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- KIN 5122 - Applied Exercise Physiology (3.0 cr)
- KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
- KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
- KIN 8132 - Seminar: Motor Development (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
- SAPH 8173 - Principles and Methods of Implementing Research (3.0 cr)
- NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
- OT 5393 - Functional Anatomy and Kinesiology (4.0 cr)
- OTOL 5993 - Directed Studies (1.0 - 12.0 cr)
- OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
- OTOL 8244 - Seminar: Current Literature (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Advanced Kinesiology (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
Twin Cities Campus
Clinical Physiology and Movement Science Postbaccalaureate Certificate

Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
400 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-624-4370; fax: 612-624-1314).
Email: jkonczak@umn.edu
Website: http://ccms.umn.edu/Programs.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Clinical Physiology & Movement Science PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The clinical physiology and movement science postbaccalaureate certificate program is aimed at D.N.P. and M.D. fellows in nursing and medicine, as well as professionals in clinical fields, such as physical, occupational, and speech therapy. In addition, engineers working in the area of medical technology or medical device development are potential candidates. The interdisciplinary coursework combines physiology and movement science with clinical skills for research and the diagnosis and assessment of disease conditions. Students have the option to tailor the program to their individual needs and interest. They may select from a list of more than 30 courses. Developed by faculty with a rich collective expertise from across the University, the programs offer students a choice of two tracks: clinical physiology and clinical movement science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Students wishing to pursue the certificate program must have completed a bachelor's degree, preferably in an allied health sciences or natural science field.

Special Application Requirements:
If the individual is applying for a certificate and is not currently enrolled in a graduate program at the University of Minnesota, two letters of support will be requested and a GPA of 3.0 or greater (or equivalent if there were a different student evaluation system) from a previous graduate program will be required. Submission package includes: clinical physiology and movement science application form, resume or curriculum vitae, transcripts, two letters of support, and documented language proficiency. Deadline for Fall semester admission is July 15; deadline for Spring semester admission is November 15.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

**Required Course**

This course is required for both the Clinical Movement Science track and the Clinical Physiology track:

- **CPMS 5101** - Introduction to Clinical Physiology and Movement Science (3.0 cr)

**Elective Courses**

The following courses are offered by a number of graduate programs and can be used as course electives for the certificate program in consultation with the adviser. NURS 8173 and SAPH 8173 are cross-listed.

- **BMEN 5201** - Advanced Biomechanics (3.0 cr)
- **or CPMS 5201** - Colloquium in Clinical Physiology and Movement Science (1.0 cr)
- **or CPMS 8201** - Seminar in Clinical Physiology and Movement Science (1.0 cr)
- **or KIN 5122** - Applied Exercise Physiology (3.0 cr)
- **or KIN 5141** - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
- **or KIN 5235** - Advanced Biomechanics II: Kinetics (3.0 cr)
- **or KIN 5385** - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- **or KIN 5485** - Advanced Electrocardiogram Interpretation (3.0 cr)
- **or KIN 5585** - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- **or KIN 5941** - Clinical Movement Neuroscience (3.0 cr)
- **or KIN 8122** - Seminar: Exercise Physiology (2.0 cr)
- **or KIN 8132** - Seminar: Motor Development (3.0 cr)
- **or KIN 8135** - Seminar: Motor Control and Learning (3.0 cr)
- **or NURS 5222** - Advanced Human Physiology (2.0 cr)
- **or NURS 8171** - Qualitative Research Design and Methods (3.0 - 4.0 cr)
- **or NURS 8173** - Principles and Methods of Implementing Research (3.0 cr)
- **or SAPH 8173** - Principles and Methods of Implementing Research (3.0 cr)
- **or NURS 8175** - Quantitative Research Design and Methods (3.0 cr)
- **or OT 5393** - Functional Anatomy and Kinesiology (4.0 cr)
- **or OTOL 5993** - Directed Studies (1.0 - 12.0 cr)
- **or OTOL 8239** - Otoneurology (1.0 - 2.0 cr)
- **or OTOL 8244** - Seminar: Current Literature (1.0 cr)
- **or PUBH 6320** - Fundamentals of Epidemiology (3.0 cr)
- **or PUBH 6341** - Epidemiologic Methods I (3.0 cr)
- **or PUBH 6342** - Epidemiologic Methods II (3.0 cr)
- **or PUBH 7415** - Introduction to Clinical Trials (3.0 cr)
- **or PUBH 7420** - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- **or RSC 5135** - Advanced Biomechanics I: Kinematics (3.0 cr)
- **or RSC 5814** - Age, Exercise, and Rehabilitation (2.0 cr)
- **or RSC 5841** - Applied Data Acquisition and Processing (4.0 cr)
- **or RSC 8130** - Current Literature Seminar (1.0 - 3.0 cr)
- **or RSC 8135** - Advanced Kinesiology (3.0 cr)
- **or RSC 8170** - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- **or RSC 8282** - Problems in Human Movement (4.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Clinical Movement Science**

Clinical movement science is a new, interdisciplinary field of study focusing on human movement dysfunctions due to neurological or orthopedic diseases or diminished physical activity. This new field bridges the gap between basic and clinical sciences by crossing the boundaries of traditional disciplines of neurology, neurophysiology, kinesiology, and physical and occupational therapy. The curriculum includes a required core course that covers the theory and application of clinical physiology and movement science. Elective courses are chosen from a broad list of offerings in departments such as kinesiology, public health, rehabilitation science, and otolaryngology.

The postbaccalaureate certificate requires a minimum of 12 semester credits. CPMS 5101 serves as a required core course for all students seeking a certificate. Electives are selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the certificate. The specific courses chosen will depend on the background and goals of the individual student.
Sample Program for Clinical Movement Science Track

Required
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

Electives
- Students should register for 2 credits of OTOL 8239.
- RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
- OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
- KIN 5941 - Clinical Movement Neuroscience (3.0 cr)

Clinical Physiology
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Clinical physiology is a branch of physiology that bridges basic physiology and clinical medicine. It joins the gap between basic and clinical sciences by crossing the boundaries of traditional disciplines of neurology, neurophysiology, kinesiology, and physical and occupational therapy. The curriculum includes a required core course that covers the theory and application of clinical physiology and movement science. Elective courses are chosen from a broad list of offerings in departments such as kinesiology, public health, rehabilitation science, and otolaryngology.

The postbaccalaureate certificate requires a minimum of 12 semester credits. CPMS 5101 is required for all students seeking a certificate. Electives are selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS) in order to satisfy the requirements for the certificate. The specific courses chosen will depend on the background and goals of the individual student.

Sample Program for Clinical Physiology Track

Required
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)

Electives
- KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- KIN 8122 - Seminar: Exercise Physiology (2.0 cr)
**Twin Cities Campus**  
**Curriculum and Instruction M.Ed.**  
**Curriculum & Instruction**  
**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**  
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)  
Email: [CIinfo@umn.edu](mailto:CIinfo@umn.edu)  
Website: [http://cehd.umn.edu/ci](http://cehd.umn.edu/ci)

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 30  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (MED)/professional studies degree programs are designed to meet the needs of practicing professionals in education and human development fields. Students admitted typically have interests in improving their current professional practice and applying their education to their present work responsibilities.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)  
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited college or university.

**Special Application Requirements:**  
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a clearly written statement of career interests, goals, and objectives. Master's applications are reviewed by department faculty three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
- Paper Based - Total Score: 550  
- IELTS  
  - Total Score: 6.5  
- MELAB  
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Arts in Education
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in arts in education is designed for experienced art, theater, and dance teachers, and others who want to acquire advanced knowledge and leadership skills in the arts field. The program is flexible and can be tailored to accommodate individual needs. Final project requirements include a school-based project examining a problem, issue, or topic identified by the student.

The MEd/professional studies arts in education sub-plan requires 12 credits of core coursework, 12 credits of arts in education coursework, and 6 credits of electives for a total of 30 credits.

Core Coursework (12 credits)
- CI 5186 should be taken for 3 credits.
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5177 - Practical Research (1.0 - 3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

Arts in Education Requirements (12 credits)
- CI 5075 and CI 5078 are required; CI 5075 can be taken for 1 to 3 credits. Other courses listed can be taken for desired amount of variable credits, provided 12 total credits between required and elective courses for art education are completed.
- CI 5075 - The Social, Historical and Cultural Foundations of Arts Education (3.0 cr)
- CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)

Arts in Education Electives
- CI 5049 and CI 5050 can be taken for 1 to 4 credits.
- Take 7 - 9 credit(s) from the following:
  - CI 5049 - Art Media Theory and Practice (1.0 - 4.0 cr)
  - CI 5050 - Issues in Art Education (1.0 - 4.0 cr)
  - CI 5069 - Curriculum Innovations in Arts Education (3.0 cr)

Electives (6 credits)
Courses will be selected in consultation with faculty advisor.

Elementary Education
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in elementary education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in elementary education is designed for elementary teachers who want to improve their instructional, decision-making, evaluation, and leadership skills. The program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies elementary education sub-plan requires 3 credits of core coursework, 15 credits of elementary education coursework, and 12 credits of electives for a total of 30 credits.

Core Coursework (3 credits)
- CI 5111 - Introduction to Elementary School Teaching (3.0 cr)
Elementary Education Requirements (15 credits)
Courses will be selected in consultation with faculty advisor.

Electives (12 credits)
Courses will be selected in consultation with faculty advisor.

English Education
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in English education addresses the needs and interests of middle school, high school, and community-college English teachers. The English education program provides instruction on current developments in English/language arts curriculum theory and research, as well as methods for teaching literature, reading, composition, media, drama, and journalism. The program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies English education sub-plan requires 6 credits of core coursework, 18 credits of English education coursework, and 6 credits of electives for a total of 30 credits.

Core Coursework (6 credits)
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

English Education Requirements (18 credits)
Take 18 or more credit(s) from the following:
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5442 - Literature for Adolescents (3.0 cr)
- CI 5451 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5462 - Evaluating and Assessing Writing (3.0 cr)
- CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)

Electives (6 credits)
Courses will be selected in consultation with faculty advisor.

Environmental Education
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in environmental education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies degree program in environmental education is designed to develop leaders in environmental education through integrated research, outreach, and teaching. This program of at least 30 semester credits offers an interdisciplinary, integrated approach to environmental learning and leadership for school teachers, extension service educators, and environmental educators in formal and informal settings. Learning experiences allow students to integrate their work experience and academic study. Field work, evaluation methods, internships, and other practical applications of theory and method are integral parts of the program.

The MEd/professional studies environmental education sub-plan requires 13 credits of core coursework, 3 credits of coursework related to research methods/evaluation/statistics, and 14 credits of electives for a total of 30 credits.

Core Coursework (13 credits)
- CI 5186 and CI 5190 must each be taken for a minimum of 2 credits.
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)
- CI 5190 - Directed Individual Study in Curriculum and Instruction (1.0 - 6.0 cr)
- CI 5537 - Principles of Environmental Education (3.0 cr)
- CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)

Research Methods, Evaluation, or Statistics (3 credits)
A minimum of 3 credits, chosen in consultation with the faculty advisor, intended to provide skills or knowledge essential to the required research project.

Electives (14 credits)
A minimum of 14 credits of graduate-level coursework (5xxx and above) selected in consultation with faculty advisor from the following
fields: natural sciences, social sciences, humanities, education, natural resources, or agriculture.

**Interdisciplinary Studies**
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in interdisciplinary studies is a graduate-level, practitioner-based, coursework-only program designed for cohorts of experienced K-12 teachers of different subjects. It integrates coursework representing a number of academic disciplines as defined in K-12 contexts with coursework emphasizing particular areas of interest. Practicing teachers complete 30 semester credits of work in two areas: a core academic program with courses representing a range of K-12 disciplines, and elective courses related to a specific focus area. The program may be combined with a certificate program offered in the Department of Curriculum and Instruction. Depending upon the cohort for which the program is designed, the program may be completed entirely online, entirely face-to-face (F2F), or as a hybrid, with a combination of F2F and online coursework.

The MEd/professional studies interdisciplinary studies sub-plan requires a minimum of 15 credits of interdisciplinary studies coursework, and 15 credits of electives for a total of 30 credits.

**MEd - Interdisciplinary Studies**

**Interdisciplinary Studies**
Total: 30 credits

**Interdisciplinary Requirements (15 credits)**
Students will take CI 5150 twice: once under the "Educational Inequities: Race, Class & Gender" topic, and the second under the "Teaching for Civic Engagement" topic.
Take 5 or more course(s) totaling 15 or more credit(s) from the following:
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)
- CI 5150 - Curriculum Topics (3.0 cr)
- CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)

**Electives (15 credits)**
Elective credits around a specific focus area will be identified for specific cohorts based on their expressed interests. Elective credits may be comprised of courses leading to a particular certificate.

-OR-

**Interdisciplinary Studies - Dual Language & Immersion Education Cohort**
Total: 30 credits

**Interdisciplinary Requirements (15 credits)**
Students will take CI 5150 twice: once under the "Educational Inequities: Race, Class & Gender" topic, and the second under the "Teaching for Civic Engagement" topic.
Take 5 or more course(s) totaling 15 or more credit(s) from the following:
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)
- CI 5150 - Curriculum Topics (3.0 cr)
- CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)

**Cohort Requirements (15 credits)**
Students will take the topic "Biliteracy Development in Dual Language and Immersion Classrooms" for the CI 5660 requirement. CI 5660 is taken for 3 credits.
- CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
- CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)

**Language Immersion Education**
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in language immersion education is designed for practicing dual language or language immersion educators, or individuals with an interest in language immersion education. Program participants have the option to add a 15 credit certificate in dual language and immersion education, which requires a separate application. Offered partially online, the program provides educators with the specific knowledge base and skill set needed for the dual language/immersion (DL/I) education setting and emphasizes practical application of concepts.
Key topics include: second language acquisition; research foundations of DL/I education; curriculum planning and assessment development that integrates subject matter content, language, literacy and culture; biliteracy development; language-focused instructional practices and strategies to bring a language focus to content-based instruction; academic language development; issues related to language status; culturally relevant pedagogy; and tools for assessing language proficiency development. The program culminates with an independent capstone project that gives educators an opportunity to apply the knowledge and skills gained in coursework to their professional practice.

The MEd/professional studies language immersion education sub-plan requires 9 credits of core coursework, 15 credits of language immersion education coursework, and 6 credits of electives for a total of 30 credits.

**Core Coursework (9 credits)**
CI 5186 should be taken for 3 credits.
CI 5177 - Practical Research (1.0 - 3.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)

**Language Immersion Requirements (15 credits)**
CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)

**Electives (6 credits)**
Recommended electives are included. Other elective options include University's Center for Advanced Research on Language Acquisition (CARLA) summer institutes on immersion education (options vary by year) or other courses selected in consultation with advisor.
CI 5641 - Language, Culture, and Education (3.0 cr)
or CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)

Learning Technologies
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in learning technologies is designed for professionals interested in using technology in their organizations (especially K-12 and college educators, new media designers, and corporate trainers). This program also serves students interested in using technology to develop instructional materials for a wide range of settings. Because TEL certificate requirements are incorporated into the MEd program, students may earn a certificate while earning the MEd degree.

The MEd/professional studies learning technologies sub-plan requires 9 credits of core coursework, 12 credits of learning technologies coursework, and 9 credits of electives for a total of 30 credits.

**Core Coursework (9 credits)**
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 5177 - Practical Research (1.0 - 3.0 cr)
CI 5190 - Directed Individual Study in Curriculum and Instruction (1.0 - 6.0 cr)

**Learning Technologies Requirements (12 credits)**
Courses will be selected in consultation with faculty advisor.

**Electives (9 credits)**
Courses will be selected in consultation with faculty advisor.

Mathematics Education
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in mathematics education is designed for experienced mathematics teachers who want to acquire advanced knowledge and leadership skills in the field of mathematics education. The program is flexible and can be tailored to accommodate individual needs. Final project requirements include a school-based project examining a problem, issue, or topic identified by the student.

The MEd/professional studies mathematics education sub-plan requires 6 credits of core coursework, 14 credits of mathematics education coursework, and 10 credits of electives for a total of 30 credits.

**Core Coursework (6 credits)**
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5177 - Practical Research (1.0 - 3.0 cr)

Mathematics Education Requirements (14 credits)
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
MTHE 5993 - Directed Studies in Mathematics Education (2.0 cr)

Mathematics Education Electives
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
- MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
- MTHE 5171 - Teaching Problem Solving (3.0 cr)
- MTHE 5172 - Teaching Probability and Statistics (3.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (10 credits)
Courses will be selected in consultation with faculty advisor. Students choose electives from MATH-designated courses (minimum 7 credits); one MTHE-designated course may be included (maximum 3 credits).

Science Education
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in science education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in science education is designed for experienced science teachers who want to acquire advanced knowledge and leadership skills in the field of science education. The program is flexible and can be tailored to accommodate individual needs. Final project requirements include a school-based project examining a problem, issue, or topic identified by the student.

The MEd/professional studies science education sub-plan requires 9 credits of core coursework, 12 credits of science education coursework, and 9 credits of electives for a total of 30 credits.

Core Coursework (9 credits)
CI 5186 should be taken for 3 credits.
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)

Science Education Requirements (12 credits)
- CI 5533 - Current Developments in Science Teaching (3.0 cr)
- CI 5534 - Studies in Science Education (3.0 cr)
- CI 5535 - Foundations of Science Education (3.0 cr)
- CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)

Electives (9 credits)
Courses will be selected in consultation with faculty advisor.

Social Studies
This sub-plan is limited to students completing the program under Plan C.

ALERT: the MEd/professional studies degree program in social studies education is currently suspended. We are not accepting applications at this time.

The MEd/professional studies program in social studies education is designed for experienced social studies teachers who want to acquire advanced knowledge and leadership skills in the field of social studies education. This program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies social studies education sub-plan requires 3 credits of core coursework, 15 credits of social studies education coursework, and 12 credits of electives for a total of 30 credits.

Core Coursework (3 credits)
- CI 5741 - Introduction to Social Studies Education (3.0 cr)

Social Studies Requirements (15 credits)
Courses will be selected in consultation with faculty advisor.

Electives (12 credits)
Courses will be selected in consultation with faculty advisor.

Second Language Education
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in second language education (SLE) is designed for experienced second language teachers who want to acquire advanced knowledge of research, best practices, and effective policies in the field of second language education. The program addresses the needs and interests of second language educators in a variety of teaching contexts, including world languages and English as a second/foreign language (ESL/EFL). While the program emphasizes instructional issues related to K-12 education, it is also relevant to teachers working with university-level or adult learners. The program is flexible and can be tailored to accommodate individual needs.

The MEd/professional studies second language education sub-plan requires 12 credits of core coursework, 12 credits of second language education coursework, and 6 credits of electives for a total of 30 credits.

Core Coursework (12 credits)
CI 5186 should be taken for 3 credits.
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5177 - Practical Research (1.0 - 3.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)

SLE Requirements (12 credits)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5662 - Second Language Curriculum Design (3.0 cr)
CI 5642 - Assessing English Learners (3.0 cr)

Electives (6 credits)
Courses will be selected in consultation with faculty advisor.

Second Language Pedagogy
This sub-plan is limited to students completing the program under Plan C.

The MEd/professional studies program in second language pedagogy is designed for practicing K-16 world language or English as a second language (ESL) teachers with an interest in enhancing their pedagogical knowledge and skills. Program participants have the option to add a 12 credit certificate in advanced practices in second language teaching, which requires a separate application. This coursework-only program is offered in conjunction with the summer institute program offered through the University’s Center for Advanced Research on Language Acquisition (CARLA).

Key topics include second language acquisition; the foundations of second language pedagogy and education; using technology to enhance language instruction; content-based curriculum development; performance assessment and issues in language testing; strategies to enhance second language literacy development and the teaching of speaking and listening skills; and integrating culture in language teaching.

The MEd/professional studies second language pedagogy sub-plan requires 21 credits of second language pedagogy coursework, and 9 credits of electives for a total of 30 credits.

Second Language Pedagogy Requirements (21 credits)

L G T T 5 1 1 0 - Technology in the Second Language Classroom (2.0 cr)
CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
CI 5622 - Second Language Acquisition Basics for Teachers (2.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5662 - Second Language Curriculum Design (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5642 - Assessing English Learners (3.0 cr)

Electives (9 credits)
At least 6 of the 9 elective credits must be comprised of CARLA summer institutes (CI 5660 course). Other elective credits selected in consultation with advisor.

CI 5623 - Improving Language Learning: A Practical Course in Styles- and Strategies-based Instruction (2.0 cr)
CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
CI 5625 - Developing Assessments for the Second Language Classroom (2.0 cr)
CI 5626 - Developing Learners' Sociocultural Competence (2.0 cr)
CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
or CI 5641 - Language, Culture, and Education (3.0 cr)
Twin Cities Campus
Disability Policy and Services Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Disability Policy and Services PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in disability policy and services is designed to allow graduate as well as community professionals, to study policies and services that affect the lives of children, youth, and adults with disabilities. The 12-credit program surveys the spectrum of education, health, and social services available to individuals with disabilities and their families, and examines the public and private networks of disability services from an interdisciplinary perspective. While the program addresses the needs of people with all types of disabilities, it emphasizes developmental disabilities across the lifespan. The program's individualized learning experience (ILE) requires students to integrate theory with practice by completing a disability-related research project or working directly with people with disabilities in settings such as schools, recreation centers, or human-service agencies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

Other requirements to be completed before admission:
Applicants must have completed an undergraduate degree by the time they start the program. Students must have completed a four-year college degree or equivalent coursework. Applications are reviewed on a rolling basis and may be submitted at any time.

Special Application Requirements:
Please address the following five questions below. Please answer each question listed and limit your response to 2 typed or word-processed pages, size-12 font. Upload your responses to the ApplyYourself online application in the "Program Specific Questions" upload area.

- What are your major areas of interest in the field of disability services or related to individuals with disabilities?
- What have been your past experiences in the area of disability services or related to individuals with disabilities?
- What is your current involvement in the field of disability services or related to individuals with disabilities?
- What is your anticipated or desired career interest?
- Why are you interested in the Disability Policy and Services Certificate Program?

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 2.80 is required for students to remain in good standing.

In addition to coursework, students must participate in at least six, one-hour interdisciplinary reflection groups to discuss relevant topics and ways to integrate field experiences with coursework. Reflection groups are offered throughout the year, including the summer session.

**Required Course**  
OLPD 5356 - Disability Policy and Services (3.0 cr)

**Specialized Coursework**  
This component broadens the student’s level of knowledge in disability policies and services. Students must choose from courses offered across the University focusing on disability policy, disability services, and/or interdisciplinary teaming, such as communication disorders, family social science, kinesiology, nursing, public affairs, or social work. The ICI Certificate Coordinator can provide students with a list of acceptable courses meeting this requirement.

6 cr to be taken with approval from the ICI Certificate Coordinator

**Individualized learning experience & Interdisciplinary reflection groups**  
This component allows students to integrate and apply the information they have learned in coursework. Students work with the ICI Certf Coord to design an individualized learning experience (ILE) in which they work with persons who have disabilities in settings like schools, recreation centers, health clinics, or human-service agencies. The ILE can be completed in one or two semesters, but must total at least 3 cr and at least 200 hours. The 3 cr to be taken with approval from the ICI Certf Coord.
Twin Cities Campus
Dual Language and Immersion Education Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Language Immersion Education PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This graduate-level certificate program gives students an opportunity to complete a coordinated series of courses in the area of dual language and immersion education. The program does not lead to a state teaching certificate or licensure (note that a university certificate program or certificate is distinct from a state certificate or certification).

In Minnesota and other states in the U.S., dual language/immersion teachers at the elementary level are required to hold a teaching license in elementary education, and at the secondary level a license in the subject matter they teach (e.g., science, social studies, math). The University of Minnesota offers initial teacher licensure programs for individuals not yet licensed, and additional teacher licensure programs for those individuals who already hold a MN teaching license and wish to add another.

The dual language and immersion education certificate program is designed for preK-12 teachers and other professionals to be able to work effectively in the following school-based program models:
- "One-way" foreign language immersion programs designed for native English-speaking students
- "Two-way" bilingual immersion programs designed for native English-speaking students and native speakers of the program's partner language, such as Spanish
- Developmental bilingual programs designed for minority language learners, such as native Spanish speakers
- Indigenous language immersion programs designed for Native American children in indigenous communities with the goal of revitalizing an endangered language and culture

In dual language and immersion programs, the second/foreign/minority language that students are acquiring is a vehicle to teach school subjects. In order to be considered a dual language or immersion program, the immersion language must be used for at least 50 percent of subject-matter instruction during the elementary school years. In a middle/secondary continuation program, at least two, year-long content courses must be taught in the immersion language.

These programs aim for "additive bilingualism and biliteracy," or the acquisition of another language at no expense to the first, native language. Research shows that well-implemented programs allow students to develop higher levels of language proficiency in the immersion language than in any other type of language program model.

This unique University certificate program is the first in the U.S. to incorporate a coherent set of courses designed specifically for dual language and immersion teachers, and other professionals. Offered by the college's Department of Curriculum and Instruction (C&I), the program was designed jointly by the college's Second Languages and Cultures (SLC) education faculty, and representatives of dual language and immersion programs in the Twin Cities metropolitan area.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.
A completed bachelor's degree is required for admission.

Students currently enrolled in a University of Minnesota graduate-level degree program may also apply.

Other requirements to be completed before admission:
Applicants should either be currently practicing as dual language or immersion educators, or provide evidence of the necessary background and interest (based on a goal statement).

This certificate program is available to graduate-level students only. Coursework taken before completion of the bachelor's degree cannot be applied to the certificate program.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a goal statement (only if applicant is not a practicing dual language or immersion educator). Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (9 credits)
CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)

Elective Courses (6 credits)
6 credits required with recommended courses listed. Other courses may be selected in consultation with the faculty advisor.
CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)
Twin Cities Campus
Early Childhood Education M.Ed.
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Road, Minneapolis, MN 55455 (612-625-9778; fax: 612-624-6373)
Email: icdapply@umn.edu
Website: http://www.cehd.umn.edu/icd/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 52 to 56
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The early childhood education initial licensure/master's of education (MEd) program is offered through the Institute of Child Development in collaboration with the department of Curriculum and Instruction. The program is designed to prepare outstanding teachers of young children who will have a strong foundation in child development theory and research and developmentally appropriate methodology for educating the different ages within the early childhood years (birth to age 8). Clinical experiences in the Shirley G. Moore Laboratory School and in local urban/suburban public schools create a strong experiential base in which to apply the principles and methods learned in University courses. Emphasis is placed on understanding individual learners, working with diverse learners, using a variety of instructional strategies, providing inclusive programming for children with and without special needs, working closely with families, and creating positive classroom communities. The program includes preparation in developing and implementing professional writing and curriculum planning, authentic assessment, documentation of student learning, reflective practice, professional development, and ethics.

Master's of education/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and the MN Early Childhood Indicators of Progress adopted by the Minnesota Board of Teaching.

The 52-56 credit program includes major coursework, early childhood and elementary methods courses, student teaching experiences in both early childhood and elementary education, and a masters capstone project. This program includes coursework to satisfy both initial licensure requirements and the MEd degree. Upon completion of all requirements, students are eligible for recommendation for teacher licensure in early childhood education (birth-third grade). Teacher licensure is awarded through the Minnesota Department of Education. Students have five years from initial enrollment in the program to complete their MEd degree, and must maintain a 2.80 GPA to be eligible for the MEd.

A 30-32 credit advanced standing plan is available for students who completed the University of Minnesota-Twin cities BS in early childhood education: foundations degree. Students in the advanced standing plan complete the MEd in two semesters.

Accreditation
This program is accredited by Council for the Accreditation of Educator Preparation (CAEP)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree must be completed at the time of matriculation. The preferred bachelor's degree is the University of Minnesota-Twin Cities BS in early childhood education: foundations.

Required prerequisites
Prerequisite Coursework
Prerequisite coursework is required to meet the Standards of Effective Practice for Teachers (SEPT) and the MN Early Childhood Indicators of Progress adopted by the Minnesota Board of Teaching. Prerequisites may be completed after admission to the program.

- CPSY 2301 - Introduction to Child Psychology (4.0 cr)
- CPSY 4331 - Social and Personality Development (3.0 cr)
- CPSY 4343 - Cognitive Development (3.0 cr)
- CPSY 4993 - Directed Experiences in Early Childhood Education (3.0 cr)
- CI 3401W - Diversity in Children's Literature [WI] (3.0 cr)
- CI 5414 - Practicum: Working With Developing Readers (2.0 cr)
- CI 5413 - Foundations of Reading (3.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- CI 3610 - Linguistics for Teachers [SOCS] (3.0 cr)
  - or LING 3001 - Introduction to Linguistics [SOCS] (4.0 cr)
  - or ENGL 3601 - Analysis of the English Language (4.0 cr)
- PUBH 3005 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)
  - or PUBH 6005 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)

Other requirements to be completed before admission:
Applicants are strongly encouraged to obtain paid or unpaid classroom experience with young children, ages birth to third grade, with multicultural and diverse populations.

Students with an undergraduate degree other than the University of Minnesota-Twin Cities BS in early childhood education: foundations are eligible to apply with the understanding that they will take approximately 30 additional credits of prerequisite coursework to meet state licensure standards.

Special Application Requirements:
All applicants must submit the following five required application materials through the online application system:

1. Transcripts - Unofficial transcripts or academic records should be uploaded directly to the online application. International students should also upload an English translation if the transcript is not in English. Please do not mail in paper copies of your transcripts. There is no need for official transcripts or academic records for initial review. If you are admitted, the University will then request official copies of this material.

2. Resume

3. Essay

4. Two Letters of Recommendation - These letters should be written by someone who is knowledgeable about your education-related experiences, work with young children, work style, and personal attributes.

5. Application fee - This fee is charged when you submit your application and is required for each application you submit. Fees must be paid online with a credit card.

Nonnative English speakers and/or international students should also submit an official score report from the Test of English as a Foreign Language (TOEFL).

All applicants must take the Minnesota Teacher Licensure Basic Skills Test [Reading (test code 001), Writing (test code 002), and Mathematics (test code 003)] prior to beginning the program, or have qualifying ACT/SAT scores.

See full application instructions and deadlines at: http://www.cehd.umn.edu/icd/futurestudents/ece/graduate/

Applicants must submit their test score(s) from the following:
- Minnesota Teacher Licensure Exam
- MTLE Basic Skills Tests

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 650

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 52 to 56 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Early Childhood Education

MEd required coursework

**Major Courses**
- CPSY 5251 - Social and Philosophical Foundations of Early Childhood Education (2.0 cr)
- EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)

**CPSY Methods Courses**
- CPSY 5252W - Facilitating Social and Emotional Learning in Early Childhood Education [WI] (3.0 cr)
- CPSY 5253 - Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)
- CPSY 5254 - Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)

**CI Methods Courses**
- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
- CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
- CI 5645 - Teaching English Learners in the Elementary Classroom (3.0 cr)
- CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
- CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)

**Student Teaching**

Take exactly 10 credit(s) from the following:
- CI 5181 - Clinical Experience in Elementary School Teaching (2.0 - 10.0 cr)

Take 4 - 6 credit(s) from the following:
- CPSY 5281 - Student Teaching in Early Childhood Education (1.0 - 6.0 cr)

**MEd Completion**
- CPSY 5187 - Capstone Project: Improvement of Teaching in Early Childhood Education (2.0 - 4.0 cr)

Early Childhood Education - U of MN BS in ECE:F Degree Transitioners

MEd required coursework

**CI Methods Courses**
- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
- CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
- CI 5645 - Teaching English Learners in the Elementary Classroom (3.0 cr)
- CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
- CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)

**Student Teaching**

Take exactly 10 credit(s) from the following:
- CI 5181 - Clinical Experience in Elementary School Teaching (2.0 - 10.0 cr)

**MEd Completion**
- CPSY 5187 - Capstone Project: Improvement of Teaching in Early Childhood Education (2.0 - 4.0 cr)
Twin Cities Campus

Education Sciences Minor

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241).
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/MITER/default.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 19
- Length of program in credits (Doctorate): 19
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The education sciences minor reflects an interdisciplinary effort that combines research in education with research in the basic arts and sciences to address problems of education. The minor draws on coursework from education, educational psychology, cognitive neuroscience, child development, psychology, and public policy. Coursework includes professional socialization courses presenting a general introduction to educational research and experimental methods; two advanced courses in research methods and statistics; and two advanced courses in cognition and learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Coursework includes a total of 19 credits: four courses of required coursework (13 credits), a 3-credit cognition & learning elective, and a 3-credit research methods and statistics elective.

Note: Students may not use course credits to satisfy requirements for both a graduate major and for the education sciences minor.

Required Coursework
EPSY 8311 must be taken 3 semesters for a total of 3 credits.
Take 13 or more credit(s) from the following:
- EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
- EPSY 8311 - Education Sciences Proseminar (1.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)

Cognition & Learning Elective
Take 3 or more credit(s) from the following:
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• PSY 5054 - Psychology of Language (3.0 cr)
• PSY 8056 - Seminar: Psychology of Language (3.0 cr)

Research Methods and Statistics Elective
Take 3 or more credit(s) from the following:
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
• PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
• PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)

Masters
Coursework includes a total of 19 credits: four courses of required coursework (13 credits), a 3-credit cognition and learning elective, and a 3-credit research methods and statistics elective.

Note: Students may not use course credits to satisfy requirements for both a graduate major and for the education sciences minor.

Required coursework
EPSY 8311 must be taken 3 semesters for a total of 3 credits.
Take 13 or more credit(s) from the following:
• EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
• EPSY 8311 - Education Sciences Proseminar (1.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)

Cognition and Learning Elective
Take 3 or more credit(s) from the following:
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• PSY 5054 - Psychology of Language (3.0 cr)
• PSY 8056 - Seminar: Psychology of Language (3.0 cr)

Research Methods and Statistics Elective
Take 3 or more credit(s) from the following:
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
• PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
• PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
Twin Cities Campus
Education, Curriculum, and Instruction M.A.
Curriculum & Instruction
College of Education and Human Development
Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277).
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 41
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for professional roles in K-12 education, postsecondary and research settings, educational service agencies, and business and industry.

The MA degree includes formal tracks in arts in education; elementary education; learning technologies; literacy education; mathematics education; science education; second language education; social studies education; and teaching English to speakers of other languages.

Students must have an interest in research in education or a related field; students plan a program of coursework that prepares them to conduct scholarly research in an area of expertise related to a track or tracks listed above.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Generally a bachelor's degree with licensure and/or teaching experience fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of undergraduate coursework determined acceptable by advisors and the director of graduate studies is adequate.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the GRE, scores from the TOEFL/IELTS/MELAB (if applicable), three letters of recommendation from individuals familiar with their scholarship and research potential, a resume, a clearly written statement of career interests, goals, and objectives, and a diversity statement. Some program tracks require an example of academic writing. Master's applications are reviewed by department faculty once per academic year, with December 1 as the deadline.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

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Information current as of January 20, 2017
- Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 to 25 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 to 25 major credits and 6 to 9 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: All MA students must demonstrate familiarity with the tools of research or scholarship in their major track, the ability to work independently, and the ability to present their work effectively.

Plan B paper(s) are less formal than the Plan A thesis and may build more directly from coursework; papers should involve deep engagement of the research literature. A paper done for a course may serve as one of the Plan B papers, with the understanding that it would be extended and revised under the advisor's supervision.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: For TESOL track only

A minimum GPA of 3.00 is required for students to remain in good standing.

In education, curriculum & instruction, students may pursue Plan A (with thesis) or Plan B (with one or two papers). Core and research course requirements are specified for Plan A and Plan B in accord with each track and are chosen in consultation with the advisor.

Plan A requires 15-26 credits in the major, depending upon the formal track chosen, and a minimum of 6 credits in one or more related fields outside the major. Plan A also requires 10 thesis credits.

Plan B requires 24-26 credits in the major and 6-9 credits in one or more related fields outside the major, depending upon formal track chosen.

Program Sub-plans

Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.

Arts in Education

The MA program's arts in education track presents opportunities for students with experience in schools or other educational settings to develop their ability to work at the intersection of theory and practice. Gaining the knowledge and skills necessary to be reflective and well-informed art educators, graduates become educational leaders in many contexts—school districts, museums, community arts organizations, government agencies—often pursue further graduate study. Students are encouraged to take courses both across the College of Education and Human Development and the University at large and typically fulfill program requirements by exploring issues of teaching, learning, curriculum, teacher education, and school reform in urban and suburban schools, several renowned art museums in the greater Minneapolis area, and within the initial teacher licensure program at the University. The course of study is planned in consultation with the adviser to meet the academic interests and background of the students; those needs are balanced with the expected foundations in research and scholarship. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

Program faculty exhibit a strong commitment to curriculum innovation, issues of social justice and diversity, and life-long aesthetic and
The arts in education track (Plan A) requires 13 credits of required major coursework plus an additional 2 credits of coursework to be selected in consultation with faculty advisor, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 31 credits.

The arts in education track (Plan B) requires 4 credits of required major coursework plus an additional 14 credits of coursework selected in consultation with faculty advisor, 6 credits of research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

Plan A or Plan B

Arts in Ed - Plan A
Total: 31 credits
Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 15 credits
CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)
CI 8079 - Research in Art Education (3.0 cr)
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits
Thesis Credits
A minimum of 10 credits are required
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Arts in Ed - Plan B
Total: 30 credits
Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 18 credits
CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)
Research Coursework
CI 8095 is required and should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 6 credits
CI 8095 - Problems: Art Education (1.0 - 12.0 cr)
Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Elementary Education
The MA program's elementary education track is designed to help professionals acquire and contribute to the advancement of knowledge and leadership so necessary to address the dynamic challenges of contemporary education at the elementary level. Emphasized within the track are, for example, the following: a focus on interdisciplinary approaches to curriculum development; the use of inquiry as a key pedagogical approach; the importance of a strong understanding of diversity and its social and educational implications, and child development and learning theories as the foundation for research and teaching elementary settings.

The elementary education track (Plan A) requires 6 credits of required major coursework plus an additional 9 credits of coursework to be selected in consultation with faculty advisor, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 31 credits.

The elementary education track (Plan B) requires 18 credits of coursework selected in consultation with faculty advisor, 6 credits of research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

Plan A or Plan B

Elem Ed - Plan A
Total: 31 credits
Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 15 credits
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits
Thesis Credits
A minimum of 10 credits are required
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Elem Ed - Plan B
Total: 30 credits

Major Coursework
Courses will be selected in consultation with faculty advisor for a total of 18 credits

Research Coursework
CI 8195 (Plan B paper) should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 6 credits
CI 8195 - Problems: Improvement of Instruction (1.0 - 6.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Learning Technologies
The learning technologies (LT) MA track prepares people for research and practice related to multimedia, design, K-12 technology integration, and online distance learning. MA graduates often conduct research and engage in LT-related practice in K-12, higher education, or business or industry, such as software companies. LT coursework includes hands-on learning and use of current technologies, development of technological solutions, consideration of theory and research, and conducting educational research.

The MA's LT track is targeted at students interested in a stronger research orientation than those who pursue the master of education degree. MA students, who often continue to a PhD program, are required to take courses in research methodology and to write a Plan A thesis or Plan B paper to complete their degree. Master's degrees extend the content in the certificate programs and include various courses taken from inside and outside the program. Students may engage in advanced media and software design and development or develop plans for technology integration for diverse educational settings.

The learning technologies track (Plan A) requires 9 credits of required major coursework plus an additional 9 credits of coursework to be selected in consultation with faculty advisor, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 34 credits.

The learning technologies track (Plan B) requires 6 credits of required major coursework plus an additional 12 credits of coursework to be selected in consultation with faculty advisor, 6 credits of research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

Plan A or Plan B

LT - Plan A
Total: 34 credits

Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 18 credits
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Thesis Credits
A minimum of 10 credits are required
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

LT - Plan B
Total: 30 credits

Major Coursework
18 credits are required; 6 credits of required courses are listed. Recommend 12 remaining credits be taken in a technology certificate area.
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)

Research Coursework
CI 8395 is required and should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 6 credits
CI 8395 - Directed Study: Learning Technologies (1.0 - 6.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits
**Literacy Education**

The MA program's literacy track is thoughtfully designed to balance theory with practical application in a variety of educational settings. There is a deep foundation in evaluating current research and students are encouraged to contribute meaningfully to research in the field of literacy. Faculty members and students work together to study at the intersection of the strands of literacy: children's and adolescent literature, critical literacies, English education, language arts, and reading. Literacy research related to diverse learners in urban, multilingual settings is a central focus of the program. The course of study is planned in consultation with the adviser to meet the academic interests and background of the students; those needs are balanced with the expected foundations in research and scholarship. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

The literacy education track (Plan A) requires 6 credits of required major coursework plus an additional 9 credits of coursework to be selected in consultation with faculty advisor, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 31 credits.

The literacy education track (Plan B) requires 18 credits of coursework selected in consultation with faculty advisor, 6 credits of research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

**Plan A or Plan B**

**Lit Ed - Plan A**

Total: 31 credits

**Major Coursework**

Required courses are listed; others selected in consultation with faculty advisor for a total of 15 credits

- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)

**Minor or Related Field**

Selected in consultation with faculty advisor for a total of 6 credits

**Thesis Credits**

A minimum of 10 credits are required

- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**OR**

**Lit Ed - Plan B**

Total: 30 credits

**Major Coursework**

Courses will be selected in consultation with faculty advisor for a total of 18 credits

**Research Coursework**

CI 8495 is required and should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 6 credits

- CI 8495 - Problems: Teaching English and Reading (1.0 - 6.0 cr)

**Minor or Related Field**

Selected in consultation with faculty advisor for a total of 6 credits

**Mathematics Education**

The MA program's mathematics education track prepares students for research and practice related to K-12 mathematics and engineering education. The MA is targeted at students interested in a stronger research orientation than those who pursue the master of education (MED) degree. MA students, who often continue on to a PhD program, are required to take courses in research methodology and to write a Plan A or Plan B paper to complete their degree. Graduate students participate in this work as teaching assistants, research assistants in externally funded projects, and as instructors.

The mathematics education track (Plan A) requires 15 credits of required major coursework, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 31 credits.

The mathematics education track (Plan B) requires 3 credits of required major coursework plus an additional 12 credits of coursework selected in consultation with faculty advisor, 6 credits of required research coursework plus an additional 3 credits of research coursework selected in consultation with faculty advisor, and 6 credits in a minor/related field for a total of 30 credits.

**Plan A or Plan B**

**Math Ed - Plan A**

Total: 31 credits

**Major Coursework**

Required courses are listed
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
CI 8572 - Learning Theory and Classical Research in STEM Education (3.0 cr)
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)

Major Coursework - Additional Choice
Choose any one of the following for a total of 3 credits. Any variable credit course should be taken for 3 credits.
- MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
- MTHE 5171 - Teaching Problem Solving (3.0 cr)
- MTHE 5172 - Teaching Probability and Statistics (3.0 cr)
- MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
- MTHE 8591 - Seminar: Mathematics Education (1.0 - 3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Thesis Credits
A minimum of 10 credits are required
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Math Ed - Plan B
Total: 30 credits

Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 15 credits
- MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)

Research Coursework
Required courses are listed and MTHE 8995 should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 9 credits
- MTHE 8571 - Research in Mathematics Education (3.0 cr)
- MTHE 8995 - Problems: Mathematics Education (1.0 - 6.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Science Education
The MA program's science education track is designed to prepare scholars to conduct thoughtful research in order to assume roles as university faculty members, educational leaders, policy makers, and researchers and to contribute meaningfully to the field. The field of science education is a broad one and includes science and environmental education at the K-12 levels, the college level, in informal and adult settings, and in early childhood. Focus areas of research within the science education area are the preparation of pre-service science teachers (K-12), induction and mentoring of beginning science teachers, design and implementation of curricula across the K-college spectrum, environmental education, cooperative learning, and social justice.

The science education track (Plan A) requires 15 credits of required major coursework, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 31 credits.

The science education track (Plan B) requires 15 credits of required major coursework plus an additional 3 credits of coursework to be selected in consultation with faculty advisor, 6 credits of research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

Plan A or Plan B

Sci Ed - Plan A
Total: 31 credits

Major Coursework
Required courses are listed; CI 8570 should be taken for 3 credits.
- CI 5535 - Foundations of Science Education (3.0 cr)
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
- CI 8570 - Advanced Topics in Science Education (1.0 - 4.0 cr)
- CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Thesis Credits
A minimum of 10 credits are required
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-
Sci Ed - Plan B
Total: 30 credits

Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 18 credits. CI 8570 should be taken twice for a total of 6 credits.
CI 5534 - Studies in Science Education (3.0 cr)
CI 5535 - Foundations of Science Education (3.0 cr)
CI 8570 - Advanced Topics in Science Education (1.0 - 4.0 cr)
CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)

Research Coursework
CI 8595 is required and should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 6 credits
CI 8595 - Problems: Science Education (1.0 - 6.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Second Language Education
The second language education (SLE) track is nationally and internationally known for its programs, which focus on English as a second language (ESL) for K-12, postsecondary, and adult classrooms; bilingual and immersion education; and traditional foreign language education in both K-12 and postsecondary settings. The program's perspective on language learning and teaching is markedly pedagogical and informed by an awareness of the role social context plays in the process of language learning and teaching. Master's students in the SLE track engage in coursework and projects that balance theory and research with practical application. Students pursue a course of study that is designed in collaboration with the faculty adviser to correspond to the interests and background of each student and to provide a solid understanding of research and best practice in the field. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

The second language education track (Plan A) requires 18 credits of required major coursework, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 34 credits.

The second language education track (Plan B) requires 15 credits of major coursework, 9 credits of foundational and research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

Plan A or Plan B

SLE - Plan A
Total: 34 credits

Major Coursework
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
or CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
If taking CI 8628 or CI 8650, student should register for 3 credits
CI 8628 - Critical Topics in Second Language Acquisition and Education (1.0 - 3.0 cr)
or CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
or CI 8671 - Sociolinguistic Research Approaches to Education (3.0 cr)
or CI 8689 - Language and Education Policy (3.0 cr)
or CI 8650 - Seminar: Special Topics in Second Languages and Cultures Research (1.0 - 3.0 cr)
Take exactly 2 course(s) totaling exactly 6 credit(s) from the following:
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
- CI 5662 - Second Language Curriculum Design (3.0 cr)
or CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5658 - Foreign Language Testing and Assessment (3.0 cr)
or CI 5642 - Assessing English Learners (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
or CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
or CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Thesis Credits
A minimum of 10 credits are required
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
SLE - Plan B
Total: 30 credits

Major Coursework
Take exactly 15 credit(s) from the following:
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
- CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
  or CI 5676 - Biliteracy Development in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
  or CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)
- CI 5662 - Second Language Curriculum Design (3.0 cr)
  or CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5658 - Foreign Language Testing and Assessment (3.0 cr)
  or CI 5642 - Assessing English Learners (3.0 cr)

Foundational & Research Coursework
Student should take the Plan B paper course - CI 8695 - for 3 credits
CI 8695 - Problems: Second Languages and Cultures Education (1.0 - 6.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
  or CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
If student takes CI 5177, it should be taken for 3 credits
CI 5177 - Practical Research (1.0 - 3.0 cr)
  or CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
  or EPSY 5261 - Introductory Statistical Methods (3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Social Studies Education
The MA's social studies education track focuses on issues related to curriculum, instruction and assessment in K-12 social studies. Graduate students are strongly encouraged to present research papers at professional conferences, specifically the National Council for the Social Studies and the American Educational Research Association.

Faculty maintain active research agendas with several research centers at the University including the Center for Applied Research and Educational Improvement, housed within the College of Education and Human Development, and two research centers housed outside the College: the Center for Environmental Learning and Leadership and the Center for the Study of Political Psychology. Social studies faculty research interests include the areas of political socialization, political tolerance, authentic assessment, citizenship and civics education, and democratic thought. In addition, faculty members engage in research centered on the history of curricula, multicultural and gender studies, and social justice.

The social studies education track (Plan A) requires 10 credits of required major coursework plus an additional 6 credits of coursework to be selected in consultation with faculty advisor, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 32 credits.

The social studies education track (Plan B) requires 18 credits of coursework to be selected in consultation with faculty advisor, 6 credits of research coursework which includes 3 credits for the Plan B paper, and 6 credits in a minor/related field for a total of 30 credits.

Plan A or Plan B

Soc Stud Ed - Plan A
Total: 32 credits

Major Coursework
Required courses are listed; others selected in consultation with faculty advisor for a total of 16 credits. CI 8796 has to be taken for a minimum of 1 credit.
- CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
- CI 8796 - Research Internship in Social Studies Education (1.0 - 6.0 cr)
Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Thesis Credits
A minimum of 10 credits are required
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Soci Stud Ed - Plan B
Total: 30 credits

Major Coursework
Courses are selected in consultation with faculty advisor for a total of 18 credits

Research Coursework
CI 8795 is required and should be taken for 3 credits; other courses selected in consultation with faculty advisor for a total of 6 credits
CI 8795 - Problems: Social Studies Education (1.0 - 6.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Teaching English to Speakers of Other Languages
The teaching English to speakers of other languages (TESOL) track focuses on the broad field of applied linguistics uniting research, teaching and service in addressing the second language learning needs of adult learners in the university and the wider community, both in the US and abroad. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

The teaching English to speakers of other languages (TESOL) track (Plan A) requires 25 credits of required major coursework, 6 credits in a minor/related field, and 10 masters thesis credits for a total of 41 credits.

The teaching English to speakers of other languages (TESOL) track (Plan B) requires 25 credits of required major coursework, and 9 credits in a minor/related field for a total of 34 credits.

Plan A or Plan B

TESOL - Plan A
Total: 41 credits

Major Coursework
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5653 - Methods in Teaching English as a Second Language (ESL) in Higher Education (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5649 - Language Analysis for ESL Teaching in Higher Ed (4.0 cr)
CI 5654 - Practicum in Teaching English as a Second Language (ESL) in Higher Education (6.0 cr)
CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
CI 5658 - Foreign Language Testing and Assessment (3.0 cr)
or CI 5642 - Assessing English Learners (3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 6 credits

Thesis
A minimum of 10 credits are required
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

TESOL - Plan B
Total: 34 credits

Major Coursework
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5653 - Methods in Teaching English as a Second Language (ESL) in Higher Education (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5649 - Language Analysis for ESL Teaching in Higher Ed (4.0 cr)
CI 5654 - Practicum in Teaching English as a Second Language (ESL) in Higher Education (6.0 cr)
CI 5628 - Analyzing Learner Language in Second Language Acquisition (3.0 cr)
CI 5658 - Foreign Language Testing and Assessment (3.0 cr)
or CI 5642 - Assessing English Learners (3.0 cr)

Minor or Related Field
Selected in consultation with faculty advisor for a total of 9 credits
Twin Cities Campus
Education, Curriculum, and Instruction Minor
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for professional roles in preK-12 education, postsecondary and research settings, educational service agencies, and business and industry.

The minor in education, curriculum and instruction may include a focus in any one of the available tracks: art education; culture and teaching (at the doctoral level); elementary education; learning technologies; literacy education; mathematics education; science education; second language education; and social studies education.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students must consult with the Director of Graduate Studies in the Department of Curriculum & Instruction regarding specific coursework and committee involvement for the minor. The Director of Graduate Studies gives final approval for the minor coursework submitted on the Graduate Degree Plan or Graduate Planning & Audit System (GPAS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
A minor at the master's level requires a minimum of 6 credits of CI-designated coursework selected in consultation with the director of graduate studies.

Doctoral
Doctoral (12 Credits)
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Electives (6 Credits)
Courses will be selected in consultation with the director of graduate studies.
Twin Cities Campus
Education, Curriculum, and Instruction Ph.D.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277).
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 78
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for academic and professional roles in K-12 education, post-secondary education, research settings, educational service agencies, and business and industry.

The PhD degree includes formal tracks in the following: arts in education; culture and teaching; elementary education; learning technologies; literacy education; science, technology, engineering and mathematics (stem) education; second language education; and social studies education.

Students must have an interest in research in education or a related field; students plan a program of coursework that prepares them to conduct scholarly research in an area of expertise related to a track listed above.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is preferred for admission to some of the tracks within the PhD program, but it is not always required.

Other requirements to be completed before admission:
Generally a bachelor's degree with licensure and/or teaching experience fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of undergraduate coursework determined acceptable by faculty is adequate.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the GRE, scores from the TOEFL/IETLS/MELAB (if applicable), three letters of recommendation from individuals familiar with their scholarship and research potential, a clearly written statement of career interests, goals, and objectives, a diversity statement, and a resume. Some program tracks require an example of academic writing. Doctoral applications are reviewed by department faculty once per academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
42 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

A total of 78 credits is required for the education, curriculum and instruction PhD program. Requirements include core coursework required by all students, major coursework in the student's selected track, research methodology coursework, and a minimum of 12 credits in a minor or supporting program. All PhD students must also complete 24 doctoral thesis credits. Specific courses and additional work vary depending upon the track and are planned in consultation with the faculty advisor.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Arts in Education
The PhD program's arts in education track presents opportunities for students with experience in schools or other informal educational settings to develop necessary philosophical, theoretical, and methodological competence to make scholarly contributions to the field. Working as researchers, scholars, policy makers, and practitioners, graduates become educational leaders in universities, colleges, K-12 school districts, museums, community arts organizations, and government agencies.

Students typically carry out dissertation inquiry in local urban and suburban schools, several renowned art museums in the Minneapolis-St. Paul area, and within the initial teacher licensure program at the University. Both qualitative and quantitative research methods have guided PhD candidates' inquiry on the following: rightness of aesthetic-based problem solving, design thinking, and media arts theory and practice in arts classrooms; teaching critical literacy in and through the arts; innovation in culture-based arts education; and other knowledge building questions specific to art teacher development and retention.

Faculty and students are committed to understanding equity and social justice in both research and teaching. Graduate students often work closely with faculty in the development, implementation, and evaluation of national, state, and local arts education initiatives.

Arts in Education students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
15 credits selected in consultation with faculty advisor

Research Methodologies Coursework
18 credits total, with 12 credits selected in consultation with faculty advisor
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth

**Minor or Supporting Program**
12 credits outside the track, selected in consultation with faculty advisor

**Elective**
3 credits selected in consultation with faculty advisor

**Culture and Teaching**
The culture and teaching (CaT) track engages the study of education as a cultural phenomenon. Students in CaT study a range of educational processes that take place both in and beyond the borders of schools, and explore alternative epistemologies and pedagogies. Faculty and students are dedicated to seeking better understandings of issues pertaining to equity and social justice in both research and teaching. The track is interdisciplinary and collaborative, so students' work will encompass many different approaches, methods, and perspectives.

Some of CaT's courses focus on the ways in which teachers are prepared to teach; engage in ongoing professional development; and develop their own personal and professional identities within collegial communities. Other courses examine the salience of understanding white racial identity for pedagogy and social change; as well as the implications of globalization and immigration for teaching, learning, and curriculum. Still other courses explore popular culture and media in relation to contemporary critical theory and teaching practices. "Culture" in CaT includes thinking about "high" and "popular" cultures, the cultures of teaching and the cultures of learning, and how our responses to all influence and are influenced by everyday meanings and practices.

CaT students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

**Core Coursework**
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

**Major Coursework**
15 credits total, with 9 credits selected in consultation with faculty advisor. CI 8159 will be taken twice for a total of 6 credits.
- CI 8159 - Culture and Teaching Colloquium (3.0 cr)

**Research Methodologies Coursework**
18 credits total, with 12 credits selected in consultation with faculty advisor
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth

**Minor or Supporting Program**
12 credits outside the track, selected in consultation with faculty advisor

**Elective**
3 credits selected in consultation with faculty advisor

**Elementary Education**
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The PhD program's elementary education track is designed to help professionals acquire and contribute to the advancement of knowledge and leadership necessary to address the dynamic challenges of contemporary education at the elementary level. Emphasized within the track are, for example, the following: a focus on interdisciplinary approaches to curriculum development, the use of inquiry as a key pedagogical approach, the importance of a strong understanding of diversity and its social and educational implications, and child development and learning theories as the foundation for research and teaching in elementary settings.

Elementary students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

**Core Coursework**
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

**Major Coursework**
15 credits selected in consultation with faculty advisor

**Research Methodologies Coursework**
18 credits total, with 12 credits selected in consultation with faculty advisor
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth

**Minor or Supporting Program**
12 credits outside the track, selected in consultation with faculty advisor
Elective
3 credits selected in consultation with faculty advisor

Learning Technologies
The PhD's learning technologies (LT) track prepares students for research and practice related to multimedia, design, K-12 technology integration, and online distance learning. PhD graduates often earn academic positions in higher education or become directors and leaders of development or research within business and industry. Coursework in LT includes hands-on learning and use of current technologies, development of technological solutions, research methods, and theory of curriculum, instruction, and learning.

The PhD degree is targeted primarily at students interested in pursuing research careers. Student research, culminating in a dissertation, typically evaluates various learning technologies issues and interventions. Common areas of study include conditions affecting educational technology use in schools, higher education, and business settings, and tend to focus on psychological, sociological, and philosophical factors. For example, recent graduates have studied the impact of technology on learning and cognition, variables that mediate effective technology use in education, and issues related to ethical technology use.

LT students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
15 credits selected in consultation with faculty advisor

Research Methodologies Coursework
18 credits total, with 12 credits selected in consultation with faculty advisor
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor

Elective
3 credits selected in consultation with faculty advisor

Literacy Education
Within the literacy education track there are three specializations: (1) children's and adolescent literature, (2) critical literacy and English education, and (3) reading education. Students who have an interest in literacy outside of these specialization areas are able to work with faculty and advisors to develop a program that builds on their interests. Although faculty members work within these distinct specializations, they also enjoy collaborating on teaching, research, and writing projects across the areas embedded within literacy education. Together, faculty and graduate students in the program investigate a host of issues in the field of literacy.

The literacy education track has four overarching goals. They are:
to apply multiple theoretical and research perspectives to problems and questions central to the field;
to engage in research, teaching, and outreach that supports culturally and linguistically diverse literacy learners;
to develop literacy teachers and leaders for diverse schools; and
- to influence literacy policies that address inequities and benefit all learners.

Literacy students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
15 credits selected in consultation with faculty advisor

Research Methodologies Coursework
18 credits total, with 12 credits selected in consultation with faculty advisor
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth

Minor or Supporting Program
Minor or Supporting Program

Elective
3 credits selected in consultation with faculty advisor
Science, Technology, Engineering, and Mathematics Education

The doctoral program's STEM education track at the University of Minnesota is interdisciplinary, focusing on science education, mathematics education, engineering education or agricultural education. Students pursuing this track will choose an area of emphasis in one of the four specializations, while simultaneously participating in scholarly work that spans all areas of STEM education. This integrated-style is one of the first in the nation, and is designed to prepare scholars to conduct thoughtful disciplinary and interdisciplinary research in STEM education in order to assume roles as university faculty members, educational leaders, policy makers, and researchers.

STEM students must take 6 credits of core coursework, 9 credits of STEM core coursework, 9 credits of focus area specific (science or mathematics or engineering or agriculture) coursework, 18 credits of research methodologies coursework, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

STEM Core Coursework
CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)
CI 8572 - Learning Theory and Classical Research in STEM Education (3.0 cr)
CI 8573 - Nature of Inquiry in STEM Education (3.0 cr)

STEM Focus Area Coursework
Students take 9 credits, with faculty advisor approval, in their focus area: science education or mathematics education or engineering education or agricultural education.

Science Education
9 credits required in consultation with faculty advisor

Mathematics Education
9 credits required in consultation with faculty advisor

Engineering Education
9 credits required in consultation with faculty advisor

Agricultural Education
6 required credits are listed; one additional "AFEE" 3 credit course must be taken in consultation with faculty advisor.
AFEE 8090 - Seminar: Agricultural Education and Extension (1.0 - 3.0 cr)
AFEE 8094 - Research in Agricultural Education and Extension (1.0 - 6.0 cr)

Research Methodologies Coursework
18 credits total, with 6 credits selected in consultation with faculty advisor.
CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8262 - Statistical Methods in Education II (3.0 cr)
or EPSY 8252 - Statistical Methods in Education II (3.0 cr)
6 additional credits of advanced coursework in quantitative and qualitative methods in consultation with faculty advisor.

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor.

Second Language Education
The PhD track in second language education (SLE) focuses on the study of language use, teaching, learning, and policy across a range of educational and community settings, including programs that serve language minority and language majority learners: ESL/EFL, foreign language education, and bilingual and immersion education. The PhD track is designed to assume roles as university faculty members, researchers, policy makers, and educational leaders. Independent scholarship is the cornerstone of the PhD.

The SLE PhD track has four specializations that correspond to the program's primary focus areas and faculty expertise:
1) Second language acquisition and classroom discourse research examines language learning processes and the way language is used by learners and their interlocutors in or out of school.
2) Second language pedagogy and teacher development research examines teachers' classroom practices and strategies as well as professional identities, experiences and attitudes.
3) Language policy research involves analysis of the formation, implementation, and negotiation of language policy in national, school, community, and private spheres.
4) Languages and cultures across schools and communities research examines connections across homes, schools, and communities with an emphasis on the experience.

SLE students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.
Core Coursework
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
15 credits selected in consultation with faculty advisor.

Research Methodologies Coursework
18 credits total, with 12 credits selected in consultation with faculty advisor.
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth.

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor.

Elective
3 credits selected in consultation with faculty advisor.

Social Studies Education
The PhD program's social studies education track focuses on issues related to curriculum, instruction, and assessment in K-12 social studies. Full-time graduate students generally have opportunities to supervise student teachers, teach introductory social studies classes, and conduct and publish research with one or more faculty members. Doctoral students are required to complete a research internship with one or more of the faculty as part of their study for the degree. Graduate students are strongly encouraged to present research papers at professional conferences, specifically the National Council for the Social Studies and the American Educational Research Association. Recent PhD graduates have conducted research in the areas of intercultural relations, moral development, multicultural gender-fair curriculum, social studies instructional issues, and the standards movement as it relates to social studies education. Graduates have assumed positions as instructional leaders in the public schools, curriculum development specialists, social studies assessment specialists, and college/university faculty.

Social Studies students must take 6 credits of core coursework, 15 credits of major coursework, 18 credits of research methodologies coursework, 3 credits of electives, and 12 credits outside the track. Unless otherwise noted, credits need to be selected in consultation with the student's faculty advisor. 24 doctoral thesis credits are also required.

Core Coursework
- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

Major Coursework
15 credits selected in consultation with faculty advisor.

Research Methodologies Coursework
18 credits total, with 12 credits selected in consultation with faculty advisor.
- CI 8134 - Foundations of Research in Curriculum and Instruction I (3.0 cr)
- CI 8135 - Foundations of Research in Curriculum and Instruction II (3.0 cr)
12 additional credits to be selected based upon student's research methodology depth.

Minor or Supporting Program
12 credits outside the track, selected in consultation with faculty advisor.

Elective
3 credits selected in consultation with faculty advisor.
Twin Cities Campus
Educational Psychology M.A.
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241).
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 51
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: counseling and student personnel psychology (CSPP); school psychology; special education; psychological foundations of education (learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (including measurement, evaluation, statistics, and statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. Official transcripts from all colleges and universities attended should accompany the application. The GRE is required for all tracks. Applications to CSPP (deadline January 15), and special education (deadline December 1) are accepted for fall admission only. Applications to psychological foundations and quantitative methods in education are accepted for fall admission (deadlines December 1 and March 1) as well as summer admission (deadline March 1) and spring admission (deadline October 15). School psychology does not offer the MA as a terminal degree.

Applicants must submit the following test score(s):
GRE General Test

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 to 24 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 to 51 major credits and 0 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

The CSPP subplan requires a minimum GPA of 3.0 for students to remain in good standing.

Students must complete credits in EPSY core courses (3 credits in statistics, 3 credits in measurement/evaluation, 3 credits in learning/cognition and 3 credits social/personality). EPSY core courses must be taken on an A-F grade basis. Plan A students must take 10 thesis credits; Plan B registration varies by track. Students must have a minimum of 14 credits in EPSY. Further required credits are detailed within subplan requirements.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Counseling and Student Personnel Psychology
This sub-plan is limited to students completing the program under Plan B.

The counseling and student personnel psychology (CSPP) track subscribes to the scientist/practitioner model, which assumes that scholarly inquiry and counseling practice are interdependent and complementary. The track’s primary mission is to prepare counseling psychologists to bring a well-trained professional’s attitude and interest to bear on the application of psychological and educational knowledge. In addition to becoming skilled clinicians, students learn to be critical consumers and producers of both quantitative and qualitative research. Emphasis areas: community counseling, school counseling, and student personnel psychology/higher education.

Students take 47-51 credits distributed as follows: 12 credits EPSY core courses, 23 credits in counseling theory and practice and 12-16 credits in the area of emphasis. All courses must be taken on an A-F grade basis. A minimum GPA of 3.00 is required in this subplan for students to remain in good standing. The final exam is written; students must also submit a portfolio.

Ed Psych Core Course Requirements

Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits in social/personality, and 3 credits in learning/cognition.

EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 8132 - Personality Development and Socialization (3.0 cr)

Learning/Cognition

Take 3 or more credits from the following:

• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
• EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)

Counseling Theory & Practice Requirements
EPSY 8402 - Individual Counseling: Theories, Applications & Counseling Skills (4.0 cr)
EPSY 8403 - Social/Cultural Contexts: Counseling and Skills (3.0 cr)
EPSY 8404 - Group Counseling: Theory, Applications, and Skills (3.0 cr)
EPSY 8405 - Career Development: Theory, Skills, and Counseling Applications (3.0 cr)
EPSY 8406 - Professional Ethics for Counselors and Psychologists (3.0 cr)
EPSY 8407 - Assessing and Counseling Clients With Psychological Disorders (4.0 cr)
EPSY 8431 - Master's Research Seminar: CSPP (3.0 cr)

Courses in Area of Emphasis
Students must take additional courses (12-16 credits) in their area of emphasis.

Community Emphasis
Students must take 4 credits of EPSY 8503, 4 credits of EPSY 8504 and the special topic course listed below for 4 credits.
EPSY 5415 - Child and Adolescent Development and Counseling (4.0 cr)
EPSY 8503 - Counseling Practicum I (1.0 - 4.0 cr)
EPSY 8504 - Counseling Practicum II (1.0 - 4.0 cr)
EPSY 5400 Wkshp:CounselPsy - Clients in Crises: Intervention and Diagnosis (4 cr)
-OR-

Student Personnel/Higher Ed Emphasis
Students must take 4 credits of EPSY 8503 and 4 credits of EPSY 8504. EPSY5421/OLPD5724 and EPSY 5451/OLPD5704 are recommended, but not required.
EPSY 5415 - Child and Adolescent Development and Counseling (4.0 cr)
EPSY 8503 - Counseling Practicum I (1.0 - 4.0 cr)
EPSY 8504 - Counseling Practicum II (1.0 - 4.0 cr)
-OR-

School Counseling Emphasis
Students must take 3 credits of EPSY 5435, 3 credits of EPSY 8503, and 3 credits of EPSY 8504.
EPSY 5415 - Child and Adolescent Development and Counseling (4.0 cr)
EPSY 5435 - Introduction to School Counseling (3.0 - 6.0 cr)
EPSY 5436 - Crisis Management and Consulting in Schools (3.0 cr)
EPSY 8503 - Counseling Practicum I (1.0 - 4.0 cr)
EPSY 8504 - Counseling Practicum II (1.0 - 4.0 cr)

Psychological Foundations
Graduate study in psychological foundations of education prepares students for research and teaching positions in colleges and universities. Students have also gone on to positions in professional settings such as schools, private industry, human service organizations, health science units, and government agencies. The goal of the track is to apply and generate knowledge of psychological processes and methodological procedures involved in learning and teaching.

The psychological foundations track offers emphases in learning and cognition/educational technology or social psychological and social developmental (including human relations) processes in educational psychology. Students typically choose one of these areas in addition to achieving broad competence in all aspects of the curriculum.

Students take 33-34 credits distributed as follows: 12 credits EPSY core requirements, 3 credits research methodology, and 12 credits in an area of emphasis (Psych Foundations requirements in the area of emphasis will satisfy EPSY core requirement for learning/cognition or social/personality). Plan A students take 10 thesis credits; Plan B students take 6 research credits and 3 additional credits.

Ed Psych Core Course Requirements
Students must take 3 credits in learning/cognition, 3 credits in social/personality, 3 credits in statistics and 3 credits in measurement/evaluation. 3 credits from the area of emphasis will satisfy learning/cognition or social/personality core requirement. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Learning/Cognition
Students in the learning area must take 3 credits from the list below. Students in the social area must take one of the following courses: EPSY 5101, 5112, 5113, 5114, 5115, 5119, 5191.
Take 3 or more credit(s) from the following:
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
- EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)

**Social/Personality**

Students in the social area must take 3 credits from the list below. Students in the learning area must take one of the following courses: EPSY 5151 or 5157.

Take 3 or more credit(s) from the following:
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

**Statistics**

Take 3 or more credit(s) from the following:
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)

**Measurement/Evaluation**

Take 3 or more credit(s) from the following:
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

**Research Methodology**

EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)

**Plan B Paper**

For students completing the MA under Plan B.

Take 6 or more credit(s) from the following:
• EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
• EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)

**Additional 3 credits**

3 additional credits are required for Plan B, preferably in either learning/cognition or social psychology/social development, but may also include other areas of educational psychology. Consult with advisor.

**Psychological Foundations Emphases**

**Learning/Cognition Emphasis**

**Required Learning and Cognition Courses**

Take 6 or more credit(s) from the following:
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5191 - Education of the Gifted and Talented (3.0 cr)

**Specialization Courses in Learning and Cognition**

Take 6 or more credit(s) from the following:
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
• EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)

-OR-

**Social Emphasis**

**Required social psychology course**

EPSY 5157 - Social Psychology of Education (3.0 cr)
Additional social psychology or social developmental courses
Take 6 or more credit(s) from the following:
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
• EPSY 8290 - Special Topics: Seminar in Psychological Foundations (1.0 - 6.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

Additional 3 credits - Plan A only
3 additional credits are required for Plan A, preferably in either social psychology/social development or learning/cognition, but may also include other areas of educational psychology.

Quantitative Methods in Education
This sub-plan is limited to students completing the program under Plan B.

Graduate study in quantitative methods in education (QME) prepares students for a wide variety of careers, including positions in college and university teaching and research, research and evaluation centers, test publishing firms, public school systems, state departments of instruction, and private industry. The goal of the QME track is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

The QME track offers emphases in measurement, evaluation, statistics, and statistics education. Students typically choose one of these areas in addition to achieving competence in all aspects of the curriculum.

Students take 33 credits distributed as follows: 12 credits EPSY core requirements, 18 credits QME core requirements (6 credits may be used to satisfy EPSY core requirements, and 3 research credits (EPSY 5991) for the Plan B paper. 2 additional courses (minimum 6 credits) in the area of emphasis are determined in consultation with advisor.

Ed Psych Core Course Requirements
Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits in learning/cognition, and 3 credits in social/personality. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Statistics
QME core courses EPSY 8251 or 8252 will satisfy this requirement.

Measurement/Evaluation
QME core courses EPSY 5221, 5243, 5244 or 5247 will satisfy this requirement.

Learning/Cognition
Take 3 or more credit(s) from the following:
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
• EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
• EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)

Social/Personality
Take 3 or more credit(s) from the following:
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• EPSY 8132 - Personality Development and Socialization (3.0 cr)
• EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
• EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
• PSY 5101 - Personality Psychology (3.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
• CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
• SOC 8721 - Theories of Social Psychology (3.0 cr)

Plan B Paper
Students take 3 credits for their Plan B paper.
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

QME Core Course Requirements
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Courses in area of emphasis
Students must take two additional courses (minimum 6 credits) in their area of emphasis.

Evaluation Emphasis
OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
QME course in consultation with adviser (3 credits)

-OR-

Measurement Emphasis
Students must take one 8xxx level measurement course (3 credits)
QME course in consultation with adviser (3 credits)

-OR-

Statistics Emphasis
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
QME course in consultation with adviser (3 credits)

-OR-

Statistics Education Emphasis
EPSY 5271 - Becoming a Teacher of Statistics (3.0 cr)
MathEd (MTHE) course in consultation with adviser (3 credits)

School Psychology
This sub-plan is limited to students completing the program under Plan B.

School psychology does not offer the MA as a terminal degree; rather, the MA is required to obtain the specialist certificate or PhD in educational psychology.

Students take 30 credits distributed as follows: 12 credits EPSY core requirements, 15 credits School Psychology course requirements, and 3 research credits (EPSY 8822).

EPSY Core Course Requirements
Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits in learning/cognition, and 3 credits in social/personality. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Statistics
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 8251 - Statistical Methods in Education I (3.0 cr)

Measurement/Evaluation
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)

Learning/Cognition
Take 3 or more credit(s) from the following:
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
- EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
- EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 8112 - Mathematical Cognition (3.0 cr)
- EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
- EPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)

Social/Personality
EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)

Plan B Paper
Take 3 or more credit(s) from the following:
- EPSY 8822 - Research in School Psychology (3.0 cr)

School Psychology Course Requirements
Take 15 or more credit(s) from the following:
- EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
- EPSY 5802 - Foundations of Developmental Psychology Across the Lifespan (3.0 cr)
- EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
- EPSY 8811 - Assessment in School Psychology I: Foundations of Academic Assessment (3.0 cr)
- EPSY 8812 - Assessment in School Psychology II: Intellectual and Social-Emotional Domains (3.0 cr)
- EPSY 8813 - Introductory Practicum in School Psychology (2.0 cr)
- EPSY 8815 - Behavioral and Social Emotional Prevention and Intervention (3.0 cr)
- EPSY 8816 - Academic Prevention and Intervention (3.0 cr)
- EPSY 8817 - Problem Analysis and Consultation in School Psychology (3.0 cr)
- EPSY 8818 - Intermediate Practicum in School Psychology (2.0 cr)
- EPSY 8821 - Issues in School Psychology (3.0 cr)
- EPSY 8893 - Ethics and Professional Standards in School Psychology (3.0 cr)
- EPSY 8849 - Assessment in Early Childhood (3.0 cr)

Special Education
The special education track offers opportunities for research and specializations in autism spectrum disorders, deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, specific learning disabilities, developmental disabilities, and self-injurious behaviors and applied behavior analysis. Early involvement in research projects and the development of original research programs in areas such as academic instructional strategies, social and cognitive development, behavioral/psychological management, child development, and technology are encouraged.

The special education track focuses on the attainment of core competencies required for special education professionals as well as interdisciplinary skills and goals. A complementary emphasis is placed on problem solving that is influential in the social and cultural perceptions, care, education, intervention, and support of persons with disabilities.

Students may emphasize consulting, college teaching, or research in one or more of the specializations.

Students take 30-31 credits distributed as follows: 12 credits EPSY core courses. Plan A students take 9 special ed coursework electives and 10 thesis credits; Plan B students take 12 special ed coursework electives and 6 credits in Research Problems (EPSY 8994).

EPSY Core Course Requirements
Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits in learning/cognition, and 3 credits in social/personality. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Statistics
Take 3 or more credit(s) from the following:
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)

Measurement/Evaluation
3 credits required in measurement or evaluation
measurement
Take 3 or more credit(s) from the following:
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
• EPSY 8221 - Psychological Scaling (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• PSY 8262 - Psychological Measurement: Theory and Methods (3.0 cr)
• PSY 8265 - Advanced Psychological and Educational Measurement (4.0 cr)
evaluation
Take 3 or more credit(s) from the following:
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 8247 - Advanced Interviewing and NVIVO (3.0 cr)
• OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Learning/Cognition
Take 3 or more credit(s) from the following:
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
• EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
• EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)

Social/Personality
Take 3 or more credit(s) from the following:
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5151 - Collaborative Learning (3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• EPSY 8132 - Personality Development and Socialization (3.0 cr)
• EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
• EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
• PSY 5101 - Personality Psychology (3.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
• CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
• SOC 8721 - Theories of Social Psychology (3.0 cr)

Special Ed Course Requirements - Plan A
For students completing the MA under Plan A.
Electives
Special Ed coursework selected in consultation with advisor (9 credits).

Thesis Credits
Take 10 or more credit(s) from the following:
• EPSY 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Special Ed Course Requirements - Plan B
For students completing the MA under Plan B.

Electives
Special ed coursework selected in consultation with advisor (12 credits)

Research Problems
Take 6 or more credit(s) from the following:
• EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)
Twin Cities Campus
Educational Psychology Minor
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; (612-624-6083; fax: 612-624-8241)
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: counseling and student personnel psychology (CSPP); school psychology; special education; psychological foundations of education (learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (including measurement, evaluation, statistics, and statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires at least 6 credits of graduate-level EPSY courses. A doctoral minor requires at least 12 credits of graduate-level EPSY courses, of which at least 9 credits must be in 8xxx courses. Course selection is determined in consultation with the educational psychology committee member. Courses must be taken on an A-F grade basis.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
A master's minor requires at least 6 credits of graduate-level EPSY courses. Course selection is determined in consultation with the educational psychology committee member. Courses must be taken on an A-F grade basis.

Doctoral
A doctoral minor requires at least 12 credits of graduate-level EPSY courses, of which at least 9 credits must be in 8xxx courses. Course selection is determined in consultation with the educational psychology committee member. Courses must be taken on an A-F grade basis.

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Information current as of January 20, 2017
Twin Cities Campus

Educational Psychology Ph.D.

Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241).
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 66 to 103
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: counseling and student personnel psychology (CSPP); school psychology; special education; psychological foundations of education (learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (including measurement, evaluation, statistics, and statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. In addition, school psychology applicants must also submit a critical issue essay, answering the following questions: Identify a critical problem facing contemporary schools in America or another country. What do you think are the social, political, and/or economic factors that are contributing to this problem? What specific solutions might you propose to tackle the problem?

Applications should be accompanied by official transcripts from all colleges and universities attended. The GRE is required for all tracks. An interview is required for those who make the initial cut in school psychology.

Applications to school psychology (deadline November 15), CSPP (deadline December 1), special education (deadline December 1) and psychological foundations (deadlines December 1 and March 1) are accepted for fall admission only. Applications to quantitative methods in education are accepted for fall admission (deadlines December 1 and March 1) as well as summer admission (deadline March 1) and spring admission (deadline October 15). To be considered for fellowship nominations, applications must be submitted for fall admission by the Nov. 15 (School Psych) or Dec. 1 deadlines.

Applicants must submit the following test score(s):
GRE General Test

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
Program Requirements
42 to 79 credits are required in the major.
0 to 9 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete credits in EPSY core courses (6 credits in statistics, 3 credits in measurement/evaluation, 6 credits in research methods, 9 credits from at least two areas: learning/cognition, social/personality, history/systems), 9 credits EPSY electives and 24 thesis credits. Further required credits are detailed within subplan requirements.

Program Sub-plans
Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

Psychological Foundations
The psychological foundations of education track prepares students for research and teaching positions in colleges and universities. Students have also gone on to positions in professional settings such as schools, private industry, human service organizations, health science units, and government agencies. The goal of the psychological foundations track is to apply and generate knowledge of psychological processes and methodological procedures involved in learning and teaching.

The track offers emphases in learning and cognition/educational technology or social psychological and social developmental (including human relations) processes in educational psychology. Students typically choose one of these areas in addition to achieving broad competence in all aspects of the curriculum.

Students take 72 credits distributed as follows: 24 credits EPSY core requirements, 9 credits EPSY electives, 18 credits in the area of emphasis in PsyF (12 PSYF credits can be used to satisfy EPSY core and elective requirements), 9 credits of coursework outside of ed psych, and 24 thesis credits.

Ed Psych Core Course Requirements
Psychological foundations students must take 3 credits in history/systems, 3 credits in learning/cognition, 3 credits in social/personality, 6 credits in research methods, 6 credits in statistics and 3 credits in measurement/evaluation. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

History/Systems
PsyF students must take EPSY 8905.
EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

Learning/Cognition
Students in the learning area of PsyF can satisfy this requirement with required learning courses.
Take 3 or more credit(s) from the following:
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
- EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
- EPSY 5119 - Mind, Brain, and Education (3.0 cr)
- EPSY 5191 - Education of the Gifted and Talented (3.0 cr)

Social/Personality
Students in the social area of PsyF can satisfy this requirement with required social/personality courses.
Take 3 or more credit(s) from the following:
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)

Research Methods
EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
EPSY 8216 - Seminar: Research Processes in Psychological Foundations of Education (3.0 cr)

Statistics
6 credits required
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)
or EPSY 8261 - Statistical Methods in Education I (3.0 cr)
EPSY 8262 - Statistical Methods in Education II (3.0 cr)

Measurement/Evaluation
Take 3 or more credit(s) from the following:
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

EPSY Electives
9 credits of EPSY electives can be satisfied by additional courses in the area of emphasis.

External Courses
Psych foundations students must take a minimum of 9 credits of coursework outside of Educational psychology in consultation with advisor.

Courses in Area of Emphasis
Students must take additional courses in their area of emphasis in consultation with advisor. EPSY courses will satisfy 3 credits ed psych learning or social core requirement and 9 credits EPSY electives.

Learning/Cognition Emphasis
Required Learning and Cognition Courses
Take 6 or more credit(s) from the following:
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5191 - Education of the Gifted and Talented (3.0 cr)

Specialization Courses in Learning and Cognition
Take 12 or more credit(s) from the following:
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
• EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
• EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
• EPSY 8290 - Special Topics: Seminar in Psychological Foundations (1.0 - 6.0 cr)

-OR-

Social Emphasis
Required Social Psychology or Social Development Courses
Take 6 or more credit(s) from the following:
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)

Specialization Courses in Social Psychology or Social Development
Take 12 or more credit(s) from the following:
Quantitative Methods in Education

The quantitative methods in education (QME) track prepares students for a wide variety of careers, including positions in college and university teaching and research, research and evaluation centers, test publishing firms, public school systems, state departments of assessment, and private industry. The goal of the QME track is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

The QME track offers emphases in measurement, evaluation, statistics, and statistics education. Students typically choose one of these areas in addition to achieving competence in all aspects of the curriculum.

Students take 72 credits distributed as follows: 27 credits EPSY core requirements, 9 credits EPSY electives, 18 credits QME core requirements, 12 additional courses in the area of emphasis in QME (18 QME credits can be used to satisfy EPSY core and elective requirements), and 24 thesis credits.

Ed Psych Core Course Requirements

Students must take 9 credits in at least two of these areas: learning/cognition, social/personality or history/systems; and 9 credits in research methods. (QME core courses will satisfy EPSY core requirements for 6 credits in statistics and 3 credits in measurement/evaluation; 9 credits in EPSY electives can be satisfied by additional courses in the area of emphasis.) Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Learning/Cognition, Social/Personality, History/Systems

Take 9 or more credit(s) including 2 or more sub-requirements(s) from the following:

learning/cognition

Take 0 or more course(s) from the following:
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
• EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
• EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)

social/personality

Take 0 or more course(s) from the following:
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• EPSY 8132 - Personality Development and Socialization (3.0 cr)
• EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
• EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
• CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
• PSY 5101 - Personality Psychology (3.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• SOC 8721 - Theories of Social Psychology (3.0 cr)

history/systems
Take 0 or more course(s) from the following:
• EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

Research Methods
QME students must take these 3 research methods courses.
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

Statistics
6 credits of statistics will be satisfied by QME core course requirements.
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Measurement/Evaluation
3 credits of measurement or evaluation will be satisfied by QME core course requirements.
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
or EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)

EPSY Electives
9 credits of EPSY electives can be satisfied by additional QME core courses and courses in the area of emphasis.

QME Core Course Requirements
Students must take these courses, including an 8xxx level measurement course selected in consultation with advisor (minimum 18 credits total).
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Courses in Area of Emphasis
Students must take minimum 12 credits in their area of emphasis (in consultation with advisor). EPSY courses will satisfy 9 credits ed psych elective core requirement.

Evaluation Emphasis
Take 12 or more credit(s) from the following:
• EPSY 5246 - Evaluation Colloquium: Psychological Foundations (1.0 cr)
• EPSY 8221 - Psychological Scaling (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8247 - Advanced Interviewing and NVIVO (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8270 - Nonparametric Statistics in Education (3.0 cr)
• EPSY 8281 - Advanced Statistical Computing and Data Analysis (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• OLPD 5056 - Case Studies for Policy Research (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)

- OR -

Measurement Emphasis
Take 12 or more credit(s) from the following:
• EPSY 5246 - Evaluation Colloquium: Psychological Foundations (1.0 cr)
• EPSY 5271 - Becoming a Teacher of Statistics (3.0 cr)
• EPSY 8221 - Psychological Scaling (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8272 - Nonparametric Statistics in Education (3.0 cr)
- EPSY 8281 - Advanced Statistical Computing and Data Analysis (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)

-OR-

Statistics Emphasis
Take 12 or more credit(s) from the following:
- EPSY 5246 - Evaluation Colloquium: Psychological Foundations (1.0 cr)
- EPSY 5271 - Becoming a Teacher of Statistics (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
- EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8271 - Statistics Education Research Seminar: Studies on Teaching and Learning Statistics (3.0 cr)
- EPSY 8272 - Nonparametric Statistics in Education (3.0 cr)
- EPSY 8281 - Advanced Statistical Computing and Data Analysis (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)

-OR-

Statistics Education Emphasis
EPSY 5271 - Becoming a Teacher of Statistics (3.0 cr)
EPSY 8271 - Statistics Education Research Seminar: Studies on Teaching and Learning Statistics (3.0 cr)
MathEd (MTHE) course (minimum 3 credits)-consult with adviser
Additional course (minimum 3 credits)-consult with adviser

School Psychology
School psychology is fully accredited by the American Psychological Association, the Minnesota Board of Teaching, and the National Association of School Psychologists. Through coursework and practica/internships, students develop competencies in assessment, consultation, intervention and program development, research, and evaluation. Graduates are employed as psychologists in local schools, university clinics and hospitals, community mental health centers, and as trainers/researchers in universities. Since 1988, training has focused on the delivery of psychological services in schools and school communities to promote children's and adolescent's academic, social, and behavioral success.

The school psychology track integrates didactic and experiential components of training and applied research. Students develop specific competencies through a broad range of applied experiences, including field placements, practica assignments, and a full-year internship.

Students take 103 credits distributed as follows: 24 credits EPSY core requirements, 9 credits EPSY electives, 55 credits School Psychology required courses (9 credits can be used to satisfy EPSY elective requirement), and 24 thesis credits.

Ed Psych Core Course Requirements
Students must take 3 credits in history/systems, 3 credits in learning/cognition, 3 credits in social/personality, 6 credits in research methods, 6 credits in statistics, 3 credits in measurement/evaluation and 9 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

History/Systems
EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

Learning/Cognition
EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)

Social/Personality
EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)

Statistics
EPSY 8251 - Statistical Methods in Education I (3.0 cr)
EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Measurement/Evaluation
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)

Research Methods
6 credits required
EPSY 8822 - Research in School Psychology (3.0 cr)
Take 3 or more credit(s) from the following:
- EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
- EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)
EPSY Electives
9 credits of EPSY electives can be satisfied by school psychology course requirements.

School Psychology Course Requirements
Students must take EPSY 8813 twice for a total of 4 credits, EPSY 8818 twice for a total of 4 credits and EPSY 8841 twice for a total of 6 credits. EPSY courses will satisfy 9 credits ed psych elective core requirement.
EPSY 5802 - Foundations of Developmental Psychology Across the Lifespan (3.0 cr)
EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
EPSY 5853 - Biological Bases of Behavior (3.0 cr)
EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
EPSY 8811 - Assessment in School Psychology I: Foundations of Academic Assessment (3.0 cr)
EPSY 8812 - Assessment in School Psychology II: Intellectual and Social-Emotional Domains (3.0 cr)
EPSY 8813 - Introductory Practicum in School Psychology (2.0 cr)
EPSY 8815 - Behavioral and Social Emotional Prevention and Intervention (3.0 cr)
EPSY 8816 - Academic Prevention and Intervention (3.0 cr)
EPSY 8817 - Problem Analysis and Consultation in School Psychology (3.0 cr)
EPSY 8818 - Intermediate Practicum in School Psychology (2.0 cr)
EPSY 8821 - Issues in School Psychology (3.0 cr)
EPSY 8823 - Ethics and Professional Standards in School Psychology (3.0 cr)
EPSY 8831 - Comprehensive School Practicum in School Psychology (3.0 cr)
EPSY 8832 - Advanced Practicum in School Psychology (3.0 cr)
EPSY 8841 - Practicum: Instruction and Supervision in School Psychology (3.0 cr)

Internship
There are two options for internship registration:
- Students completing an internship after defending their dissertation must register for EPSY 8843 both fall & spring semesters of the internship year (2 credits total).
- Students completing an internship before dissertation defense must register for EPSY 8842 both fall & spring semesters of the internship year (1 credit each term).
EPSY 8843 - Internship - School Psychology (1.0 cr)
or EPSY 8842 - Internship: School Psychological Services (1.0 - 10.0 cr)

Special Education
The special education track offers specializations in deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, learning disabilities, autism, and developmental disabilities. Early involvement in research projects and the development of original research programs in such areas as instructional strategies, social and cognitive development, behavioral and psychological management, child development, and technology are encouraged. Special projects and training programs supplement academic studies.

The special education track focuses on the attainment of core competencies and related skills, since special education professionals share many common concerns and goals. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities; and federal, state, and local legislation regarding prevention and the care, treatment, education, training, and support of persons with disabilities.

Students take 66 credits distributed as follows: 24 credits EPSY core requirements, 9 credits EPSY electives, 18 credits special ed course requirements (9 credits can be used to satisfy EPSY elective requirement), and 24 thesis credits.

Ed Psych Core Course Requirements
Students must take 9 credits in at least two of these areas: learning/cognition, social/personality or history/systems; 6 credits in research methods; 6 credits in statistics; 3 credits in measurement/evaluation and 9 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.
Learning/Cognition, Social/Personality, History/Systems
Take 9 or more credit(s) including 2 or more sub-requirements(s) from the following:
- Take 0 or more course(s) from the following:
  - EPSY 5101 - Intelligence and Creativity (3.0 cr)
  - EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
  - EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
  - EPSY 5114 - Psychology of Student Learning (3.0 cr)
  - EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
  - EPSY 5119 - Mind, Brain, and Education (3.0 cr)
  - EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
  - EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>EPSY 8112</td>
<td>Mathematical Cognition (3.0 cr)</td>
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<tr>
<td>EPSY 8115</td>
<td>Psychology of Instruction and Technology (3.0 cr)</td>
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<tr>
<td>EPSY 8116</td>
<td>Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)</td>
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<tr>
<td>EPSY 8707</td>
<td>Principles of Behavior Analysis and Learning (3.0 cr)</td>
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<tr>
<td>CPSY 8301</td>
<td>Developmental Psychology: Cognitive Processes (4.0 cr)</td>
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<tr>
<td>PSY 5014</td>
<td>Psychology of Human Learning and Memory (3.0 cr)</td>
</tr>
<tr>
<td>PSY 5015</td>
<td>Cognition, Computation, and Brain (3.0 cr)</td>
</tr>
</tbody>
</table>

- **social/personality**

  Take 0 or more course(s) from the following:
  - EPSY 5135 - Human Relations Workshop (4.0 cr)
  - EPSY 5151 - Cooperative Learning (3.0 cr)
  - EPSY 5157 - Social Psychology of Education (3.0 cr)
  - EPSY 8132 - Personality Development and Socialization (3.0 cr)
  - EPSY 8157 - Key Topics and Issues in Applying Social Psychology to Education (3.0 cr)
  - EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)
  - CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
  - CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
  - PSY 5101 - Personality Psychology (3.0 cr)
  - PSY 5135 - Psychology of Individual Differences (3.0 cr)
  - PSY 5202 - Attitudes and Social Behavior (3.0 cr)
  - PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
  - PSY 5205 - Applied Social Psychology (3.0 cr)
  - PSY 5207 - Personality and Social Behavior (3.0 cr)
  - PSY 8201 - Social Cognition (3.0 cr)
  - PSY 8202 - Close Relationships (3.0 cr)
  - PSY 8208 - Social Psychology: The Self (3.0 cr)
  - SOC 8721 - Theories of Social Psychology (3.0 cr)

- **history/systems**

  Take 0 or more course(s) from the following:
  - EPSY 8905 - History and Systems of Psychology: Landmark Issues in Educational Psychology (3.0 cr)

**Research Methods**
- EPSY 8694 - Research in Special Education (3.0 cr)
- EPSY 8706 - Single Case Designs in Intervention Research (3.0 cr)

**Statistics**
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- EPSY 8253 - Statistical Methods in Education III (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)

**Measurement/Evaluation**

Take 3 or more credit(s) from the following:
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
- EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
- EPSY 8247 - Advanced Interviewing and NVIVO (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5865 - Advanced Psychological and Educational Measurement (4.0 cr)

**EPSY Electives**

9 credits of EPSY electives can be satisfied by special ed course requirements.

**Special Ed Course Requirements**

Students take 18 special ed credits in consultation with advisor. EPSY courses will satisfy 9 credits ed psych elective core requirement.

- EPSY 8600 Special Topics: Special Education Issues - Grant Writing Seminar (3 credits)
- EPSY 8701 - Doctoral Core Seminar: Special Education I (3.0 cr)
- EPSY 8702 - Doctoral Core Seminar: Special Education II (3.0 cr)
- EPSY 8xxx - Special Ed elective in consultation with adviser, 3 cr. (EPSY 8707 recommended, but not required)
- EPSY 8xxx - Special Ed elective in consultation with adviser, 3 cr. (EPSY 8708 recommended, but not required)
- EPSY 8xxx - Special Ed elective in consultation with adviser, 3 cr.
Educational Psychology Specialist Certificate in Education and School Psychological Services

Twin Cities Campus

Contact Information:
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-4156; fax 612-624-8241).
Email: schpsy@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SchoolPsych/default.html

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

School psychology is fully accredited by the American Psychological Association, the Minnesota Board of Teaching, and the National Association of School Psychologists. Through coursework and practicum/internships, students develop competencies in assessment, consultation, intervention and program development, research, and evaluation. Graduates are employed as psychologists in local schools, university clinics and hospitals, community mental health centers, and as trainers/researchers in universities. Since 1988, training has focused on the delivery of psychological services in schools and school communities to promote children's and adolescent's academic, social, and behavioral success.

The specialist certificate integrates didactic and experiential components of training and applied research. Students develop specific competencies through a broad range of applied experiences, including field placements, practicum assignments, and a full-year internship.

The specialist certificate is designed for students who want to become practitioners. It meets the Minnesota certification requirements for school psychologists.

Accreditation
This program is accredited by National Association of School Psychologists (NASP).

Program Delivery
This program is available:

via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. Applicants must also submit a critical issue essay, answering the following questions: Identify a critical problem facing contemporary schools in America or another country. What do you think are the social, political, and/or economic factors that are contributing to this problem? What specific solutions might you propose to tackle the problem?

Applications should be accompanied by official transcripts from all colleges and universities attended. The GRE General Test is required; an interview is also required for those who make the initial cut.

Applications are accepted for fall admission only (deadline November 15).

Applicants must submit their test score(s) from the following:
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to test abbreviations: GRE, TOEFL, IELTS, MELAB.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students take 60 credits distributed as follows: 15 credits EPSY core courses, 6 credits EPSY electives, and 45 credits school psychology course requirements (6 credits can satisfy EPSY elective requirement). There is a written final exam.

#### Ed Psych Core Course Requirements

Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits learning/cognition, 3 credits social/personality, 3 credits in research methods and 6 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

- **Statistics**
  - Take 3 or more credit(s) from the following:
    - EPSY 5261 - Introductory Statistical Methods (3.0 cr)
    - EPSY 8251 - Statistical Methods in Education I (3.0 cr)

- **Measurement/Evaluation**
  - EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)

- **Learning/Cognition**
  - Take 3 or more credit(s) from the following:
    - EPSY 5101 - Intelligence and Creativity (3.0 cr)
    - EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
    - EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
    - EPSY 5114 - Psychology of Student Learning (3.0 cr)
    - EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
    - EPSY 5119 - Mind, Brain, and Education (3.0 cr)
    - EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
    - EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
    - EPSY 8112 - Mathematical Cognition (3.0 cr)
    - EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
    - EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
    - EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
    - EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
    - CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
    - PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
    - PSY 5015 - Cognition, Computation, and Brain (3.0 cr)

- **Social/Personality**
  - EPSY 8819 - Emotion & Childhood Psychopathology (3.0 cr)

- **Research Methods**
  - Take 3 or more credit(s) from the following:
    - EPSY 5216 - Introduction to Research in Educational Psychology and Human Development (3.0 cr)
    - EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

- **EPSY Electives**
  - 6 credits of EPSY electives can be satisfied by school psychology course requirements.
School Psychology Course Requirements
Students must take 36 credits required courses, 3 credits research problems and 6 credits electives.

Required Courses
Students must take EPSY 8813 twice for 4 credits total, EPSY 8818 twice for 4 credits total, and EPSY 8842 for 4 credits. EPSY courses will satisfy 6 credits educational psychology elective core requirement.

EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
EPSY 8811 - Assessment in School Psychology I: Foundations of Academic Assessment (3.0 cr)
EPSY 8812 - Assessment in School Psychology II: Intellectual and Social-Emotional Domains (3.0 cr)
EPSY 8813 - Introductory Practicum in School Psychology (2.0 cr)
EPSY 8815 - Behavioral and Social Emotional Prevention and Intervention (3.0 cr)
EPSY 8816 - Academic Prevention and Intervention (3.0 cr)
EPSY 8817 - Problem Analysis and Consultation in School Psychology (3.0 cr)
EPSY 8818 - Intermediate Practicum in School Psychology (2.0 cr)
EPSY 8821 - Issues in School Psychology (3.0 cr)
EPSY 8822 - Ethics and Professional Standards in School Psychology (3.0 cr)
EPSY 8842 - Internship: School Psychological Services (1.0 - 10.0 cr)

Research Problems
EPSY 8822 - Research in School Psychology (3.0 cr)

Electives
Students must take 6 credits electives from the following list. Other courses may be taken with permission of advisor.
Take 6 or more credit(s) from the following:
• EPSY 5802 - Foundations of Developmental Psychology Across the Lifespan (3.0 cr)
• EPSY 8831 - Comprehensive School Practicum in School Psychology (3.0 cr)
• EPSY 8832 - Advanced Practicum in School Psychology (3.0 cr)
• EPSY 8849 - Assessment in Early Childhood (3.0 cr)
Twin Cities Campus
Educational Psychology Specialist Certificate in Education and Special Education
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241).
Email: epsy.adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Spec Educ

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Special education offers specializations in deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, learning disabilities, autism, and developmental disabilities. Early involvement in research projects and the development of original research programs in such areas as instructional strategies, social and cognitive development, behavioral and psychological management, child development, and technology are encouraged. Special projects and training programs supplement academic studies.

The program focuses on the attainment of core competencies and related skills, since special education professionals share many common concerns and goals. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities, and federal, state, and local legislation regarding prevention and the care, treatment, education, training, and support of persons with disabilities.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. Applications are accepted for fall admission only (deadline December 1).

Applications should be accompanied by official transcripts from all colleges and universities attended. The GRE General Test is required.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
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  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students take 60 credits distributed as follows: 15 credits EPSY core courses, 6 credits EPSY electives and 45 credits of coursework in special education (6 credits can satisfy EPSY elective requirement).

Ed Psych Core Course Requirements
Students must take 3 credits in statistics, 3 credits in measurement/evaluation, 3 credits learning/cognition, 3 credits social/personality, 3 credits in research methods and 6 credits EPSY electives. Courses taken to satisfy EPSY core requirements must be taken on an A-F grade basis.

Statistics
Take 3 or more credit(s) from the following:
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)

Measurement/Evaluation
3 credits required from measurement or evaluation

Take 3 or more credit(s) from the following:
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
• EPSY 8221 - Psychological Scaling (3.0 cr)
• EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
• EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
• EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
• EPSY 8265 - Factor Analysis (3.0 cr)
• PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
• PSY 5865 - Advanced Psychological and Educational Measurement (4.0 cr)

Learning/Cognition
Take 3 or more credit(s) from the following:
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
• EPSY 5119 - Mind, Brain, and Education (3.0 cr)
• EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
• EPSY 8112 - Mathematical Cognition (3.0 cr)
• EPSY 8115 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 8707 - Principles of Behavior Analysis and Learning (3.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)

Social/Personality
Take 3 or more credit(s) from the following:
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• EPSY 8132 - Personality Development and Socialization (3.0 cr)
• PSY 5101 - Personality Psychology (3.0 cr)
• PSY 5135 - Psychology of Individual Differences (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5207 - Personality and Social Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8202 - Close Relationships (3.0 cr)
• PSY 8208 - Social Psychology: The Self (3.0 cr)
• CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
• CPSY 8606 - Advanced Developmental Psychopathology (3.0 cr)
• SOC 8721 - Theories of Social Psychology (3.0 cr)

Research Methods
  EPSY 8215 - Advanced Research Methodologies in Education (3.0 cr)

EPSY Electives
  6 credits of EPSY electives can be satisfied by special education course requirements.

Special Education Course Requirements
  EPSY courses will satisfy 6 credits Ed Psych elective core requirement.
  EPSY 8694 - Research in Special Education (3.0 cr)
  EPSY 8701 - Doctoral Core Seminar: Special Education I (3.0 cr)
  EPSY 8702 - Doctoral Core Seminar: Special Education II (3.0 cr)
  EPSY 8706 - Single Case Designs in Intervention Research (3.0 cr)
  EPSY 8600 Special Topics: Grant Writing (3 cr.)
  EPSY 8600 Special Topics: Math Res. Stts with Math Diff (3 cr.)
  EPSY 8600 Special Topics: Reading Disabilities Research (3 cr.)

Electives
  Students must take 15 credits electives from the following list. Other courses may be taken with permission of adviser.
  Take 15 or more credit(s) from the following:
  • EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
  • EPSY 5851 - Engaging Diverse Students and Families (3.0 cr)
  • EPSY 8600 - Special Topics: Special Education Issues (1.0 - 3.0 cr)
  • OLPD 5344 - School Law (3.0 cr)

Specialist Project
  Take 9 or more credit(s) from the following:
  • EPSY 8993 - Directed Study: Educational Psychology (1.0 - 10.0 cr)
  • EPSY 8994 - Research Problems: Educational Psychology (1.0 - 6.0 cr)
Emerging Leaders in Private Colleges Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development
University of Minnesota--Twin Cities
Wulling Hall, Rm. 330E
86 Pleasant St. SE
Minneapolis, MN  55455

612-624-1006
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- For now the courses will be based on the UM Twin Cities campus.
- Degree: Private College Leadership PBacc Cer

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Created for professionals who are in faculty positions or beginning levels of college administration, this graduate-level certificate offers specific knowledge and skills related to organizational development, leadership, entrepreneurship, and decision-making necessary for leading independent colleges. The Emerging Leaders in Independent Colleges curriculum is designed for individuals who seek to move into leadership positions but do not have formal training related to leadership and management of independent colleges.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited institution.

Other requirements to be completed before admission:
Two years of experience in a professional position in higher education.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Course List
Take exactly 4 course(s) totaling exactly 12 credit(s) from the following:
- OLPD 5002 - Private Colleges as Formal Organizations (3.0 cr)
- OLPD 5332 - Personal Leadership and the Private College (3.0 cr)
- OLPD 5845 - The Entrepreneurial Private College (3.0 cr)
- OLPD 5902 - Leading Change in Private Colleges (3.0 cr)
Twin Cities Campus

Family Education M.Ed.

Family Social Science

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Ave, St. Paul, MN 55108 (612-624-1294; fax: 612-625-4227)
Email: famed@umn.edu
Website: http://cehd.umn.edu/FSoS/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.) Plan C in family education develops and strengthens professionals' competencies to work with individuals and families to enhance family life. This graduate-level, practitioner-based program is offered by the Department of Family Social Science (FSoS). The program prepares licensed teachers to further develop their knowledge and skills in the family education field, or non-licensed professionals to work with adults, youth, or children in a variety of settings. This program prepares parent educators for positions in an early childhood family education (ECFE) program in Minnesota, as well as for positions in health care, social service agencies, and religious settings in Minnesota and in other states and countries. Diversity and cultural responsiveness are integrated throughout coursework, student teaching, and observation experiences. Students may fulfill requirements for a parent educator license, parent education certificate, or community and learning certificate as part of this degree. With guidance from faculty advisors, students choose at least 30 semester credits of work that may include courses, independent study, internships, and workshops.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
A bachelor's degree from an accredited institution in family studies, child psychology, early childhood education, nutrition, or related fields. A 2.80 overall GPA in undergraduate work.

Special Application Requirements:
Application deadlines are March 1 and October 1. Apply Online at https://app.applyyourself.com/?id=umtc-cehd.

For program specific application details see http://www.cehd.umn.edu/fsos/prospective/famed.asp

International Students: Please note, this program is not offered full-time and therefore is not intended for international students needing a visa to study in the US.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language
Program Requirements

Plan C: Plan C requires 30 to 31 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Family Education M.Ed. requires 30 credits in consultation with the adviser.

Students complete: 15 credits in family education, including FSOS 5902 Family Education Perspectives (3 cr); 5-6 credits in coursework with a focus on educational processes that are not limited to a specific subject matter (family ed courses do not count for this (e.g. FSOS 5949)); 9-10 credits in coursework with a supporting focus on family, children, and/or youth issues; a degree completion interview/examination.

Required Coursework

FSOS 5902 - Family Education Perspectives (3.0 cr)

Recommended Coursework

Recommended courses that fulfill the major area of family education are within the department and include:

FSOS 5900 - Special Topics in Family, Youth, and Community (1.0 - 4.0 cr)

or FSOS 5906 - Program Planning in Family Education (3.0 cr)

or FSOS 5932 - Introduction to Parent Education (1.0 cr)

or FSOS 5937 - Parent-Child Interaction (3.0 cr)

or FSOS 5942 - Everyday Experiences of Families (2.0 cr)

or FSOS 5943 - Parent Learning and Development: Implications for Parent Education (2.0 cr)

or FSOS 5944 - Parent Education Curriculum (2.0 cr)

or FSOS 5945 - Teaching and Learning in Parent Education (2.0 cr)

or FSOS 5946 - Assessment and Evaluation in Parent Education (2.0 cr)

or FSOS 5949 - Student Teaching in Parent Education (2.0 cr)

Educational Processes

OLPD 5201 - Strategies for Teaching Adults (3.0 cr)

or CI 5351 - Technology Tools for Educators (3.0 cr)

Supporting Focus: Family/Children/Youth

FSOS 5946 - Assessment and Evaluation in Parent Education (2.0 cr)

or FSOS 5949 - Student Teaching in Parent Education (2.0 cr)

or CPSY 4302 - Infant Development (3.0 cr)

or CPSY 4331 - Social and Personality Development (3.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Parent Education Teaching License

A teacher of parent and family education is authorized to instruct parents in an early childhood family education (ECFE) program. A parent educator plans, coordinates, and teaches in an instructional program that addresses the intellectual, emotional, cultural, social, and physical needs of both parents and children. Parent education seeks to support respectful, reciprocal interactions between parents and their children.

In Minnesota, a parent educator license is required for employment in an ECFE program. The purpose of the license is to ensure, through scholarly preparation, that parent educators are well-prepared professionals who are qualified to deliver educational programs
for parents.

Coursework for the sub plan M.Ed. is organized by teaching license requirements.

**M.Ed. Required Course**
- FSOS 5902 - Family Education Perspectives (3.0 cr)

**Parenting Ed Courses**
- FSOS 5932 - Introduction to Parent Education (1.0 cr)
- FSOS 5937 - Parent-Child Interaction (3.0 cr)
- FSOS 5942 - Everyday Experiences of Families (2.0 cr)
- FSOS 5943 - Parent Learning and Development: Implications for Parent Education (2.0 cr)
- FSOS 5944 - Parent Education Curriculum (2.0 cr)
- FSOS 5945 - Teaching and Learning in Parent Education (2.0 cr)
- FSOS 5946 - Assessment and Evaluation in Parent Education (2.0 cr)
- FSOS 5949 - Student Teaching in Parent Education (2.0 cr)

**Child Development, Human Relations, & Fundamentals of Drug & Alcohol Abuse**
- CPSY 4302 - Infant Development (3.0 cr)
- CPSY 4331 - Social and Personality Development (3.0 cr)
- EPSY 5135 - Human Relations Workshop (4.0 cr)
- PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)

**M.Ed. Elective Education Processes**
- EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
  or OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
  or CI 5351 - Technology Tools for Educators (3.0 cr)
Twin Cities Campus
Family Social Science M.A.
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/default.asp

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program of study uses methods of social science to examine family systems and their interactions with various environments. The curriculum supports study in several broad theme areas: family economic well-being, families and mental health, family diversity, and relationships and development across the lifespan.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Three overall criteria guide admissions decisions: 1) evidence of strong academic preparation and the ability and desire to perform graduate level scholarship, including research; 2) fit of the applicant’s professional goals with family social science (FSoS) faculty scholarship and with the overall FSoS mission, that is, enhancing the well-being of diverse families in a changing world; and 3) unique contributions applicant would make to FSoS values, including social relevance, collaboration, inclusiveness, excellence, innovation, and diversity.

Special Application Requirements:
For more information about application requirements and procedures, consult the Family Social Science web page at http://www.cehd.umn.edu/fsos/default.asp.

Applicants for the master’s program are reviewed only once per year. The application deadline is December 1 for admission fall semester of the following year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Students must demonstrate familiarity with the tools of research or scholarship in the field of family social science, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project.

The project should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The graduate faculty specifies both the nature and extent of the options available to satisfy this requirement, and whether the requirement is to be satisfied in conjunction with, or independent of, the courses in the student's program.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.50 is required for students to remain in good standing.

The MA program is offered under Plan A and Plan B. The Plan A master's is recommended for students who intend to pursue a PhD degree. The Plan B master's is for students who wish to further their education so that they may hold positions of responsibility serving families. Although the instruction is based on research, the Plan B degree is not intended to provide intensive research training. The Plan B program is understood to be a terminal degree and is not recommended for students who intend to pursue the PhD degree. Consult the department for the most current information.

Plan A
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 8200 - Orientation for Family Social Science (1.0 cr)

Emphasis or Area of Concentration
- FSOS 5015 - Family Research Laboratory (1.0 cr)

One course in FSOS (3.0 cr)

Supporting Program
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Thesis Credits
Plan A students must complete at least 10 master's thesis credits.
- FSOS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8200 - Orientation for Family Social Science (1.0 cr)

One of the following 3-credit research methods courses.
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- or Evaluation research methods course (3.0 cr)

Emphasis or Area of Concentration
- FSOS 5015 - Family Research Laboratory (1.0 cr)

Four additional 3-credit FSOS courses in student's chosen field of concentration.

Supporting Program
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)

One course outside FSoS (3.0 cr)

Plan B Project
Take exactly 4 credit(s) from the following:
- FSOS 8755 - Master's Paper: Plan B Project (1.0 - 6.0 cr)
Twin Cities Campus
Family Social Science Minor
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227).
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/default.asp

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program of study for the family social science graduate minor uses methods of social science to examine family systems and their interactions with various environments. The curriculum supports study in core family social science coursework including family theories, family research methods, and core family content.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Master’s students must complete at least 6 credits of 5xxx or 8xxx coursework in family social science.

Doctoral students must complete at least 12 credits of 5xxx or 8xxx coursework in family social science.

All courses for the minor must be taken A-F and completed with a GPA of at least 3.00.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Required
Take 12 or more credit(s) from the following:

Required
• FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
• FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)
FSOS 8xxx
• FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
• FSOS 5015 - Family Research Laboratory (1.0 cr)
or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
or FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)

Masters
Required
Take 6 or more credit(s) from the following:
• FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)

FSOS Electives
• FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)
or FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
• FSOS 5015 - Family Research Laboratory (1.0 cr)
or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
or FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
Twin Cities Campus
Family Social Science Ph.D.
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/default.asp

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 72 to 75
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program of study for the PhD in family social science uses methods of social science to examine family systems and their interactions with various environments. The curriculum supports study in several broad theme areas: family economic well-being, families and mental health, family diversity, and relationships and development across the lifespan.

Accreditation
This program is accredited by Commission on Accreditation for Marriage and Family Therapy Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Three overall criteria guide admissions decisions: 1) evidence of strong academic preparation and the ability and desire to perform graduate level scholarship, including research; 2) fit of the applicant’s professional goals with family social science (FSoS) faculty scholarship and with the overall FSoS mission, that is, enhancing the well-being of diverse families in a changing world; and 3) unique contributions the applicant would make to FSoS values, including social relevance, collaboration, inclusiveness, excellence, innovation, and diversity.

Special Application Requirements:
Students may apply for admission to the Ph.D. program, family science specialization, after completing either a bachelor’s degree or a master’s degree. Students who enter the Ph.D. program with a bachelor’s degree are expected to fulfill the requirements for an M.A. degree in the process of working toward the Ph.D. Students applying for the specialization in Couple and Family Therapy must have a clinical master’s degree or have achieved equivalent clinical experience as determined by the Couple Family Therapy faculty. Students cannot earn a clinical master’s degree in the Department of Family Social Science.

For more information about application requirements and procedures, consult the Family Social Science Prospective Students web page at http://www.cehd.umn.edu/fsos/prospective/default.asp.

Applicants for the doctoral program are reviewed only once per year. The application deadline is December 1, for admission to fall semester of the following year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
48 to 51 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.5 is required for students to remain in good standing.

Courses in the PhD degree program must contribute to an organized program of study and research. The program requires at least 72 credits, including a minimum of 48 course credits and 24 dissertation credits. Coursework includes at least 23 credits in core family theory and research methods, 9 credits in statistics, and 7 directed research credits. In addition, students complete one of two designated specializations: family science (9 additional credits) or couple and family therapy (12 additional credits). An optional teaching internship program is recommended for students who are planning for careers in higher education.

Major Field Credits—Depending on previous preparation and the nature of the research undertaken, the number of credits required for individual students, even within the same major field, may vary considerably.

Core Requirements
Take the following courses for a total of 23 credits:
- FSOS 8200 - Orientation for Family Social Science (1.0 cr)
- FSOS 8001 - Conceptual Frameworks in the Family (3.0 cr)
- FSOS 8002 - Advanced Family Conceptual Frameworks (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- FSOS 8015 - Advanced Qualitative Family Research Methods (3.0 cr)
- FSOS 5014 - Quantitative Family Research Methods I (3.0 cr)
- FSOS 5015 - Family Research Laboratory (1.0 cr)
- FSOS 8014 - Quantitative Family Research Methods II (3.0 cr)
- FSOS 8101 - Family Stress, Coping, and Adaptation (3.0 cr)

Directed Research
Take FSOS 8794 during the first three years of the program, for a total of 7 credits. Take 7 or more credit(s) from the following:
  • FSOS 8794 - Directed Research in Family Social Science (1.0 - 6.0 cr)

Statistics or Methods
Take one of the following statistics/methods sequences for a total of 9 credits:

Family Science
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

Advanced Statistics or Methods (3.0 cr)

or Couple & Family Therapy
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)
- FSOS 8036 - Couple/Marriage and Family Therapy Research (3.0 cr)
Specialization Requirements

Family Science Specialization Requirements
Family Science Electives
Take at least 6 credits in consultation with the advisor.

Community/Engagement/Internship Experience
Take 3 credits of coursework to fulfill the specialization's community, engagement, or internship experience requirement, chosen in consultation with advisor.

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Couple & Family Therapy Specialization Requirements
Family Therapy Supervision
Take 3 or more credit(s) from the following:
• FSOS 8034 - Marriage and Family Therapy Supervision (3.0 cr)

Family Therapy Practicum
Take FSOS 8295 twice for a total of 6 credits.
Take 6 or more credit(s) from the following:
• FSOS 8295 - Couple/Marriage Family Therapy Practicum (1.0 - 6.0 cr)

Family Therapy Internship
Take 3 or more credit(s) from the following:
• FSOS 8296 - Couple/ Marriage Family Therapy Internship (1.0 - 12.0 cr)
**Twin Cities Campus**

**Human Resource Development M.Ed.**

Organizational Leadership, Policy and Development

College of Education and Human Development

Link to a list of faculty for this program.

**Contact Information:**

Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455

(612-624-1006; fax: 612-624-3377)

Email: olpd@umn.edu

Website: [http://www.cehd.umn.edu/olpd](http://www.cehd.umn.edu/olpd)

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies program in human resource development (HRD) focuses on training of human resources and organizational change issues. This graduate-level, practitioner-based program can be tailored to meet the needs of individual students. The HRD program is offered by the Department of Organizational Leadership, Policy, and Development (OLPD) in the College of Education and Human Development (CEHD). Courses at the University of Minnesota campus are offered at a variety of times, including late afternoons and evenings. Students may also enroll in courses offered during the summer and at off-campus sites.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 2.80.

**Special Application Requirements:**

In addition to Statements #1 & 2, applicants must upload or submit a résumé and personal statement describing their career goals and rationale for interest in the M.Ed. program (limit two pages) along with the application. Two letters of recommendation must also be submitted. Applications are accepted on a rolling basis with semester deadlines of March 1 (Summer), July 1 (Fall) and November 1 (Spring).

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 22 major credits and 12 credits outside the major. There is no final exam.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Course Requirements
Students not holding an undergraduate degree in HRD must complete at least 34 credits, including the following courses listed below.

Note: For OLPD 5696 at least 4 credits are required and no more than 6 credits will count toward the program.
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
OLPD 5605 - Strategic Planning through Human Resources (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 5615 - Training and Development of Human Resources (3.0 cr)
OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Twelve (12) elective credits approved by a faculty adviser.

U of M HRD UG Degree Continuing Students
Students holding an undergraduate HRD degree from the University of Minnesota will not be required to retake courses completed during the undergraduate program. Students must still take a total of 34 credits of graduate coursework in the program. Of this, students must complete at least 16 credits in HRD-designated courses as described below. Note: For OLPD 5696 at least 4 credits are required and no more than 6 credits will count toward the program.

Required Courses (16 cr)
OLPD 5605 - Strategic Planning through Human Resources (3.0 cr)
OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Option 1 (6 cr)
Organization Development Specialization
OLPD 5607 - Organization Development (3.0 cr)
OLPD 8602 - Advanced Organization Development (3.0 cr)

Option 2 (6 cr)
Training and Development Specialization
OLPD 5615 - Training and Development of Human Resources (3.0 cr)
OLPD 8601 - Advanced Training and Development of Human Resources (3.0 cr)

Additional HRD Courses (6 cr)
6 additional HRD credits approved by faculty adviser
Electives (12 cr)
12 elective credits approved by faculty adviser

Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
Requirements for the Rochester sub-plan are the same as those listed in general description. Students may take courses on Twin Cities or Rochester campuses.
Twin Cities Campus

Human Resource Development Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006, fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2016
• Length of program in credits: 14
• This program does not require summer semesters for timely completion.
• Degree: Human Resource Development PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program in human resource development (HRD) focuses on training of human resources and organizational change issues. The HRD program is offered by the Organizational Leadership, Policy, and Development (OLPD) in the College of Education and Human Development (CEHD). Courses at the University of Minnesota campus are offered at a variety of times, including late afternoons and evenings.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students who possess a U.S. bachelor's degree (or international equivalent). Applications are reviewed on an ongoing basis and may be submitted at any time.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Required Courses
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
OLPD 5615 - Training and Development of Human Resources (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)

Internship or Field Experience
4 credits is recommended for either option below
Take exactly 1 course(s) totaling 3 - 6 credit(s) from the following:
• OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
• OLPD 5296 - Field Experience in Adult Education (1.0 - 6.0 cr)

Electives
The remaining credits can be selected from the following:
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
or Additional OLPD courses with adviser approval to make total credits earned equal at least 14 credits.
Twin Cities Campus
Infant and Early Childhood Mental Health Postbaccalaureate Certificate
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Road, Minneapolis, MN 55455 (612-625-2252; fax: 612-624-6373).
Email: lepin008@umn.edu
Website: http://www.cehd.umn.edu/CEED/certificateprograms/iecmh/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 21
- This program requires summer semesters for timely completion.
- Degree: Infant & Early Childhood Mental Health PBac Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota Infant and Early Childhood Mental Health (IECMH) Certificate Program is an intensive, interdisciplinary postbaccalaureate training program for students and professionals in domains of mental health, health and early care and education.

The program serves to deepen the knowledge and skills of individuals working in birth-to-five prevention, intervention, program administration, and policy development, and to prepare individuals to provide leadership in expanding the breadth and depth of relationship-based services and policies.

The IECMH certificate program is founded on a core set of principles of infant and early childhood mental health practice, asserting that services to families should be relationship-based, culturally sensitive, grounded in an understanding of developmental theory and research with special attention to the effects of trauma, and supported by reflective practice.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to this program is currently suspended.

Applicants must hold at least a baccalaureate degree from an accredited college or university in a related area (e.g., child development, social work, child psychology) or document at least two years of work experience in a related field.

The admissions model is cohort-based, with new cohorts usually admitted every other year. Admission to this program is currently suspended, but may be opened for fall 2015 at a future time. Please see our website for more details:
http://www.cehd.umn.edu/CEED/certificateprograms/iecmh/admissionprocess.html

Special Application Requirements:
Applicants must have at least two years of documented experience in early childhood research or practice.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of January 20, 2017
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Course requirements
- CPSY 5501 - Foundations in Infant and Early Childhood Mental Health I (3.0 cr)
- CPSY 5503 - Foundations in Infant and Early Childhood Mental Health II (3.0 cr)
- CPSY 5506 - Infant Observation Seminar I (1.0 cr)
- CPSY 5508 - Infant Observation Seminar II (1.0 cr)
- CPSY 5511 - Infant Observation Seminar III (1.0 cr)
- CPSY 5513 - Assessment in Infant and Early Childhood Mental Health: DC 0-3R (2.0 cr)
- CPSY 5515 - Assessment in Infant and Early Childhood Mental Health: NCAST (2.0 cr)
- CPSY 5518 - Prevention and Intervention in Infant and Early Childhood Mental Health I (3.0 cr)
- CPSY 5521 - Prevention and Intervention in Infant and Early Childhood Mental Health II (3.0 cr)
- CPSY 5523 - Reflective Supervision in Infant and Early Childhood Mental Health: Community-based (1.0 cr)
- CPSY 5525 - Reflective Supervision in Infant and Early Childhood Mental Health: Clinical (1.0 cr)
Twin Cities Campus

Integrative Leadership Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455 (612-624-1006)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/grad-programs/ILM/default.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate-level academic minor in integrative leadership (ILM) will enhance the preparation of graduate students to lead and foster collective actions across boundaries of individuals, groups, organizations, sectors, and nations to solve some of the world's most pressing and complex problems.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Prior admission into an established master's, doctoral, or graduate professional degree program is required. Students interested in admission to the minor should contact the ILM director of Graduate Studies. Admission requires the addition of the required minor coursework to the student's graduate degree program form and the ILM director of Graduate Studies's signature on the form. Students must demonstrate relevant academic background and experience.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Any student in any University of Minnesota graduate or professional program, regardless of college or enrollment, is encouraged to apply for this minor. Students must already be admitted to a master's, doctoral, or professional degree program at the University of Minnesota.

Doctoral students will need to take an additional course from either the Overview of Leadership Theory or Leading Engagement Processes Subgroups to total the 12 credits required of the doctoral minor.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Overview of Leadership Theory
Take 3 - 6 credit(s) from the following:
- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 8020 - Leadership: From Theory to Reflective Practice (3.0 cr)
PA 5011 - Management of Organizations (3.0 cr)
PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)
Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the Director of Graduate Studies for the Integrative Leadership Minor.

Leading Engagement Processes
If student is taking PA 5990 to fulfill this requirement it should be for section called "Neighborhood Collaborative Engagement (CHANGE)."

MGMT 6035 is cross listed with LAW 6626.
Take 3 - 6 credit(s) from the following:
- MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
- MGMT 6410 - Corporate Responsibility (2.0 cr)
- OLPD 5736 - Public Engagement and Higher Education (3.0 cr)
- OLPD 6490 - Managing Civic Engagement (3.0 cr)
- PA 5145 - Civic Participation in Public Affairs (3.0 cr)
- PA 5253 - Designing Planning and Participation Processes (3.0 cr)
- PA 5990 - Topics: Public Affairs General Topics (0.0 - 3.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the Director of Graduate Studies for the Integrative Leadership Minor.

Required Final Course
All students must take one of the following:
- LAW 6623 - Integrative Leadership: From Theory to Practice (3.0 cr)
or
- MGMT 6402 - Integrative Leadership: From Theory to Practice (3.0 cr)
or
- OLPD 6402 - Integrative Leadership Seminar (3.0 cr)
or
- PA 5105 - Integrative Leadership Seminar (3.0 cr)
or
- PUBH 6702 - Integrative Leadership Seminar (3.0 cr)

Additional Coursework
A minimum of 3 additional credits must be selected from the list of electives below. With permission from the ILM director of Graduate Studies, students with sufficient background and previous course experience equivalent to one or more courses within the curriculum may apply for waiver of appropriate requirements and replace waived courses with additional electives. PA 5190 is a topics course and topic must be approved by ILM director of Graduate Studies prior to registering for course.

IBUS 6316 - Sustainability & Cooperative Advantage in Scandinavia (4.0 cr)
or
- MGMT 6004 - Negotiation Strategies (2.0 cr)
or
- MGMT 6032 - Strategic Alliances (2.0 cr)
or
- MGMT 6034 - Strategic Leadership (2.0 cr)
or
- MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
or
- MGMT 6040 - International Strategy and Organization (2.0 cr)
or
- NURS 7610 - System Leadership and Innovation (3.0 cr)
or
- OLPD 5323 - Women in Leadership (3.0 cr)
or
- OLPD 5332 - Personal Leadership and the Private College (3.0 cr)
or
- OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
or
- PA 5103 - Leadership and Change in an Innovation Society (3.0 cr)
or
- PA 5190 - Topics in Public and Nonprofit Leadership and Management (1.0 - 3.0 cr)
or
- PA 5251 - Strategic Planning and Management (3.0 cr)
or
- PA 5405 - Public Policy Implementation (3.0 cr)
or
- PA 5920 - Skills Workshop (0.5 - 4.0 cr)
or
- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)

Masters

Overview of Leadership Theory
Take 3 or more credit(s) from the following:
- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
or
- OLPD 8020 - Leadership: From Theory to Reflective Practice (3.0 cr)
or
- PA 5011 - Management of Organizations (3.0 cr)
or
- PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 3.0 cr)

Other
Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the director of Graduate Studies for the integrative leadership minor.

Leading Engagement Processes
If student is taking PA 5990 to fulfill this requirement it should be for section called "Neighborhood Collaborative Engagement (CHANGE)."

MGMT 6035 is cross listed with LAW 6626.
Take 3 or more credit(s) from the following:

- MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
- MGMT 6410 - Corporate Responsibility (2.0 cr)
- OLPD 5736 - Public Engagement and Higher Education (3.0 cr)
- OLPD 6490 - Managing Civic Engagement (3.0 cr)
- PA 5145 - Civic Participation in Public Affairs (3.0 cr)
- PA 5253 - Designing Planning and Participation Processes (3.0 cr)
- PA 5990 - Topics: Public Affairs General Topics (0.0 - 3.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)

- Other Courses on overview of leadership theory and development from other colleges may be substituted for this core course subject to approval by the director of Graduate Studies for the integrative leadership minor.

Required Final Course
All students must take one course from the following:

- LAW 6623 - Integrative Leadership: From Theory to Practice (3.0 cr)
- or MGMT 6402 - Integrative Leadership: From Theory to Practice (3.0 cr)
- or OLPD 6402 - Integrative Leadership Seminar (3.0 cr)
- or PA 5105 - Integrative Leadership Seminar (3.0 cr)
- or PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
International Education Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary minor in international education is for students enrolled in any masters or doctoral program who wish to enter careers in research, consulting, administration, and teaching in an international context. The minor offers a coordinated set of courses from the Departments of Curriculum and Instruction; Educational Psychology; Organizational Leadership, Policy, and Development; the School of Kinesiology; and the Institute of Child Development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Admission is contingent upon being admitted to a master's or a doctoral degree-granting program at the University of Minnesota. For an application form visit the international education minor website (http://www.cehd.umn.edu/olpd/grad-programs/CIDE/gradminor.html) or consult with the director of graduate studies for more information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Each program is developed in consultation with the student, the student's advisor, major director of graduate studies, and director of graduate studies for international education. Requirements include courses listed below. Electives from the University may be added with the advisor's consent and director of graduate studies approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Core Courses
Take 1 or more course(s) from the following:
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8103 - Comparative Education (3.0 cr)

**Area Specific Coursework**

Students interested in OLPD 5080 or OLPD 8087 should consult minor advisor prior to registration, as these courses can vary and may or may not be appropriate for this minor.

Take 6 or more credit(s) from the following:
• AFEE 5361 - World Development Problems (3.0 cr)
• CI 5145 - Critical Pedagogy (3.0 cr)
• CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
• CI 8150 - Research Topics in Curriculum & Instruction (1.0 - 6.0 cr)
• CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8650 - Seminar: Special Topics in Second Languages and Cultures Research (1.0 - 3.0 cr)
• EPSY 8403 - Social/Cultural Contexts: Counseling and Skills (3.0 cr)
• OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
• OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 5612 - International Human Resource Development (3.0 cr)
• OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8842 - Comparative Systems in Organizational Leadership, Policy, and Development (3.0 cr)
• PA 5414 - Child Human Rights: Work and Education (3.0 cr)

**Doctoral Core Courses**

Students interested in OLPD 8087 should consult minor advisor prior to registration, as this course can vary and may or may not be appropriate for this minor.

Take 2 or more course(s) from the following:
• OLPD 5103 - Comparative Education (3.0 cr)
• OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
• OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8103 - Comparative Education (3.0 cr)

**Area specific coursework**

Students interested in OLPD 5080 should consult minor advisor prior to registration, as this course can vary and may or may not be appropriate for this minor.

Take 6 or more credit(s) from the following:
• AFEE 5361 - World Development Problems (3.0 cr)
• CI 5145 - Critical Pedagogy (3.0 cr)
• CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
• CI 8150 - Research Topics in Curriculum & Instruction (1.0 - 6.0 cr)
• CI 8645 - Indigenous Language Revitalization and Activist Research Methods (3.0 cr)
• CI 8650 - Seminar: Special Topics in Second Languages and Cultures Research (1.0 - 3.0 cr)
• EPSY 8403 - Social/Cultural Contexts: Counseling and Skills (3.0 cr)
• OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
• OLPD 5121 - Educational Reform in International Context (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 5612 - International Human Resource Development (3.0 cr)
• OLPD 8101 - International Education and Development (3.0 cr)
• OLPD 8842 - Comparative Systems in Organizational Leadership, Policy, and Development (3.0 cr)
• PA 5414 - Child Human Rights: Work and Education (3.0 cr)
Twin Cities Campus
Interpersonal Relationships Research Minor
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, University of Minnesota, S354 Elliott Hall, 75 East River Parkway, Minneapolis, MN 55455 (612-626-0025)
Email: simps108@umn.edu
Website: http://www.cehd.umn.edu/icd/Programs/IrelMinor/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in interpersonal relationships research provides doctoral students with a broad theoretical and methodological foundation for research on behavioral interaction patterns between two persons and the impact of these interactions.

A recently recognized and rapidly advancing interdisciplinary field of scientific inquiry, interpersonal relationships research has its roots in psychology, sociology, family studies, communication, and nursing. The program brings together faculty and students from eight University departments and schools.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the interpersonal relationships research graduate minor is contingent upon prior admission to a doctoral program in a degree-granting department. Admission to the minor program is limited and only by permission of the director of graduate studies in interpersonal relationships research.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Required Coursework
IREL 8001 - Proseminar in Interpersonal Relationships Research (2.0 cr)
IREL 8021 - Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- or PSY 8202 - Close Relationships (3.0 cr)
6 additional credits selected in consultation with minor adviser.

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Information current as of January 20, 2017
Twin Cities Campus
K-12 Technology Integration Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-4006; fax: 612-624-8277)
Email: CIAinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: T E L: K-12 Technology Integration PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The K-12 Technology Integration certificate program prepares students to use technology (computers and the web) to develop instructional materials for use in a wide range of educational contexts (note that a university certificate program or certificate is distinct from a state certificate or certification).

The program is designed for K-12 teachers or administrators interested in using technology in the classroom.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one page goal statement. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (12 credits)
Required courses are listed; students will also take one additional CI 5xxx course for 3 credits that complements content area, elementary/secondary focus, and individual interests. CI 5330 should be taken for 3 credits.
CI 5330 - Special Topics in Learning Technologies (3.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)
CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
Twin Cities Campus

Kinesiology M.S.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue SE, Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700).
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Kinesiology spans a wide range of inquiry connected by the common thread of the study of human movement. Graduate programs reflect a broad study of physical activity ranging from exercise science, movement science and human performance, to social and behavioral science and sport management. Much of the research conducted in the school is interdisciplinary in nature and involves collaborative partnerships with life science disciplines such as medicine, neuroscience, and epidemiology and fosters links with business, education, and social sciences. MS students pursue an individualized program with an emphasis in one of the following areas: biomechanics and neuromotor control; exercise physiology; perceptual-motor control and learning; physical activity and sport science with concentrations in behavioral aspects of physical activity, sport and exercise psychology, or sport sociology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Although prospective masters students generally have an undergraduate degree in kinesiology or the health sciences, others with a baccalaureate degree who have related preparation and a significant background and interest in the scientific study of physical activity may be admitted.

Special Application Requirements:
Applicants must submit a University of Minnesota Graduate Admissions application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts. Deadline for submission of all application materials is December 1 for the following fall admission. Students generally are admitted for the fall semester only.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
The preferred English language test is Test of English as Foreign Language (TOEFL, IELTS, MELAB).

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 18 major credits and 12 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is an independent research project with the adviser that meets the following guidelines: Involves a total of approximately 120 hours of work; demonstrates familiarity with the tools of research and scholarship in the field of kinesiology; demonstrates the ability to work independently; and demonstrates the ability to effectively present the results of the investigation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The MS is offered under Plan A and Plan B. Plan A requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field (including a minimum of 3 credits in statistics as determined by emphasis area) and 10 thesis credits (8777). Plan B also requires 30 credits, including at least 14 major course credits in kinesiology, a capstone project of 4 credits in KIN 8995, at least 6 course credits in a minor or related field (including a minimum of 3 credits in statistics as determined by emphasis area), and 6 additional credits in any of these areas. A maximum of 9 credits of 4xxx-level courses are allowed at the discretion of the advisor.

For both Plan A and Plan B, students must take KIN 5981 (3 cr), KIN 8980 (1 cr), and at least 3 credits of statistics or equivalent as defined by the emphasis area. A GPA of at least 3.00 is required to maintain good academic standing and to graduate.

**Required courses**

The MS in kinesiology has the following requirements. In addition, Plan A students must take 10 credits of KIN 8777; and Plan B students must take 4 credits of KIN 8995.

- **KIN 5981** - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
- **KIN 8980** - Graduate Research Seminar in Kinesiology (1.0 cr)

**Minor or related field**

At least 6 credits in a related field are required, including a minimum of 3 credits in statistics as required by the emphasis area.

**Emphasis Areas**

Kinesiology MS students concentrate their studies in one of the following areas: behavioral aspects of physical activity, biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, sport and exercise psychology, or sport sociology.

**Behavioral Aspects of Physical Activity**

This emphasis examines behavioral interventions for physical activity adoption and maintenance; the epidemiology of physical activity; psychosocial theories related to physical activity promotion; understanding sedentary behavior; and the objective and subjective assessment of physical activity. In addition to the MS requirements, students choose courses from the following lists with advisor consultation.

**Recommended courses**

Plan A and Plan B students take a minimum of 10 major course credits chosen from the following list. Registration for KIN 5720 is limited to 3 credits.

- **KIN 5122** - Applied Exercise Physiology (3.0 cr)
- or **KIN 5123** - Motivational Interventions in Physical Activity (3.0 cr)
or KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
or KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
or KIN 5375 - Sport and Gender (3.0 cr)
or KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
or KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
or KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
or KIN 8126 - Sports Medicine Psychology (3.0 cr)
or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

Minor or Related Field

Plan A and Plan B students take 3 credits of statistics (EPSY 5261 or EPSY 8261). Plan A students take an additional 3 related-field credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for related fields are listed below. Possible minors include public health (9 credits) or child psychology or psychology (9 credits).

EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 8262 - Statistical Methods in Education II (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
or PUBH 6914 - Community Nutrition Intervention (3.0 cr)

OR-

Biomechanics and Neuromotor Control

Only Plan A students are accepted in this emphasis. The study of the mechanical and electromyographic analysis of human motion is combined with neurophysiological knowledge about the various neuronal subsystems to provide a basis for understanding how the brain controls bodily and limb motion. KIN 8995 (3 cr) must be taken with the advisor to develop the thesis.

Recommended Courses

A minimum of 10 major course credits (not including KIN 8777) are needed outside of the requirements and may be chosen from the following list.

KIN 4441 - Movement Neuroscience (3.0 cr)
or RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
or KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
or KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
or KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
or KIN 8132 - Seminar: Motor Development (3.0 cr)
or KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
or KIN 8211 - Seminar: Perception and Action (3.0 cr)
or KIN 8995 - Research Problems in Kinesiology (1.0 - 12.0 cr)

Minor or related field

A minimum of 6 semester credits are required in one or more related fields (not KIN prefix). One statistics course and an additional course are required, chosen from the following list. Minor option: clinical physiology and movement science.

EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 8262 - Statistical Methods in Education II (3.0 cr)
or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 7405 - Biostatistics: Regression (4.0 cr)
or PUBH 7406 - Advanced Regression and Design (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5601 - Nonparametric Methods (3.0 cr)
or KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

OR-

Exercise Physiology

Exercise physiology is the study of issues related to acute and chronic effects of physical activity on human physiological systems and health, and how fundamental concepts of human energetics and mechanics apply to exercise, sport, physical exertion, and health promotion. In addition to the MS requirements, students choose courses from the following lists with advisor consultation.

Plan A and Plan B students take a minimum of 10 major course credits chosen from the following list.

KIN 5122 - Applied Exercise Physiology (3.0 cr)
or KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
or KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
or KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)

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Minor or related field

For Plan A and Plan B, a minimum of 6 course credits in statistics are required and may be chosen from the following list. Plan B students will choose an additional minimum of 6 credits in any related field with guidance from the advisor.

EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 8261 - Statistical Methods in Education I (3.0 cr)
EPSY 8262 - Statistical Methods in Education II (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

-OR-

Sport and Exercise Psychology

Students will examine the thoughts, feelings, and actions of participants in physical activity contexts such as sport, exercise, physical education, health and wellness and sports medicine. Multidisciplinary research and outreach are conducted through the Tucker Center for Research on Girls & Women in Sport and other entities. In addition to the MS requirements, students choose courses from the following lists with advisor consultation. In addition, Plan A students take a minimum of 3 credits and Plan B students take a minimum of 9 credits in any related field in consultation with the advisor.

Recommended Courses

For Plan A and Plan B, a minimum of 10 major course credits are needed outside the requirements and may be chosen from the following list:

KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
KIN 5136 - Psychology of Coaching (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
KIN 5375 - Youth Sport Science (3.0 cr)
KIN 5511 - Sport and Gender (3.0 cr)
KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
KIN 8126 - Sports Medicine Psychology (3.0 cr)
KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)

Minor or related field

Plan A and Plan B students take 3 credits of statistics (EPSY 5261 or EPSY 8261). Plan A students take an additional 3 related-field credits and Plan B students take an additional 9 related-field credits in consultation with the advisor. Recommended courses for
related fields are listed below. Recommended minors include psychology or child psychology (6 credits of graduate-level EPSY courses); educational psychological foundations (6 credits of graduate-level EPSY courses); public health (6 cr)

EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 5401 - Counseling Procedures (3.0 cr)
or PSY 5207 - Personality and Social Behavior (3.0 cr)

-OR-

Sport Sociology
Sport sociology is the scientific study of human behavior and social organization in the sport context, focusing on behavior patterns and social processes that occur in the organizational and management systems in which sport exists. The program is housed in the Tucker Center for Research on Girls & Women in Sport, an interdisciplinary research institute. In addition to the MS requirements, students choose courses from the following lists with advisor consultation.

**Recommended Courses**
For Plan A and Plan B, a minimum of 10 major course credits are needed outside the requirements and may be chosen from the following list:

KIN 5136 - Psychology of Coaching (3.0 cr)
or KIN 5371 - Sport and Society (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
or KIN 5801 - Legal Aspects of Sport and Recreation (4.0 cr)

**Minor or related field**
Plan A and Plan B students take 3 credits of statistics (EPSY 5261 or EPSY 8261). Plan A students take an additional 3 related-field course credits and Plan B students take an additional 9 related-field course credits in consultation with the advisor.

EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or COMM 5221 - Media, Race, and Identity (3.0 cr)
Twin Cities Campus

Kinesiology Minor
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700).
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Master's students can choose a kinesiology minor in the following emphasis areas: behavioral aspects of physical activity, biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, sport and exercise psychology, and sport sociology. Doctoral students can pursue a kinesiology minor in these same emphasis areas, with the addition of the sport management emphasis.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires at least 6 credits of graduate-level kinesiology courses. A doctoral minor requires at least 12 credits of graduate-level kinesiology courses. Courses should be chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's

Minor Courses
Minor requires at least 6 credits of graduate-level kinesiology courses. Courses should be chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.

Doctoral

Minor Courses
Minor requires at least 12 credits of graduate-level kinesiology courses. Courses should be chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.
Twin Cities Campus
Kinesiology Ph.D.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue SE, Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

PhD students pursue an individualized program with an emphasis in biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, physical activity and sport science, or sport management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

It is preferred that applicants have completed a master's degree in the field of kinesiology or a related field and achieved an overall minimum GPA of 3.50.

Other requirements to be completed before admission:
Applicants must have completed a baccalaureate degree, generally in the following areas: kinesiology; exercise science; sport management; sport psychology/sociology; movement science; or related preparation and significant background and interest in the scientific study of physical activity.

Special Application Requirements:
Applicants must submit a University of Minnesota application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three recommendations from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts. Submission of all application materials by December 1 ensures priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students are admitted for the fall semester.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Listening Score: 14
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 to 29 credits are required in the major.
12 to 19 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires 36 to 48 course credits and 24 thesis credits. A minimum total of 60 credits and a maximum total of 72 credits are required to complete the program. Course credits include a minimum of 15 major program credits (including 3 credits of KIN 8980 Graduate Research Seminar), 6 credits in a supporting program or 12 credits in a doctoral minor, 6 research skills course credits, and 9 credits of mentored research experience. At least 6 major course credits, 6 research skills course credits, and 6 mentored experience course credits must be taken as a U of M enrolled student. A GPA of at least 3.00 is required to maintain good standing and to graduate.

Required Kinesiology Courses
A minimum of 3 credits of KIN 8980 and a minimum of 9 credits of KIN 8995 are required over the course of the program.

KIN 8980 - Graduate Research Seminar in Kinesiology (1.0 cr)
KIN 8995 - Research Problems in Kinesiology (1.0 - 12.0 cr)

Emphasis Areas
Kinesiology PhD students pursue an individualized program with an emphasis in biomechanics and neuromotor control, exercise physiology, perceptual-motor control and learning, physical activity and sport science, or sport management.

Biomechanics and Neuromotor Control
The study of the mechanical and electromyographic analysis of human motion is combined with neurophysiological knowledge about the various neuronal subsystems to provide a basis for understanding how the brain controls bodily and limb motion.

Emphasis courses
A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.

KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
KIN 8211 - Seminar: Perception and Action (3.0 cr)
KIN 8132 - Seminar: Motor Development (3.0 cr)
KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
NSC 5661W - Behavioral Neuroscience [WI] (3.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. Courses taken to fulfill the research skills course requirements can't be double counted to fulfill the supporting program requirement.

EPSY 8261 - Statistical Methods in Education I (3.0 cr)
EPSY 8262 - Statistical Methods in Education II (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 7405 - Biostatistics: Regression (4.0 cr)
or PUBH 7406 - Advanced Regression and Design (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5601 - Nonparametric Methods (3.0 cr)

Minor
Choose either minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: CGSC, CPMS, GER, HUMF, NSC, or PREV.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include exercise physiology, perceptual-motor control and learning, physical activity and sport science, or sport management. Recommended program areas for supporting courses include: BMEN, ME, NURS, OT, OTOL, PUBH, NSC and RSC.

KIN 5881 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
or KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

-OR-

Exercise Physiology
Exercise physiology is the study of issues related to acute and chronic effects of physical activity on human physiological systems and health, and how fundamental concepts of human energetics and mechanics apply to exercise, sport, physical exertion, and health promotion. Doctoral students learn to apply principles of physiology to solving problems related to functional responses and adaptations involved in human skeletal muscular activity.

Emphasis courses
A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx. KIN 8122 may be taken multiple times.

KIN 5122 - Applied Exercise Physiology (3.0 cr)
or KIN 5141 - Nutrition and Exercise for Health Promotion and Disease Prevention (3.0 cr)
or KIN 5142 - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
or KIN 5385 - Exercise for Healthy Aging & Disease Prevention and Management (3.0 cr)
or KIN 5435 - Advanced Theory and Techniques of Exercise Science (3.0 cr)
or KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
or KIN 5585 - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
or KIN 5641 - Scientific Theory and Application of Training and Conditioning in Sport (3.0 cr)
or KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
or KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)
or KIN 8122 - Seminar: Exercise Physiology (2.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. It is recommended to take a statistical sequence in either EPSY, STAT, or PUBH. It is not recommended to switch courses between departments unless agreed to by the advisor. Courses taken to fulfill the research skills courses requirement can't be double counted to fulfill the supporting program requirement.

EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 8262 - Statistical Methods in Education II (3.0 cr)
or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 7405 - Biostatistics: Regression (4.0 cr)
or PUBH 7406 - Advanced Regression and Design (4.0 cr)
or PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
or PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5601 - Nonparametric Methods (3.0 cr)

Minor
Choose either a minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: CGSC, CPMS, GER, HUMF, NSC, or PREV.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, perceptual-motor control and learning, physical activity and sport science, or sport management. Recommended areas for supporting program include: BIO, FSCN, OT, PHSL, PUBH, NSC, and RSC.
Perceptual-Motor Control and Learning
Perceptual-motor control and learning includes related areas of movement behavior inquiry. Motor learning is the study of the learning of movement skills and the factors that mediate learning, such as practice, perceptual guidance, or knowledge of results. Although a lifespan approach is emphasized, students may focus on one or more specific age periods, such as infancy, early childhood, adolescence, or later adulthood.

Emphasis courses
A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.
KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
or KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
or KIN 5941 - Clinical Movement Neuroscience (3.0 cr)
or KIN 8211 - Seminar: Perception and Action (3.0 cr)
or KIN 8132 - Seminar: Motor Development (3.0 cr)
or KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
or RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. It is recommended to take a statistical sequence in either EPSY, STAT, or PUBH. It is not recommended to switch courses between departments unless agreed to by the advisor. Courses taken to fulfill the research skills courses can't be double counted to fulfill the supporting program requirement.
EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 7405 - Biostatistics: Regression (4.0 cr)
or PUBH 7406 - Advanced Regression and Design (4.0 cr)
or STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5601 - Nonparametric Methods (3.0 cr)

Minor
Choose either a minor or supporting program. All University of Minnesota doctoral minors require a minimum of 12 credits. Recommended minors include CGSC, CPMS, GERO, HUMF, NSC, or PREV.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, exercise physiology, physical activity and sport science, or sport management. Recommended programs for supporting courses include: BMEN, ME, NURS, OT, OTOL, PubH, NSC, and RSC. Specific KIN course recommendations include:
KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
or KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)

Physical Activity and Sport Science
This emphasis centers on the broad context of human physical activity in areas such as competitive sport, fitness programs, lifestyle exercise, physical education, sports medicine and physical rehabilitation. Students can choose from three concentrations: behavioral aspects of physical activity, sport and exercise psychology, and sport sociology.

Emphasis courses
A minimum of 12 course credits must be selected from the following list. At least 3 credits must be KIN 8xxx.
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
or KIN 5126 - Social Psychology of Sport & Physical Activity (3.0 cr)
or KIN 5136 - Psychology of Coaching (3.0 cr)
or KIN 5371 - Sport and Society (3.0 cr)
or KIN 5375 - Youth Sport Science (3.0 cr)
or KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5723 - Psychology of Sport Injury and Rehabilitation (3.0 cr)
or KIN 8126 - Sports Medicine Psychology (3.0 cr)
or KIN 8136 - Developmental Sport and Exercise Psychology (3.0 cr)
or KIN 8696 - Internship: Applied Sport Psychology (3.0 - 6.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor. Courses taken to fulfill the research skills credits can't be double counted to fulfill the supporting program requirement.
KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
or EPSY 8247 - Advanced Interviewing and NVIVO (3.0 cr)
or EPSY 8261 - Statistical Methods in Education I (3.0 cr)
or EPSY 8262 - Statistical Methods in Education II (3.0 cr)
or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
or PSY 8209 - Research Methods in Social Psychology (3.0 cr)
or PUBH 6810 - Survey Research Methods (3.0 cr)
or PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
or PUBH 7405 - Biostatistics: Regression (4.0 cr)
or PUBH 7406 - Advanced Regression and Design (4.0 cr)

Minor
Choose either minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: EPSY, PSY, CPSY, PUBH, SOC, or CSPH.

Supporting program
See options for each of the 3 academic tracks under the kinesiology MS program catalog for behavioral aspects of physical activity, sport and exercise psychology, and sport sociology.

-OR-

Sport Management
This emphasis concentrates on the theoretical and practical dimensions of the management of athletic events, sports teams and facilities, and the sporting process. The management areas studied include those in the public sector (interscholastic and intercollegiate sport) as well as fitness and facility management. Sport management policy and ethics are also a focus of this emphasis area and research agenda.

Required courses
KIN 8128 - Doctoral Sport Management Seminar (3.0 cr)

Program courses
A minimum of 9 credits must be selected from the following list:
KIN 5111 - Sports Facilities (3.0 cr)
or KIN 5375 - Youth Sport Science (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5371 - Sport and Society (3.0 cr)
or KIN 5421 - Sport Finance (3.0 cr)
or KIN 5461 - Issues in the Sport Industry (3.0 cr)
or KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
or KIN 5631 - Programming and Promotion in Sport (3.0 cr)
or KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
or KIN 5801 - Legal Aspects of Sport and Recreation (4.0 cr)

Research skills courses
A minimum of 6-9 research skills course credits are required, selected from the following list or in consultation with the advisor.
Courses taken to fulfill the research skills courses requirement can't be double counted to fulfill the supporting program requirement.
KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
or OLPD 5056 - Case Studies for Policy Research (3.0 cr)
or OLPD 5061 - Ethnographic Research Methods (3.0 cr)
or OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
or EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
or EPSY 8247 - Advanced Interviewing and NVIVO (3.0 cr)
or EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
or EPSY 8265 - Factor Analysis (3.0 cr)
or EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
or EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
or FSOS 8013 - Qualitative Family Research Methods (3.0 cr)

Minor
Choose either a minor or supporting program. A minimum of 12 course credits are required for a University of Minnesota doctoral minor. Recommended minors include: public policy, COMM, EPSY, BA, or CI.

Supporting program
Any combination of at least 6 KIN or non-KIN course credits may be used for the supporting program and must be approved by the advisor. Recommended kinesiology emphasis areas for supporting courses include biomechanics and neuromotor control, exercise physiology, physical activity and sport science, and perceptual-motor control and learning. Recommended program areas for supporting program courses include: OLPD, PA, COMM, marketing, and management.
**Twin Cities Campus**
**Leadership in Education M.Ed.**
**Organizational Leadership, Policy and Development**
**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377.
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies program in leadership in education, offered jointly by the Department of Organizational Leadership, Policy, and Development (OLPD) and the Department of Curriculum and Instruction (C&I) in the College of Education and Human Development (CEHD), builds leadership skills and facilitates analysis of K-12 school culture, policies, and practice.

This program develops educational leaders who can serve in schools that foster continuous learning and improvement. Program participants are prepared to advance team, school-wide, and district-wide reform initiatives for coherent educational systems and programs. This program addresses formal and informal leadership methods, emphasizing the roles and contributions of teachers as leaders of instructional improvement, including ways that teachers and principals work together to promote collaborative school cultures.

This 30-semester credit program emphasizes the essential components of leadership, including collaboration, group dynamics, continuous professional learning, school policy, school culture, design and facilitation of improvement initiatives, innovations in teaching and assessment practice, creation of coherent learning experiences, cross-cultural education, and technology.

Students are encouraged to begin the program with other educators from the same school or district. Most students complete the degree in two to three years while continuing to teach full time. Some degree coursework is offered at convenient, off-campus sites in the Twin Cities area.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have teaching experience.

**Special Application Requirements:**
Applications are reviewed on an ongoing basis, but students are advised to submit application materials by the following preferred dates: November 1 (Spring), March 1 (Summer), July 1 (Fall). International students must apply six weeks earlier than those dates listed.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Course Requirements

OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)
OLPD 5374 - Leadership for Professional Development (4.0 cr)
OLPD 5387 - Leadership for Teaching and Learning (3.0 cr)
  or CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
  or CI 5177 - Practical Research (1.0 - 3.0 cr)
OLPD 5361 - Project in Teacher Leadership (3.0 cr)

Electives

14 or more credits of elective courses with adviser approval. Students often choose elective credits aligned with certificates in staff development, school technology, reading, and school administration.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester

This sub-plan is not accepting new students at this time. Course requirements are the same as the Twin Cities program.

Singapore

Course requirements are the same as the Twin Cities program.
Twin Cities Campus
Literacy Education M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: Cliinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (MED)/professional studies program in Literacy Education is designed to improve the quality of literacy education in K-12 schools. The program aims to address the growing state and national emphasis on pupils' reading skills and achievement.

The literacy education program provides instruction on current developments in literacy theory and research, as well as teaching methods for reading, writing, language, speech, and media studies. Students will learn to develop instructional units, evaluate and assess K-12 pupils' literacy skills, and develop technology tools to teach them. The program also encourages students to become "literacy leaders" in their schools and school systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited college or university.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a clearly written statement of career interests, goals, and objectives. Master's applications are reviewed by department faculty three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

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Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. The is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Coursework (6 credits)
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

Literacy Education Requirements (18 credits)
Take 18 or more credit(s) from the following:
- CI 5402 - Introduction to Special Collections (3.0 cr)
- CI 5403 - Writing For and By Children (3.0 cr)
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5431 - Introduction to Instructional Leadership in K-12 Reading (3.0 cr)
- CI 5432 - Instructional Leadership in Reading in Kindergarten and the Elementary Grades (3.0 cr)
- CI 5433 - Instructional Leadership in Reading for the Middle and Secondary Grades (3.0 cr)
- CI 5434 - Professional Development and Evolving Practice in K-12 Reading (3.0 cr)
- CI 5435 - Instructional Leadership in Preventing Reading Difficulties (3.0 cr)
- CI 5441 - Teaching Literature in the Secondary School (2.0 - 3.0 cr)
- CI 5442 - Literature for Adolescents (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5461 - Teaching Composition in the Secondary School (3.0 cr)
- CI 5462 - Evaluating and Assessing Writing (3.0 cr)
- CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)

Electives (6 credits)
Courses will be selected in consultation with faculty advisor. Students are advised to select courses that reflect learning issues faced in their classroom, including special education, secondary language, or cultural diversity issues.
Take 6 or more credit(s) from the following:
- CI 5331 - Introduction to Learning Technologies (3.0 cr)
- CI 5361 - Teaching and Learning with the Internet (2.0 - 3.0 cr)
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5642 - Assessing English Learners (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- YOST 5952 - Everyday Lives of Youth (3.0 cr)
- YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
- ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
- EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
- EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5151 - Cooperative Learning (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
Multicultural College Teaching and Learning M.A.
Organizational Leadership, Policy and Development
College of Education and Human Development

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of arts in multicultural college teaching and learning offered by the Department of Organizational Leadership, Policy, and Development (OLPD) provides an opportunity for intensive study of a transformative approach to teaching and learning to promote access to and success for traditionally underserved students. The program is multidisciplinary and a broad understanding of multiculturalism is employed that includes race, ethnicity, class, gender, sexual orientation, disability, age, and religion, so as to acknowledge that personal identity is complex and intersectional. Students engage in a critical examination of contemporary frameworks in educational theory, as well as the study of best practices for addressing them, such as multicultural education, critical pedagogy, assessment, and classroom research. Students are required to complete a semester-long supervised practicum and a two-semester supervised internship.

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit two letters of recommendation from persons familiar with their scholarship and research potential, transcripts, a current résumé, and answer to two essay questions found within the University's online application. The GRE is not required for EPL and MCTL M.A. applicants but is required for application to other M.A. program tracks (CIDE, ES, HE, and HRD). International students must also submit a TOEFL or IELTS score, but international applicants to the M.A. program are exempt from the GRE. All applications for admission are reviewed once a year. All new students begin in fall semester unless permission to start earlier is granted by the track coordinator. The annual deadline is March 1 for the two-year M.A. program. The annual deadline is March 1 for one-year M.A. program options (not available for the HRD or MCTL tracks).

Letters of recommendation, résumé, essays, and other department application materials are submitted via the University online application system. Unofficial GRE scores, transcripts, and TOEFL/IELTS score may also be submitted via the online application for admission review purposes only. Admitted students must submit official GRE scores (as applicable), transcripts (sent directly from institution(s)), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer.

Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in social science, liberal arts, public affairs, and business fields. The department offers study opportunities for professionals who are employed full time as well as for those who wish to pursue graduate studies full time.

International applicants must submit score(s) from one of the following tests:

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Program Requirements

**Plan A:** Plan A requires 15 major credits, 9 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 18 major credits and 12 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B master's degree requires students to complete a capstone project. Students must demonstrate familiarity with the tools of research or scholarship in multicultural college teaching and learning, the ability to work independently, and the ability to present the results of their investigation effectively. The Plan B capstone project will involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The OLPD graduate faculty will specify the nature and extent of the options available to satisfy this requirement. In conjunction with the capstone project, students must enroll in the 3 credit OLPD 8715 Plan B Capstone Seminar.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The Plan A master's requires a minimum of 34 credits. Students must complete a minimum of 15 credits in the major field (including practicum and internship), a minimum of 6 elective credits outside, one additional 3 credit research methods course, as well as 10 thesis credits and a master's thesis. The Plan B master's degree requires a minimum of 30 credits. Students must complete 15 credits in the major field, the 3 credit Plan B Capstone Seminar, and a capstone project, as well as a minimum of 12 elective credits.

**Required core courses (15 cr minimum)**

The following courses are required for both the Plan A and the Plan B. Student must take 3 credits of OLPD 8796. Additional credits of OLPD 8796 may be taken with advisor approval.

- **CI 5106** - Multicultural Teaching and Learning in Diverse College Contexts (3.0 cr)
- **OLPD 5796** - Supervised Practicum in Multicultural Postsecondary Teaching and Learning (3.0 cr)
- **CI 5116** - Action Research Methods to Improve College Teaching and Learning (3.0 cr)
- **OLPD 5712** - Multicultural Theories of College Student Development Applied to Teaching and Learning (3.0 cr)
- **OLPD 8796** - Supervised Internship in Postsecondary Teaching and Learning (3.0 - 12.0 cr)

**Electives (Plan A 6 cr) (Plan B 12 cr)**

To be determined with advisor; used to reach total of 34 credits Plan A or 30 credits Plan B. Options include:

- **CI 5137** - Multicultural Gender-Fair Curriculum (3.0 cr)
- **CI 5145** - Critical Pedagogy (3.0 cr)
- **CI 5323** - Online Learning Communities (3.0 cr)
- **CI 5325** - Designing and Developing Online Distance Learning (3.0 cr)
- **CI 5331** - Introduction to Learning Technologies (3.0 cr)
- **CI 5351** - Technology Tools for Educators (3.0 cr)
- **CI 5367** - Interactive Multimedia Instruction (3.0 cr)
- **CI 5536** - Equity, Policy, and Assessment in Science Education (3.0 cr)
- **CI 8131** - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- **CI 8461** - Sociocultural Theory, Education, and Literacy (3.0 cr)
- **EPSY 5113** - Psychology of Instruction and Technology (3.0 cr)

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or EPSY 5114 - Psychology of Student Learning (3.0 cr)
or EPSY 5115 - Psychology of Adult Learning and Instruction (3.0 cr)
or EPSY 5151 - Cooperative Learning (3.0 cr)
or EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
or EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
or EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
or EPSY 5261 - Introductory Statistical Methods (3.0 cr)
or EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
or GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
or GRAD 5105 - Practicum in University Teaching for Nonnative English Speakers (1.0 - 2.0 cr)
or GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8102 - Practicum for Future Faculty (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
or OLPD 5056 - Case Studies for Policy Research (3.0 cr)
or OLPD 5061 - Ethnographic Research Methods (3.0 cr)
or OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
or OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
or OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
or OLPD 5211 - Introduction to the Undereducated Adult (1.0 cr)
or OLPD 5225 - Informal Assessment of Adult Literacy (1.0 cr)
or OLPD 5226 - Advanced Assessment of Adult Literacy (1.0 cr)
or OLPD 5235 - Methods of Teaching Advanced Adult Literacy (1.0 cr)
or OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
or OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
or OLPD 5701 - U.S. Higher Education (3.0 cr)
or OLPD 5704 - College Students Today (3.0 cr)
or OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
or OLPD 5816 - Distance Learning in Adult Education and Training (3.0 cr)
or OLPD 8721 - Instruction and Learning in Higher Education (2.0 - 3.0 cr)
or CI 5105 - Increasing Access and Success in Undergraduate Classrooms (3.0 cr)

Plan A and Plan B requirements

Plan A
All Plan A students must take 10 thesis credits and 6 elective credits and one research methods course to be selected in consultation with advisor.

OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
All Plan B students must take the Plan B Capstone Seminar and elective credits to be selected in consultation with advisor to reach required total of 30 credits.

OLPD 8715 - Plan B Capstone Seminar (3.0 cr)
Twin Cities Campus
Multicultural College Teaching and Learning Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development's (OLPD) graduate minor in multicultural college teaching and learning is designed for current University of Minnesota graduate students who want to study innovative strategies to increase access and success of diverse undergraduate students.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
To obtain a minor, graduate students should work with the MCTL director of graduate studies (DGS) to map out coursework that will enhance their ability to teach in diverse postsecondary contexts.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Courses (Select 6 cr)
Coursework planned with MCTL director of graduate studies to total 6 credits.
CI 5105 - Increasing Access and Success in Undergraduate Classrooms (3.0 cr)
CI 5106 - Multicultural Teaching and Learning in Diverse College Contexts (3.0 cr)
CI 5116 - Action Research Methods to Improve College Teaching and Learning (3.0 cr)
OLPD 5712 - Multicultural Theories of College Student Development Applied to Teaching and Learning (3.0 cr)

Doctoral
Courses (12 cr)
Coursework planned with MCTL director of graduate studies to total 12 credits.
CI 5105 - Increasing Access and Success in Undergraduate Classrooms (3.0 cr)
CI 5106 - Multicultural Teaching and Learning in Diverse College Contexts (3.0 cr)
CI 5116 - Action Research Methods to Improve College Teaching and Learning (3.0 cr)
OLPD 5712 - Multicultural Theories of College Student Development Applied to Teaching and Learning (3.0 cr)
Twin Cities Campus
Multimedia Design and Development Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: T E L: Multimedia Design & Dev PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This certificate program in multimedia design and development prepares students to use technology (computers and the Internet) to develop instructional materials for use in a wide range of educational and training contexts (note that a university certificate program or certificate is distinct from a state certificate or certification).

The program is designed for K-12 teachers, higher education instructors, corporate trainers, and other professionals interested in using technology to support instruction.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one page goal statement. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (12 credits)
- CI 5362 - Foundations of Interactive Design for Web-based Learning (3.0 cr)
- CI 5363 - New Media and Interaction Design for Online and Mobile Learning (3.0 cr)
- CI 5336 - Planning for Multimedia Design and Development (3.0 cr)
- CI 5367 - Interactive Multimedia Instruction (3.0 cr)
Online Distance Learning Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Online Distance Learning Postbaccalaureate Cert.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The online distance learning certificate is designed to prepare educators and other professionals to design and deliver distance learning opportunities in academic or business settings (note that a university certificate program or certificate is distinct from a state certificate or certification). Technology experience is not required, and courses are designed for learners with a wide range of experience.

This 12-credit certificate program will prepare students to successfully design, develop, and deliver curriculum on the Internet; use interactive online media; and create online learning communities for business and K-12 and postsecondary schools. As schools and businesses embrace online education, a variety of instructional design guidelines and pedagogical approaches have been developed to effectively guide online education and enhance learning.

Goals of the distance learning certificate include:
- Developing knowledge and skills in the best practices for designing and delivering online distance learning
- Engaging with current research about distance learning, current practices, and learning theory
- Providing opportunities to practice designing, developing, and delivering online distance learning
- Creating learning communities where students can reflect on their own teaching, reading, designing, and writing
- Allowing students to learn from each other

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor's degree is required for admission.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn't earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, and a one page goal statement. Certificate applications are reviewed by the department three times per academic year: Fall, Spring, and Summer.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
- Total Score: 6.5

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Information current as of January 20, 2017
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses (12 credits)
- CI 5321 - Foundations of Distance Education (3.0 cr)
- CI 5323 - Online Learning Communities (3.0 cr)
- CI 5325 - Designing and Developing Online Distance Learning (3.0 cr)
- CI 5327 - Designing Online Adventure Learning (3.0 cr)
Twin Cities Campus
Organizational Leadership, Policy, and Development Ed.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 58 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Its research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the Ed.D. programs choose from one of three complementary but distinct program tracks: education policy and leadership (EPL), higher education (HiEd), and human resource development (HRD). The department offers M.A. and Ph.D. degrees in the tracks mentioned above, as well as comparative and international development education (CIDE) and evaluation studies. Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is required. The preferred graduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of academic transcripts, and a current résumé, as well as answer required essay questions via the University's online application system. International students must also submit a TOEFL or IELTS score. Unofficial GRE scores, transcripts, and TOEFL/IELTS score may be submitted via the online application for admission review purposes only. Admitted students must submit official GRE scores (as applicable), transcripts (sent directly from institution[s]), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer. Applicants to the international cohorts should have at least three years of experience in international education.

Special Application Requirements:
Admission to the Education Policy and Leadership track, the Higher Education track, and the Human Resource Development track of the Ed.D. are currently suspended.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
- Total Score: 6.5
  - MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
34 credits are required in the major.
12 to 14 credits are required outside the major.
12 to 24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The doctor of education (Ed.D.) is a professionally oriented degree program for those who will provide leadership in educational institutions and work and community education environments. Students combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of their program area. The Ed.D. is offered in 3 OLPD tracks: EPL (pre-K-12 schools), higher education and HRD. Cohorts for the EPL and higher education tracks include those in the metropolitan area, out state Minnesota, and international schools. Those two Ed.D. degree tracks are offered only in the context of cohort programs of 20-30 students each. All Ed.D. cohort programs include department core courses, program core courses, inquiry and research courses, supporting program or minor, and field research project credits. Through courses, seminars, and independent study, students learn to apply the products of disciplined inquiry to educational policy issues and practical situations in various educational environments and conduct types of research that contribute and/or apply that knowledge to the specialization. Within the overall framework (some credits may be brought in from previous graduate work), specific course requirements are developed for each program area and cohort when applicable. See the department website for requirements in specific cohorts. Preliminary written and oral exams are required. Students must complete a professional field project that contributes to the improvement of policy or practice.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Education Policy and Leadership
The EPL Ed.D. track is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Higher Education
The higher education Ed.D. track is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Human Resource Development
The HRD Ed.D. track is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Research Courses
Students should consult with advisers about the appropriate time to register for each course.
OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)
a 3 credit statistics course to be determined by student and adviser (3 cr inside or outside department)
a qualitative course to be determined by student and adviser (3 cr; inside or outside department)
a quantitative course to be determined by student and adviser (3 cr inside or outside department)
OLPD 8890 - Research Seminar (1.0 cr)

Additional Research Course
- a 3 credits qualitative course taken with adviser approval
- or OLPD 8812 - Quantitative Research in Education (3.0 cr)

Skills and Special Topics
19 credits minimum. OLPD 8011 must be taken during the first year of the program.
OLPD 8011 - Doctoral Research Seminar I (1.0 cr)
18 credits of HRD elective coursework jointly determined by student and adviser based around the student's professional role

Specialization
Must total 12 credits.
- A 3 credit OLPD 8xxx level theory seminar course as determined by the adviser
- 9 additional credits of appropriate coursework as determined by the faculty adviser

Rochester
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Same as general program description.

This sub-plan is not accepting new students.
Twin Cities Campus
Organizational Leadership, Policy, and Development M.A.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the MA and PhD programs choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and human resource development (HRD). Our undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, transcripts, a current résumé, and answer to two essay questions found within the University's online application. The GRE is not required for EPL and MCTL M.A. applicants but is required for application to other M.A. program tracks (CIDE, ES, HE, and HRD). International students must also submit a TOEFL or IELTS score, but international applicants to the MA program are exempt from the GRE. All applications for admission are reviewed once a year. All new students begin in fall semester unless permission to start earlier is granted by the track coordinator. The annual deadline is March 1 for the two-year MA program. The annual deadline is March 1 for one-year MA program options (not available for the HRD or MCTL tracks).

Letters of recommendation, résumé, essays, and other department application materials are submitted via the University online application system. Unofficial GRE scores, transcripts, and TOEFL/IELTS score may also be submitted via the online application for admission review purposes only. Admitted students must submit official GRE scores (as applicable), transcripts (sent directly from institution[s]), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer.

Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in social science, liberal arts, public affairs, and business fields. The department offers study opportunities for professionals who are employed full time as well as for those who wish to pursue graduate studies full time.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 to 26 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 to 28 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Comparative and International Development Education

Plan A
  Total Plan A CIDE Credits: 34 credits

Plan A or Plan B

Program Core

Offered only in the fall term and normally taken during the year in which the student is writing the masters thesis. Student must take 3 credits of OLPD 5087

OLPD 5087 - MA Research Seminar (1.0 - 3.0 cr)

Program Specialization

Select one of the specializations below and choose two of its three core courses.

Comparative and international development education

OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5121 - Educational Reform in International Context (3.0 cr)

or

Intercultural/international education

OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)

Research Design and Methods

3 credits to be selected in consultation with advisor.

Related Fields

The master's degree requires 6 semester credits taken outside the CIDE program track that directly relate to the student's area of study. These credits should be selected in consultation with the advisor and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

Electives

Take 6 or more credit(s) from the following list with advisor approval as needed to reach 34 credits total in the program:
Note: 8xxx courses should be taken only with the consent of the instructor.

OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
-or OLPD 5056 - Case Studies for Policy Research (3.0 cr)
-or OLPD 5061 - Ethnographic Research Methods (3.0 cr)
-or OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
-or OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
-or OLPD 5107 - Gender, Education, and International Development (3.0 cr)
-or OLPD 5128 - Anthropology of Education (3.0 cr)
-or OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
-or OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
-or OLPD 8101 - International Education and Development (3.0 cr)
-or OLPD 8103 - Comparative Education (3.0 cr)
-or OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)

**Thesis Credits**

Take 10 or more credit(s) from the following:

OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B**

Total Plan B CIDE Credits: 30 credits

**Program Core**

This is a course (OLPD 5087) or an independent study under the adviser (OLPD 5095) to prepare Plan B paper. Students pursuing the degree as a one-year program must take a total of 6 cr of OLPD 5087 over 3 semesters (three of those credits will count towards the electives requirement). Students pursing the degree as a two-year program must take a minimum of 3 credits of OLPD 5087 or OLPD 5095.

OLPD 5087 - MA Research Seminar (1.0 - 3.0 cr)
-or OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

**Program Specializations**

Select one of the specializations below and choose two of its three core courses.

**Comparative and international development education**

OLPD 5103 - Comparative Education (3.0 cr)

OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)

OLPD 5121 - Educational Reform in International Context (3.0 cr)

-or **Intercultural/international education**

OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)

OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)

OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)

**Research Design and Methods**

3 credits to be selected in consultation with advisor.

**Electives**

Take 12 or more credit(s) from the following list with advisor approval as needed to reach 30 credits total in the program:

Note: 8xxx courses should be taken only with the consent of the instructor.

OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
-or OLPD 5056 - Case Studies for Policy Research (3.0 cr)
-or OLPD 5061 - Ethnographic Research Methods (3.0 cr)
-or OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
-or OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
-or OLPD 5107 - Gender, Education, and International Development (3.0 cr)
-or OLPD 5128 - Anthropology of Education (3.0 cr)
-or OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
-or OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
-or OLPD 8101 - International Education and Development (3.0 cr)
-or OLPD 8103 - Comparative Education (3.0 cr)
-or OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)

**Related Fields**

The master's degree requires 6 semester credits taken outside the CIDE program track that directly relate to the student's area of study. These courses should be selected in consultation with the advisor and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

**Education Policy and Leadership**

**Plan A or Plan B**
Plan A

Program Core (Minimum 6 cr)
Take from the following including subgroup 1:
OLPD 5041 - Sociology of Education (3.0 cr)
or OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
or OLPD 5344 - School Law (3.0 cr)
OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)
or OLPD 8302 - Educational Policy Perspectives (3.0 cr)

or Subgroup 1
Take OLPD 5001 if it is being offered or one of the two alternatives if OLPD 5001 is not being offered. Note: OLPD 5011 should be taken only with advisor approval.
OLPD 5001 - Formal Organizations in Education (3.0 cr)
or OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
or OLPD 5607 - Organization Development (3.0 cr)

Research Design and Methods (6 cr)
Selected in consultation with advisor.

Related Fields (6 cr outside EPL)
The master's degree requires 6 credits taken outside of the EPL program track that directly relate to the student's area of study. These courses should be selected in consultation with the advisor.

Electives (2-8 cr)
Selected in consultation with advisor.

Thesis Credits (10 cr)
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Research Project
Plan A students will develop and carry out an empirical research project under the supervision of their advisor.

Total = 30 - 36 credits

-OR-

Plan B

Required Coursework (Minimum 6 cr)
Take a minimum of 6 credits from the following including subgroup 1:
OLPD 5607 - Organization Development (3.0 cr)
or OLPD 8302 - Educational Policy Perspectives (3.0 cr)

or Subgroup 1
Take OLPD 5001 if it is being offered or the alternative if OLPD 5001 is not being offered. Note OLPD 5011 should only be taken with advisor approval.
OLPD 5001 - Formal Organizations in Education (3.0 cr)
or OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)

Program Core (6 cr)
Choose one course from each of the following two areas:

Leadership courses
Choose one of the following:
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
or OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)

Other Coursework
Choose one of the following:
OLPD 5041 - Sociology of Education (3.0 cr)
or OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
or OLPD 5128 - Anthropology of Education (3.0 cr)
or OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
or OLPD 5344 - School Law (3.0 cr)
or OLPD 5346 - Politics of Education (3.0 cr)

Research Design and Methods (3 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Related Fields (6 cr outside EPL)
6 additional credits outside of the EPL program track, selected in consultation with advisor. These usually include additional courses from the program core or other OLPD courses.

Electives (3-8 cr)
Selected in consultation with advisor to meet required 30-32 total credit requirement for this track.

Colloquium Paper (3-6)
Students prepare a paper on an issue of relevance in school administration or revise and expand three course papers. Total of 120 hours of work required. Students in the two-year program must take 3 or more credits of OLPD 5095. Students in the one-year program must take a total of 6 cr of OLPD 5087 or OLPD 5095 over 3 semesters with advisor approval (three of those credits will
count towards the electives requirement).
OLPD 5087 - MA Research Seminar (1.0 - 3.0 cr)
or OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

Evaluation Studies

Plan A or Plan B

Plan A
Total Plan A ES Credits: 31-32 credits
Program Core (6 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5502 - Theory and Models of Evaluation (3.0 cr)
or OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
Research Design and Methods (Minimum 6 cr)
Two qualitative methods courses selected in consultation with advisor for a minimum of 6 credits. Related Fields (6 cr outside ES)
The master's degree requires 6 semester credits taken outside the ES program track that directly relate to the student's area of study. These courses should be selected in consultation with the advisor. These courses may include additional methods courses taught outside the department such as:
EPSY 5261-Introductory Statistical Methods (3 cr) or comparable stats course required
One additional EPSY measurement or methods course
Electives (Minimum 3 cr)
At least 3 cr selected in consultation with advisor to meet required 31-32 total credit requirement.
Thesis Credits (10 cr)
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Total Plan B ES Credits: 30-32 credits
Program Core (9 credits)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
OLPD 5502 - Theory and Models of Evaluation (3.0 cr)
or OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
Research Design and Methods (Minimum 6 cr)
Two qualitative methods courses selected in consultation with advisor.
Related Fields (6 cr outside ES)
The master's degree requires 6 semester credits taken outside the ES program track that directly relate to the student's area of study. These courses should be selected in consultation with the advisor and should constitute a solid coursework foundation for the student's thesis.
Electives (6-7 cr)
Coursework related to the student's specialization, selected in consultation with the advisor. This will total 6-7 credits for students in the one-year or two-year program. These may be OLPD or outside courses.
Colloquium Paper (3-6 cr)
Total of 120 hours of work required. Students in the two-year program must take 3 or more credits of OLPD 5095. Students in the one-year program must take a total of 6 cr of OLPD 5087 or OLPD 5095 over 3 semesters with advisor approval (three of those credits will count towards the electives requirement).
OLPD 5087 - MA Research Seminar (1.0 - 3.0 cr)
or OLPD 5095 - Problems: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

Higher Education

Plan A or Plan B

Plan A
Total Plan A HE Credits: 34 credits
Required Coursework (6 cr)
OLPD 5701 - U.S. Higher Education (3.0 cr)
OLPD 5709 - Critical Issues in Higher Education (3.0 cr)
Program Area (9 cr minimum)
From the following with advisor consultation and approval. Other courses as offered by HE program track faculty may also meet this requirement.
OLPD 5001 - Formal Organizations in Education (3.0 cr)
or OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
OLPD 5704 - College Students Today (3.0 cr)
OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
OLPD 5724 - Leadership and Administration of Student Affairs (2.0 - 3.0 cr)
OLPD 5732 - The Law and Postsecondary Institutions (3.0 cr)
OLPD 5734 - Institutional Research in Postsecondary Education (2.0 - 3.0 cr)
OLPD 5736 - Public Engagement and Higher Education (3.0 cr)
OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
OLPD 8703 - Public Policy in Higher Education (3.0 cr)

Related Fields (6 cr outside HE)

The master's degree requires 6 semester credits taken outside the HE program track that directly relate to the student's area of study. These courses should be selected in consultation with the advisor and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

Research Design and Methods (3 cr minimum)

Select courses in consultation with their advisor.

CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8261 - Statistical Methods in Education I (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 8812 - Quantitative Research in Education (3.0 cr)
CI 5116 - Action Research Methods to Improve College Teaching and Learning (3.0 cr)

Thesis Credits (10 cr)

Take 10 or more credit(s) from the following:
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Total Plan B HE Credits: 30 credits

Required Coursework (6 cr)

OLPD 5701 - U.S. Higher Education (3.0 cr)
OLPD 5709 - Critical Issues in Higher Education (3.0 cr)

Program Area (12 cr minimum)

Selected from the following with advisor consultation and approval. Other courses as offered by HE program track faculty may also meet this requirement:

OLPD 5001 - Formal Organizations in Education (3.0 cr)
OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
OLPD 5704 - College Students Today (3.0 cr)
OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
OLPD 5724 - Leadership and Administration of Student Affairs (2.0 - 3.0 cr)
OLPD 5732 - The Law and Postsecondary Institutions (3.0 cr)
OLPD 5734 - Institutional Research in Postsecondary Education (2.0 - 3.0 cr)
OLPD 5736 - Public Engagement and Higher Education (3.0 cr)
OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
OLPD 8703 - Public Policy in Higher Education (3.0 cr)

Related Fields (6 cr)

The master's degree requires 6 semester credits taken outside the HE track that directly relate to the student's area of study. These courses should be selected in consultation with the advisor and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

Methods Course (3 cr minimum)

Select courses in consultation with advisor for a minimum of 3 credits. It is strongly recommended that students in the one year program take a methods course with a course designator other than OLPD.

CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
EPSY 8261 - Statistical Methods in Education I (3.0 cr)
OLPD 5056 - Case Studies for Policy Research (3.0 cr)
OLPD 5061 - Ethnographic Research Methods (3.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 8812 - Quantitative Research in Education (3.0 cr)
or CI 5116 - Action Research Methods to Improve College Teaching and Learning (3.0 cr)

**Colloquium Paper (3 - 6 cr)**

Plan B paper is prepared under the guidance of advisor and committee. The final paper must represent no fewer than 120 hours of work. Students in the two-year program must take 3 or more credits of OLPD 5087 or 5795. Students in the one-year program must take a total of 6 cr of OLPD 5087 or OLPD 5795 over 3 semesters with advisor approval (three of those credits will count towards the related fields requirement).

OLPD 5087 - MA Research Seminar (1.0 - 3.0 cr)
or OLPD 5795 - Plan B Research Design (3.0 cr)

**Human Resource Development**

**Plan A or Plan B**

**Plan A**
The masters degree requires 6 credits taken outside the program track that directly relate to the students area of study. Courses totaling 6+ credits should be selected in consultation with the advisor. These courses may include additional methods courses taught outside the department.

**General Aspects (3 cr)**
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)

**Research (7 cr)**
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
OLPD 8815 - Ethics and Responsible Research (1.0 cr)
an 8xxx qualitative or quantitative research course (3 cr)

**Program Core (16 cr minimum)**
Student must take 4 credits of OLPD 5696. Advisor can substitute courses as appropriate.

OLPD 5605 - Strategic Planning through Human Resources (3.0 cr)
OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
OLPD 5615 - Training and Development of Human Resources (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)

**Thesis Credits (10 cr)**
OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Electives**
Credits to total a minimum of 36 graduate-level coursework credits

**Total = 36 cr**

-OR-

**Plan B**
The masters degree requires 6 credits taken outside the program track that directly relate to the students area of study. Courses totaling 6+ credits should be selected in consultation with the advisor. These courses may include additional methods courses taught outside the department.

**General Aspects (3 cr)**
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)

**Research (7 cr)**
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
OLPD 8815 - Ethics and Responsible Research (1.0 cr)
an 8xxx qualitative or quantitative research course (3 cr)

**Program Core (16 cr minimum)**
Student must take 4 credits of OLPD 5696. Advisor can substitute courses as appropriate.

OLPD 5605 - Strategic Planning through Human Resources (3.0 cr)
OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
OLPD 5615 - Training and Development of Human Resources (3.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)

**Plan B Project Paper (3 - 6 cr)**
Plan B project/paper is prepared under the guidance of advisor & committee - must represent no fewer than 120 hours of work. Students should register for between 3-6 credits

OLPD 5893 - Directed Study in OLPD (1.0 - 4.0 cr)

**Electives**
With approval of advisor as needed to total a minimum of 34 graduate-level coursework credits overall for this plan.

**Total = 34 cr**
Twin Cities Campus
Organizational Leadership, Policy, and Development Ph.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
The Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 70 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Its research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and PhD programs choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HiED), comparative and international development education (CIDE), and human resource development (HRD). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in social science, liberal arts, business, and education fields. The department offers study opportunities for professionals who are employed full-time, as well as for those who wish to pursue graduate studies full-time.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of academic transcripts, and a current résumé; as well as answer required essay questions via the University online application system. Unofficial GRE scores, transcripts, and TOEFL/IELTS score may be submitted via the online application for admission review purposes only. Admitted students must submit official GRE scores (as applicable), transcripts (sent directly from institution[s]), and TOEFL/IELTS scores (as applicable) to the University as a condition of any admission offer.

The GRE is required for all tracks in the doctoral degree programs (Ed.D. and Ph.D.). International students must also submit a TOEFL or IELTS score. All applications for admission are reviewed once per year for Fall admission. Submission of all application materials for all tracks by December 1 is strongly encouraged to ensure priority consideration for assistantships awarded for the next academic year. All new students begin in fall semester unless special permission to start earlier is granted by the program coordinator.

International applicants must submit score(s) from one of the following tests:
- TOEFL
Program Requirements
30 to 48 credits are required in the major.
0 to 18 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Credits required by the major vary by track. The PhD is available in five program tracks: education policy and leadership, evaluation studies, higher education, comparative and international development education, and human resource development. All PhD programs include 16 credits in department core courses (which include 15 credits of research methodology courses), 18 or more credits in program core courses, 12-14 credits program approved electives, and 24 thesis credits. The minimum total of course credits varies by track (see the student handbook on the department website for details). Preliminary written and oral exams are required. Students must complete a dissertation. Within the general framework for PhD requirements, the degree program is developed by the student and his or her advisor and is subject to approval by the department's director of Graduate Studies and the University.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Comparative and International Development Education
The doctor of philosophy (PhD) degree with a program emphasis in comparative and international development education (CIDE) is offered by the Department of Organizational Leadership, Policy, and Development (OLPD). CIDE uses an interdisciplinary approach to the study of education's role in economic, political, and sociocultural development; international educational exchange; and the internationalization of education. The two specializations within CIDE are comparative and international development education and intercultural/international education.

Department Core (16 cr)
Professional socialization seminar
Taken fall term of first year.
OLPD 8011 - Doctoral Research Seminar I (1.0 cr)
Research courses
Take OLPD 8015 spring term of first year.
OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)
Quantitative course to be determined by student and adviser (3 cr in or outside of department)
Qualitative course to be determined by student and adviser (3 cr in or outside of department)
6 credits of additional methods courses to be determined by student and adviser (in or outside of department)

Doctoral Seminars in CIDE (6 cr)
Students take 6 credits; 2 credits in each of 3 semesters starting in the spring term of the first year in the program; course numbers are listed as OLPD 8121, section 002; OLPD 8121, section 003; and OLPD 8121, section 004.

Specialization Courses (6 cr minimum)
Students choose two courses, with a minimum of one 8xxx course for specializations. Any specialization core course not being used as core class can become a CIDE elective.

Comparative and International Development Education
Take 6 or more credit(s) from the following:
OLPD 5103 - Comparative Education (3.0 cr)
or OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
or OLPD 5121 - Educational Reform in International Context (3.0 cr)
or OLPD 8101 - International Education and Development (3.0 cr)
or OLPD 8103 - Comparative Education (3.0 cr)

Intercultural/international education
Take 6 or more credit(s) from the following:
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
or OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
or OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
or OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

CIDE Elective Courses (8 cr minimum)
OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
or OLPD 5056 - Case Studies for Policy Research (3.0 cr)
or OLPD 5061 - Ethnographic Research Methods (3.0 cr)
or OLPD 5080 - Special Topics: Organizational Leadership, Policy, & Development (1.0 - 3.0 cr)
or OLPD 5107 - Gender, Education, and International Development (3.0 cr)
or OLPD 5128 - Anthropology of Education (3.0 cr)
or OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
or OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)
or OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)

Additional Coursework (12 cr minimum)
These credits can be used to meet the requirement that a minimum of 12 credits be taken outside the CIDE track or for a minor.
Courses not specifically listed should have advisor approval.

Education Policy and Leadership
The doctor of philosophy (PhD) degree with a program emphasis in education policy and leadership (EPL) provides an opportunity for intensive study of the field of education. It is especially suitable for students who wish to pursue careers in policy, research, or college and university teaching. It is also available to students who are interested in careers in school, district, and statewide administration, though it is more theory and research-oriented than the doctorate of education (Ed.D.) degree, which is also offered by OLPD. Educational administration offers coursework and research opportunities for those interested in making a difference in educational systems and settings that involve PreK-12 children and youth. The program is committed to supporting the development of leaders and scholars who work to continuously improve educational quality and effectiveness so that young people graduate from secondary education well prepared to continue their learning and to contribute to their communities. The program promotes understanding of schools as organizations and emphasizes application of knowledge and research to varied contexts of educational practice.

Department Core (16 cr)
Professional socialization seminar
Taken fall term of first year.
OLPD 8011 - Doctoral Research Seminar I (1.0 cr)
Research courses
Take OLPD 8015 spring term of first year.
OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)
3 credit quantitative course (in or outside of department) in consultation with adviser
3 credit qualitative course (in or outside of department) in consultation with adviser
6 credits of additional methods courses in consultation with adviser

Program Core: Education Policy and Leadership (18 cr)
OLPD 5346 - Politics of Education (3.0 cr)
OLPD 8020 - Leadership: From Theory to Reflective Practice (3.0 cr)
OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)
OLPD 8302 - Educational Policy Perspectives (3.0 cr)

Subgroup 1
Take OLPD 5001 if it is being offered or one of the two alternatives if OLPD 5001 is not being offered.
OLPD 5001 - Formal Organizations in Education (3.0 cr)
or OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
or OLPD 5607 - Organization Development (3.0 cr)

OLPD Electives (Minimum 3 cr)
Electives selected with approval of advisor.

Additional Coursework (12 cr minimum)
These credits can be used to meet the requirement that a minimum of 12 credits be taken outside the EPL track or for a minor.
Courses not specifically listed should have adviser approval. Students who have successfully completed enrollment in the University of Minnesota's Principals Academy may use transfer credits to fulfill this requirement.

Evaluation Studies
The doctor of philosophy (PhD) degree with a program emphasis in evaluation studies (ES) provides an opportunity for intensive study.
of the techniques and process of evaluation and policy research and of the social and political context within which program evaluation occurs. Graduates leave with a portfolio filled with evidence of their expertise with the tools of the evaluation trade—qualitative and quantitative inquiry methods, communication skills, and computer database analysis experience. Evaluation knowledge and skills are gleaned not only from time in the classroom but also from internships and collaboration with evaluation professionals in real-world settings. Evaluation studies students have access to some of the best evaluators in the field.

**Department Core (16 cr)**
- Taken fall term of first year.
- OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Research Courses**
- Take OLPD 8015 spring term of first year.
- OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)
  - 3 credit quantitative course (in or outside of department) in consultation with adviser
  - 3 credit qualitative course (in or outside of department) in consultation with adviser
  - 6 credits of additional methods courses in consultation with adviser

**Program Core: Evaluation Studies (15 cr)**
- Student must take OLPD 8595 for 3 credits. Student must take OLPD 8596 twice in two different semesters for 3 credits each time.
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
- OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
- OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)
- OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

**Additional Coursework (17 cr minimum)**
- These credits can be used to meet the requirement that a minimum of 12 credits be taken outside the ES track or for a minor. Courses not specifically listed should have advisor approval.

**Higher Education**
The doctor of philosophy (PhD) degree with a program emphasis in higher education (HIED) provides an opportunity for intensive study of the policies and organizational issues in higher education institutions and systems. HIED focuses on the experiences, practices, and decisions of those involved in postsecondary education, as well as on the sociopolitical contexts in which higher education exists. Areas of specialization include administration and organization, policy, college students, external relations, equity-oriented change, and research integrity.

**Department Core (16 cr)**
- Professional socialization seminar
  - Taken fall term of first year.
  - OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Research Design and Methods**
- Take OLPD 8015 spring term of first year.
- OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)
  - 3 credit quantitative course (in or outside of department) in consultation with adviser
  - 3 credit qualitative course (in or outside of department) in consultation with adviser
  - 6 credits of additional methods courses in consultation with adviser

**Program Core: Higher Education (12 cr)**
- OLPD 5701 - U.S. Higher Education (3.0 cr)
- OLPD 5704 - College Students Today (3.0 cr)
- OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
- OLPD 8703 - Public Policy in Higher Education (3.0 cr)

**Electives (9 cr)**
- Focused on issues relevant to the HE track with advisor approval.

**Additional Coursework (11 cr minimum)**
- These credits can be used to meet the requirement that a minimum of 12 credits be taken outside the HE track or for a minor. Courses not specifically listed should have advisor approval.

**Human Resource Development**
The doctor of philosophy (PhD) degree with a program emphasis in human resource development (HRD) is offered by the Department of Organizational Leadership, Policy, and Development (OLPD). Students in HRD combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of work and community education; social, economic, historical, political, cultural, educational, technological, and psychological contexts within which work and community education exist; and types of research that contribute to or apply that knowledge to the specialization.

**Department Core (16 cr)**
- Professional socialization seminar
  - Taken fall term of first year.
  - OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Dept Research Courses**
Take OLPD 8015 spring term of first year.

OLPD 8015 - Inquiry strategies in educational and organizational research (3.0 cr)

3 credit quantitative foundations course (in or outside of department) in consultation with adviser

3 credit qualitative foundations course (in or outside of department) in consultation with adviser

6 credits of additional methods courses in consultation with adviser

Specialization (9 cr)

Courses must have advisor approval.

One 8xxx level theory seminar (3 cr)

2 or 3 8xxx level seminars offered by various HRD faculty (2-3 credits each for a total of 6 cr)

Additional Research Courses (8 cr)

In addition to the research/methodology courses mentioned in the department core, the following are required for students in the HRD track:

- 3 credit statistics course selected in consultation with advisor
- 5 credits of a capstone year-long research course (OLPD 8087) taken over two semesters. 3 credits to be taken in fall semester and 2 credits to be taken in spring semester. Is usually taken during the second year if the student is full time.

OLPD 8087 - Seminar: Organizational Leadership, Policy, and Development (1.0 - 3.0 cr)

Additional Coursework (15 cr minimum)

These credits can be used to meet the requirement that a minimum of 12 credits be taken outside the HRD track or for a minor.

Courses not specifically listed should have advisor approval.
Twin Cities Campus

Parent Education Postbaccalaureate Certificate
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, St Paul MN 55108 (612-625-3116; fax: 612-625-4227)
Email: famed@umn.edu
Website: http://www.cehd.umn.edu/fsos/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 16
- This program requires summer semesters for timely completion.
- Degree: Parent Education PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The parent education certificate program is designed to prepare professionals to plan, coordinate, and teach parent education programs and services for families with children from early childhood through adolescence.

The 16-credit program prepares professionals who are well qualified to deliver programs designed to address the intellectual, emotional, cultural, social, and physical needs of parents and children. In addition to educational settings that may include public-school parent education programs, preschools, child care centers, and Head Start programs, parent educators may also work in health care and social-service agencies and institutions, and faith-based settings.

Certificate courses are offered online. Online coursework is designed to meet the needs of local and distance learners in Minnesota, around the country and the world.

Students participate in live online chat sessions and weekly reflections with their course instructors. They interview parents, read the latest research, and view presentations by University of Minnesota faculty and noted experts in the field.

The capstone course (FSOS 5949 - Student Teaching in Parent Education) allows students to teach and interact with parents in a parent education setting under the supervision of a licensed or highly qualified parent educator approved by core faculty. This individualized student teaching allows each program participant to integrate and apply what they have learned to parent education experiences, preparing them for professional work in the field.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission

Special Application Requirements:
Complete the equivalent of six semester undergraduate or graduate credits in child development courses before entering the parent education certificate program, completed within 10 years of admission to the certificate program. If these credits have not been completed at the time of application, the applicant may be admitted conditionally until they are completed and recorded on a transcript. The following CEHD courses may be examples of child development courses that may meet this requirement:

CPSY 4302 - Infant Development
CPSY 4331 - Social and Personality Development
CPSY 4343 - Cognitive Development

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Required Courses**

- FSOS 5932 - Introduction to Parent Education (1.0 cr)
- FSOS 5937 - Parent-Child Interaction (3.0 cr)
- FSOS 5942 - Everyday Experiences of Families (2.0 cr)
- FSOS 5943 - Parent Learning and Development: Implications for Parent Education (2.0 cr)
- FSOS 5944 - Parent Education Curriculum (2.0 cr)
- FSOS 5945 - Teaching and Learning in Parent Education (2.0 cr)
- FSOS 5946 - Assessment and Evaluation in Parent Education (2.0 cr)
- FSOS 5949 - Student Teaching in Parent Education (2.0 cr)
Twin Cities Campus
PK-12 Administration Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Leadership, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-625-9087; fax: 612-624-3377)
Email: licensure@umn.edu
Website: http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 22 to 23
- This program requires summer semesters for timely completion.
- Degree: PK-12 Administration PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Housed within the University of Minnesota’s Department of Organizational Leadership, Policy, and Development (OLPD), the PK-12 Administration certificate offers aspiring educational administrators an individualized program to prepare them for the following licenses:
- K-12 principal
- Superintendent
- Director of special education
- Director of community education

The PK-12 Administration certificate program offers a variety of courses specifically designed to address the competencies required by the state for the various licenses.

Accreditation
This program is accredited by Minnesota Board of School Administrators and the NCATE.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applications are reviewed on a rolling basis.

Please visit http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/apply.html for information about application process and related fees.

Applications to the doctoral and licensure programs are separate processes. Only three-credit licensure courses that have been approved by the candidate's adviser may be counted toward an Ed.D. or Ph.D. If you are considering doing both the certificate and a doctoral program, contact our program office.

Please note: This program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Further requirements for K-12 principal, superintendent, or director of special education:
- Possess or complete three years of teaching experience
- 60 credits beyond a bachelor's degree to include a graduate degree
- 320 hours of field experience

Further requirements for director of community education:
- A bachelor's degree plus 20 credits
- 320 hours of field experience

Exit requirements
Complete all coursework with a grade of S or C or better
An electronic portfolio presented to a review panel made up of representatives from the University and licensed practitioners is required as the last step to earning licensure.

Required for All Licenses
Note: OLPD 5391 is not required for the director of special education license. OLPD 5387 and 5391 are not required for the director of community education license.
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5348 - Leaders of Human Resources Administration (3.0 cr)
OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
OLPD 5387 - Leadership for Teaching and Learning (3.0 cr)
OLPD 5396 - Field Experience in PK-12 Administration: Authentic Practice in Leadership (3.0 cr)

Licensure-Specific Course Requirements

K-12 principal
OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)
OLPD 5388 - Leadership for Master(ful) Scheduling (2.0 cr)

-OR-

Superintendent
OLPD 5322 - Leaders in the Superintendency and Central Office (3.0 cr)
OLPD 5393 - Leading School Finance Elections (1.0 cr)

-OR-

Director of special education
OLPD 5386 - Leadership for Special Education Services (3.0 cr)
OLPD 5392 - Special Education Finance: Program Models, Policy, and Law (2.0 cr)
OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)

-OR-

Director of community education

Note: OLPD 5391 is not required for the director of special education license. OLPD 5387 and 5391 are not required for the director of community education license.
OLPD 5389 - Community Education Leadership (3.0 cr)
OLPD 5394 - Leadership in Community Education Finance and Law (1.0 cr)

**Electives for Director of Community Education**

Plus credits in the following areas dependent upon undergraduate coursework or work experience with advisor approval:

- OLPD 5211 - Introduction to the Undereducated Adult (1.0 cr)
- or OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
- or CPSY 4334W - Children, Youth in Society [WI] (3.0 cr)
Twin Cities Campus
Prevention Science Minor
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Prevention Science Program, 290 McNeal Hall, 1985 Buford Avenue St Paul, MN 55108 (612-625-1900; fax: 612-625-4227)
Email: prevsci@umn.edu
Website: http://www.preventionscience.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Prevention science is defined for the purposes of this program as the scientific study of systematic efforts to reduce the incidence of unhealthy or maladaptive behavior, and to promote health and adaptive behavior in populations across the life span through designing and evaluating interventions, and utilizing knowledge about them more strategically.

The fundamental assumption of this free-standing minor is that future researchers and scholars will be most able to meet the challenges and changes occurring in society and in their chosen professions and disciplines if their training is comprehensive and transdisciplinary.

Prevention science is a rapidly expanding interdisciplinary field and this program will increase opportunities for the University's academic researchers to partner with communities to address the complex issues facing society.

Six areas of concentration will be offered. Students will be expected to select one as a major emphasis. Areas of concentration are: 1) promotion of mental health and well being across the life span; 2) interventions in education, health, and social services; 3) social policy; 4) family and community studies (early stage research, needs assessments, action research); 5) methodology; 6) individualized concentration.

For more information about these areas of concentration, visit http://www.preventionscience.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must have gained admission to a master's or doctoral degree-granting program, and have prepared a minor program of coursework approved by the director of graduate studies in prevention science. Students are required to make formal application to the program. Doctoral students must apply prior to submitting their graduate degree plan for approval. Instructions and form can be found at http://www.preventionscience.umn.edu.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's and doctoral minors are developed in consultation with, and should be approved in advance by, the director of graduate
studies for prevention science.

The purpose of the minor is to provide students with interdisciplinary training in prevention science; therefore, all students will be required to fulfill the elective requirements for the minor by taking courses outside their major. Courses counting toward a student's major may not be counted toward the minor.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's

Required Courses

PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)

Students should choose 6 additional credits of elective courses primarily from the student's area of concentration in consultation with the director of graduate studies.

Doctoral

Required Courses

PREV 8001 - Prevention Science: Principles and Practices (3.0 cr)
PREV 8005 - Prevention Science Capstone Course (1.0 cr)

Students should choose 9 additional credits of elective courses primarily from the student's area of concentration in consultation with the director of graduate studies.
Twin Cities Campus

Professional Development Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12 to 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in professional development is designed to prepare leaders in designing, implementing, and evaluating learning opportunities for preK-12 educators and related staff.

This 12- to 15-credit graduate-level program offers professional development opportunities for teachers, administrators, and others involved in school improvement initiatives. Throughout the program, students are required to reflect on their learning, make explicit connections between theory and practice, and design staff development processes and materials for use in their own work contexts.

Through the program, participants will:
Learn to apply research-based standards for staff development,
Be prepared for the multifaceted roles and competencies of staff developers,
Identify organizational and leadership capacities for effective staff development policies and practices,
Be able to articulate effective staff learning principles, designs, and strategies,
Evaluate staff development, including its effects on students, staff, and systems,
Learn to work effectively with groups, including both facilitation and training models of learning,
Identify and access staff development resources, including current research and best practices literature,
Gain awareness of individual strengths and areas for continuous improvement as a professional educator and leader of staff learning.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
Admission to the professional development certificate is open to both degree-seeking or non-degree seeking students. Students may pursue the certificate alone or concurrently with a UM masters or doctoral degree. Applicants must have at least three years of experience working as education or related professionals in preK-12 education. Please note that this program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States. Admission for this program is done on a rolling basis.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
Required Courses
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
OLPD 5374 - Leadership for Professional Development (4.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Additional Coursework
With certificate program faculty approval, students choose and complete 2-5 credits of coursework focusing on a topic that interests them. Students can complete this requirement in one of two ways.
Independently designed study or project [OLPD 5095]
Focused elective coursework
Take 2 - 5 credit(s) from the following:

Indepedently designed study or project: OLPD 5095
OLPD 5095 Problems: Educational Policy and Administration (1-3 cr). Students submit a proposal for an independently designed study or project to the certificate coordinator for approval by submitting the Proposal for Independent Study or Project as Elective Option [PDF].
Examples of independently designed studies or projects include:
Comprehensive site-level design for staff development, including learning, implementation, and evaluation components.

Indepedently designed study or project: OLPD 5095 Cont'd
Evaluation of a current staff development or curricular initiative
Internship focused on staff development research, policy, or practice with personnel in school districts, state departments, or higher education
Individualized study or research review of a staff development-related topic
Attendance at a national conference with documentation, reflection on learning, and specified follow-up application

Focused elective coursework
In consultation with the certificate coordinator, students can choose elective coursework that aligns with individual interests and best practices in the staff development field. Students may choose from the wide range of offerings at the University of Minnesota, including coursework with the following course designators:
Curriculum and Instruction (CI)
Educational Psychology (EPSY)
Organizational Leadership, Policy, and Development (OLPD)
Public Affairs (PA)
Sociology (SOC)

Please Note:
The certificate coordinator must approve elective coursework. Courses taken before formal admission into the program may be accepted as program credits at a later date. Relevant graduate coursework from other graduate institutions may be approved to fulfill the elective requirement after review of relevant course syllabi. However, all coursework must have been taken within five years from the date of acceptance into the certificate program.
Twin Cities Campus
Program Evaluation Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Program evaluation is an area of inquiry that uses both quantitative and qualitative methods to address questions of concern to policy makers, administrators, managers, and, in some cases, program participants. In this era of competing developments--increased accountability and the democratization of research activity--knowledge of program evaluation is a useful and valuable commodity. The program evaluation minor is an interdisciplinary effort providing intensive study of the techniques and process of evaluation and policy research, in addition to the social and political context within which program evaluation occurs. The graduate minor in program evaluation offers a coordinated set of courses designed for students who wish to have the knowledge and skills necessary to conduct evaluations combined with their graduate majors or professional fields of study. Courses include readings, discussions, and assignments designed to develop the skills essential to professionals intending to use or conduct evaluation in nonprofit and for-profit organizations.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Prior admission into an established MA or PhD is required. Students in the existing evaluation-related concentrations in organizational leadership, policy, and development or educational psychology are not allowed into the minor. Admission to the minor program will therefore be contingent upon enrollment in good standing within a recognized University of Minnesota degree-granting program.

Special Application Requirements:
Students interested in admission to the minor should contact the minor's Director of Graduate Studies. Students must demonstrate relevant academic background and experience.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Use of 4xxx courses towards program requirements is not permitted.

The program for an individual student will be developed by the student, the major advisor, and the director of graduate studies (DGS) of the program evaluation minor. With permission of the program evaluation minor DGS, students with sufficient background and previous course experience equivalent to one or more courses within the minor field curriculum may apply for a waiver of appropriate requirements, and replace waived courses with additional electives to meet the minimum number of credits required for the minor.
Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Minor Requirements
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
  or An alternative course approved by program evaluation steering committee
- OLPD 5502 - Theory and Models of Evaluation (3.0 cr)
  or OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
- OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

Doctoral
Minor Requirements
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
  or or an alternative course approved by program evaluation steering committee
- OLPD 5502 - Theory and Models of Evaluation (3.0 cr)
  or OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
- OLPD 8521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
- OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

Additional coursework
Additional coursework must be selected in conjunction with, and approved by, the minor adviser.
Twin Cities Campus

Program Evaluation Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12 to 13
- This program does not require summer semesters for timely completion.
- Degree: Program Evaluation Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program evaluation certificate program offers intensive study of applied methods of evaluating programs and services in school, health, government, nonprofit agencies and market research settings. This interdisciplinary program surveys program evaluation techniques and processes, and examines the social and political contexts of the studies. The program allows working professionals from a variety of disciplines to formalize their training in program evaluation by earning a certificate in this area. Demand for trained professionals in program evaluation has increased steadily to meet the reporting needs of funding agencies, policy makers, and program managers in the public and private sectors. Graduates of evaluation studies programs have found employment in county government, social service agencies, state departments, and research consulting firms and businesses.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A completed graduate-level degree, master of education (MEd) or master of arts (MA), in an appropriate content area, including education, social work, public health, or public policy.

Other requirements to be completed before admission:
Students must demonstrate relevant academic background, including research methodology and experience in a field in which program evaluation is practiced (e.g., public health, social work, or education). Admission will be based on an assessment of the applicant's advanced knowledge and level of professional experience in the field of program evaluation. Applications are reviewed on a rolling basis.

Special Application Requirements:
Enrollment in the certificate program will be limited to a maximum of 10 students per calendar year.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Required Coursework
8-9 credits required. The following courses (or equivalents approved by the program coordinator of evaluation studies) are required.
Foundations of evaluation
Take 1 course from the following:
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
PA 5311 - Program Evaluation (3.0 cr)
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
SW 8603 - Program Evaluation (2.0 cr)

Evaluation theory
OLPD 5502 - Theory and Models of Evaluation (3.0 cr)
or OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)

Internship in evaluation
Only 3 credits of this course can count towards this certificate.
OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

Elective Coursework
Students may choose 3-4 credits of elective coursework from the following list to meet the overall program minimum of 12 credits. Additional courses may be approved by the program coordinator of evaluation studies.
Take 3 or more credits from the following:
• CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
• CI 8914 - Critical Science Research (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
• OLPD 5056 - Case Studies for Policy Research (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 8521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
• OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)
• PUBH 8724 - The Health Care System and Public Health (3.0 cr)
• SW 8602 - Direct Practice Evaluation (2.0 cr)
Twin Cities Campus
Social Work M.S.W.
School of Social Work
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Social Work, 105 Peters Hall, 1404 Gortner Avenue, St. Paul, MN 55108 (612-625-1220; fax: 612-624-3744)
Email: swadmis@umn.edu
Website: http://cehd.umn.edu/ssw

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34 to 53
- This program does not require summer semesters for timely completion.
- Degree: Master of Social Work

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MSW prepares students for advanced social work practice. A 53-credit program and a 34-credit advanced standing program are available. The curriculum offers concentrations in clinical mental health, families and children, health, disabilities and aging, or community practice.

Accreditation
This program is accredited by Council on Social Work Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
A foundation in the liberal arts and one year of work experience in human services is preferred. Work experience may include paid, volunteer, and intern positions.

Special Application Requirements:
In order to apply, applicants are required to submit a specified personal statement, writing sample, resume, transcripts, and three letters of recommendation. All application instructions are posted on the School of Social Work website.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 34 to 53 major credits and up to null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The MSW requires 53 credits; a 34-credit advanced standing program is available to graduates of undergraduate social work programs accredited by the Council on Social Work Education. All credits for the MSW can be completed in two years of full-time study, or three years to four years of part-time study, and must be completed within five years of the date of the earliest coursework taken for the
degree.

The 53-credit program includes a set of required foundation courses (19 cr), courses from a selected concentration, two field internships, and social work electives.

A maximum of 26 credits may be transferred from the following sources with School of Social Work approval: up to 8 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota; up to 26 credits from another regionally and professionally accredited school of social work if the student was registered as a graduate student in the program.

The 34-credit advanced standing program includes courses from a selected concentration, one field internship, and social work electives. A maximum of 16 credits may be transferred from the following sources with School of Social Work approval: 16 credits completed as a graduate student in another accredited MSW program; up to 6 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota.

Foundations Curriculum- Full Program (53 credit) Students

The 19-cr foundation curriculum is required for full program (53 cr) students. The foundation curriculum is waived for advanced standing students, unless required in a student's conditions of admission. Advanced standing students who receive a grade of B- or less in a BSW class that is comparable to one of our foundation classes may be asked to repeat that content in our MSW program.

Students should take 5051 for 2 cr; 5101 for 3 cr; 8010 for 3 cr in fall; 3 cr in spring or 6 cr in summer.

Take exactly 19 credit(s) from the following:
- SW 5051 - Human Behavior and the Social Environment (2.0 - 3.0 cr)
- SW 5101 - Historical Origins and Contemporary Policies and Programs in Social Welfare (3.0 - 4.0 cr)
- SW 8151 - Social Work Methods: Practice With Individuals and Systems (2.0 cr)
- SW 8152 - Social Work Practice Methods: Families and Groups (2.0 cr)
- SW 8153 - Models of Community Intervention (1.0 cr)
- SW 8154 - Organizations and Policy Advocacy (1.0 cr)
- SW 8941 - Social Work Research Methods (2.0 cr)
- SW 8010 - Seminar: Field Practicum I (1.0 - 8.0 cr)

Concentrations

Clinical Mental Health Concentration

Prepares students for advanced clinical social work practice with children, adults and families across diverse settings and populations. Students learn contextually based approaches to mental health diagnostic assessment, treatment and practice evaluation, with a strong focus on client systems experiencing significant mental health risk. In addition to the following requirements, students must complete 5 cr of electives at a minimum of 5000 level.

Anchor and Boost

SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)
SW 8452 - Core Concepts in Clinical Social Work Practice (3.0 cr)

Concentration Electives

Students must take two courses/ 6 cr of concentration electives.

Take 6 or more credit(s) from the following:
- SW 8352 - Advanced Practice with Families (3.0 cr)
- SW 8461 - Advanced Clinical Social Work Practice with Adults (3.0 cr)
- SW 8462 - Advanced Clinical Practice With Children and Adolescents (3.0 cr)
- SW 8463 - Social Work Practice With Severe and Persistent Mental Illness and Severe Emotional Disturbance (3.0 cr)

Diversity

SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

Field Practicum and Advanced Evaluation

SW 8020, Field Practicum II (6 cr) and SW 8842, Advanced Social Work Evaluation (3 cr) must be taken concurrently. SW 8842 must be taken for a total of 3 cr. The credits are split between fall and spring semesters. If a student registers for 2 cr in the fall, they must register for 1 cr in the spring and vice versa. Students taking 8842 in the summer register for 3 cr.

Advanced Standing students will take SW 8030 concurrently with SW 8842.

SW 8020 - Field Practicum II (1.0 - 6.0 cr)

Advanced Policy

SW 8806 - Health and Mental Health Policy (3.0 cr)
or SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

2nd Focus Anchor

Students must choose one course.

SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
or SW 8351 - Advanced Practice I: Families and Children (3.0 cr)
or SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)
Community Practice Concentration
Concentration prepares students to improve the effectiveness and responsiveness of human service systems to mobilize groups for social change, and to serve as catalysts for sustainable development and social justice. Students are prepared to fill a variety of community practice roles—leaders, planners, policy advocates, community organizers, mediators, evaluators and agency administrators in a range of settings. In addition to the following requirements, students must complete 5 cr of electives.

Anchor and Boost
- SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)
- SW 8552 - Advanced Community Practice: Leadership, Planning, and Program Development (3.0 cr)

Concentration Electives
Students must take two courses/6 cr of concentration electives.
Take 6 or more credit(s) from the following:
- SW 5562 - Global Social Work and Social Development (3.0 cr)
- SW 8561 - Human Resources Management in Human Services Agencies (3.0 cr)
- SW 8563 - Advanced Policy Advocacy (3.0 cr)

Diversity
- SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

Field Practicum and Advanced Evaluation
SW 8020, Field Practicum II (6 cr) and SW 8842, Advanced Social Work Evaluation (3 cr) must be taken concurrently. SW 8842 must be taken for a total of 3 cr. The credits are split between fall and spring semesters. If a student registers for 2 cr in the fall, they must register for 1 cr in the spring and vice versa. Students taking 8842 in the summer register for 3 cr.

Advanced Standing students will take SW 8030 concurrently with SW 8842.

SW 8020 - Field Practicum II (1.0 - 6.0 cr)
with SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)

Advanced Policy
- SW 8804 - Child Welfare Policy (3.0 cr)
- SW 8805 - Aging and Disability Policy (3.0 cr)
- SW 8806 - Health and Mental Health Policy (3.0 cr)
- SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

2nd Focus Anchor
- SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
- SW 8351 - Advanced Practice I: Families and Children (3.0 cr)
- SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)

Families and Children Concentration
Prepares students to work with families and children in a range of settings and organizations, as well as influence relevant organizational structures and policies. Students will be able to identify protective supports and develop interventions that mediate risk and promote resilience. In addition to the following requirements, students must complete 5 cr of electives at a minimum of 5-000 level.

Anchor and Boost
- SW 8351 - Advanced Practice I: Families and Children (3.0 cr)
- SW 8352 - Advanced Practice with Families (3.0 cr)

Concentration Electives
Students must take two courses/6 cr of concentration electives.
Take 6 or more credit(s) from the following:
- SW 8361 - Identification and Assessment of Family Violence (3.0 cr)
- SW 8363 - Social Work in Child Welfare (3.0 cr)
- SW 8462 - Advanced Clinical Practice With Children and Adolescents (3.0 cr)

Diversity
- SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

Field Practicum and Advanced Evaluation
SW 8020, Field Practicum II (6 cr) and SW 8842, Advanced Social Work Evaluation (3 cr) must be taken concurrently. SW 8842 must be taken for a total of 3 cr. The credits are split between fall and spring semesters. If a student registers for 2 cr in the fall, they must register for 1 cr in the spring and vice versa. Students taking 8842 in the summer register for 3 cr.

Advanced Standing students will take SW 8030 concurrently with SW 8842.

SW 8020 - Field Practicum II (1.0 - 6.0 cr)
with SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)

Advanced Policy
- SW 8804 - Child Welfare Policy (3.0 cr)
- SW 8805 - Aging and Disability Policy (3.0 cr)
- SW 8806 - Health and Mental Health Policy (3.0 cr)
Health, Disability and Aging Concentration
Prepares students to work with people affected by distinct and interconnected issues related to health, disability and aging. Students are prepared to work in a variety of settings such as hospitals, primary care clinics, residential care facilities, hospice, community-based programs, and in policy and advocacy organizations. In addition to the following requirements, students must complete 5 cr of electives at a minimum of 5000 level.

Anchor and Boost
- SW 8251 - Social Work Practice in Health, Disabilities, and Aging (3.0 cr)
- SW 8261 - Advanced Social Work Practice in Health Care (3.0 cr)

Concentration Electives
Students must take two courses/6 cr of concentration electives.
Take 6 or more credit(s) from the following:
- SW 8262 - Empowerment Practice With Persons With Disabilities (3.0 cr)
- SW 8263 - Advanced Direct Practice and Community-Based Interventions in Gerontology (3.0 cr)
- SW 8463 - Social Work Practice With Severe and Persistent Mental Illness and Severe Emotional Disturbance (3.0 cr)

Diversity
- SW 8821 - Social Work and Difference, Diversity and Privilege (2.0 cr)

Field Practicum and Advanced Evaluation
SW 8020, Field Practicum II (6 cr) and SW 8842, Advanced Social Work Evaluation (3 cr) must be taken concurrently. SW 8842 must be taken for a total of 3 cr. The credits are split between fall and spring semesters. If a student registers for 2 cr in the fall, they must register for 1 cr in the spring and vice versa. Students taking 8842 in the summer register for 3 cr.

Advanced Standing students will take SW 8030 concurrently with SW 8842.
SW 8020 - Field Practicum II (1.0 - 6.0 cr)
**with** SW 8842 - Advanced Social Work Evaluation (1.0 - 3.0 cr)

Advanced Policy
- SW 8805 - Aging and Disability Policy (3.0 cr)
- SW 8806 - Health and Mental Health Policy (3.0 cr)
- SW 8807 - International and Comparative Social Welfare Policy (3.0 cr)

2nd Focus Anchor
- SW 8351 - Advanced Practice I: Families and Children (3.0 cr)
- SW 8451 - Assessment and Engagement in Clinical Social Work Practice (3.0 cr)
- SW 8551 - Advanced Community Practice: Assessment, Organizing, and Advocacy (3.0 cr)

Joint- or Dual-degree Coursework: MSW/MPH, MSW/MPP, and MSW/MURP
Student may take a total of 22 credits in common among the academic programs.
Twin Cities Campus
Social Work Ph.D.
School of Social Work
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Social Work, 105 Peters Hall, 1404 Gortner Avenue, St. Paul, MN 55108 (612-625-1220; fax: 612-624-3744)
Email: swadmis@umn.edu
Website: http://cehd.umn.edu/ssw

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in social work prepares students to provide intellectual leadership for the social work profession through advanced levels of scholarship, research, theory development, and policy analysis. Students are expected to acquire skill in research design and statistics and to develop a comprehensive knowledge of social work and social welfare history, theory, and policy.

The PhD program does not focus on the development of advanced skills for clinical practice. However, students gain knowledge of practice theory and research related to social work practice. Many graduates assume positions as university faculty. Consequently, the program offers opportunities for students to acquire skills in teaching and curriculum development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is required.

Special Application Requirements:
Priority application deadline is early January in the appropriate year. Final deadline is early March. Applications received by second deadline will be reviewed and applicants accepted on a space-available basis.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
28 to 32 credits are required in the major.
8 to 12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The PhD program emphasizes mastery of student and program determined objectives rather than an accumulation of course credits. Degree requirements vary according to the student's background and educational goals. A minimum of 40 credits plus 24 required thesis credits beyond the MSW are required. Required courses include core seminars in social work research, social welfare history, social welfare policy, and theory and model development; a teaching course; a supervised research practicum and practicum seminar (two-semester sequence); supporting program courses (12 credits of supporting program course work is required - eight credits must be taken outside of social work while four credits may be taken in social work); statistics courses (most students take EPSY 8261 and EPSY 8262 but other sequences may be approved by the PhD Committee). Students must also have teaching experience in the School of Social Work while in the program. Students are expected to attend PhD Colloquia and research colloquia for at least the first two years of their participation in the program.

Required Courses
SW 8875, Research Practicum, must be taken two semesters for a total of four credits.
SW 8871 - Social Work Research Seminar I (3.0 cr)
SW 8872 - Social Work Research Seminar II (3.0 cr)
SW 8875 - Research Practicum (2.0 cr)
SW 8861 - Theory and Model Development in Social Work (3.0 cr)
SW 8855 - Social Policy Formulation and Analysis (3.0 cr)
SW 8851 - Social Welfare History and Historical Research Methods (3.0 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
EPSY 8261 - Statistical Methods in Education I (3.0 cr)
EPSY 8262 - Statistical Methods in Education II (3.0 cr)

Other sequence of statistics courses may be approved by the PHD Committee.

Supporting Program Coursework
Students must take 12 credits of supporting course work in consultation with their advisor. 8 credits must be taken outside of social work while 4 credits may be taken in social work.
Twin Cities Campus
Sociocultural Studies in Education Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The sociocultural studies in education (SCSE) minor (previously known as the social and philosophic studies of education minor) provides a multidisciplinary foundation for the study of social and cultural phenomena that shape educational ideologies and practices. The minor enables students to take courses from a variety of social science, humanities, and interdisciplinary fields in order to generate a particular perspective, lens, or optic that can illuminate problems or processes of interest to them.

The SCSE minor program is shaped to suit the particular needs and interests of the student at either the master's or doctoral level. Courses at either the 5xxx or 8xxx level are selected in consultation with an SCSE faculty member and approved by the SCSE director of graduate studies (DGS). Courses are generally of two types: those that explicitly draw upon a disciplinary or interdisciplinary perspective to examine educational processes (e.g. economics of education); and those that provide an in-depth exploration of a disciplinary or interdisciplinary perspective itself (e.g. contemporary political thought).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the SCSE minor is contingent upon prior admission to a University masters or doctoral degree-granting program. Interested students should consult with a SCSE faculty member to develop a proposed course of study, then formally declare the minor when they file their degree plan. Students who declare the minor are required to include a member of the SCSE faculty on their masters or doctoral committee. Students may apply to this minor throughout the year.

Special Application Requirements:
The director of graduate studies (DGS) of the SCSE minor must approve the applicant's proposed course of study by signing the student's degree program form in addition to the student's major DGS.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters

Minor Requirements

Master’s students complete at least 9 graduate credits from the list of approved courses below. These must include a minimum of 3 OLPD course credits and 3 credits from courses outside of OLPD (these courses may be within CEHD). Additional courses may be approved by SCSE faculty in consultation with the SCSE minor DGS.

OLPD Courses

Must take at least 3 credits from the list below.

Take 1 - 2 course(s) from the following:

- OLPD 5041 - Sociology of Education (3.0 cr)
- OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5107 - Gender, Education, and International Development (3.0 cr)
- OLPD 5323 - Women in Leadership (3.0 cr)
- OLPD 5128 - Anthropology of Education (3.0 cr)
- OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
- OLPD 5346 - Politics of Education (3.0 cr)
- OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
- OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
- OLPD 8103 - Comparative Education (3.0 cr)

Non-OLPD Courses

Must take at least 3 credits from the list below.

Take 1 - 2 course(s) from the following:

- AFRO 5103 - World History and Africa (3.0 cr)
- AFRO 5120 - Social and Intellectual Movements in the African Diaspora (3.0 cr)
- AFRO 5551 - Methods: Use of Oral Traditions as Resources for History (3.0 cr)
- AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
- AMIN 5890 - Problems in American Indian History (3.0 cr)
- AMST 8288 - Working in the Global Economy: Readings (3.0 cr)
- ANTH 8001 - Ethnography, Theory, History (3.0 cr)
- ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
- ANTH 8207 - Political and Social Anthropology (3.0 cr)
- ANTH 8215 - Anthropology of Gender (3.0 cr)
- CI 5136 - History of the American Curriculum (3.0 cr)
- CI 5137 - Multicultural Gender-Fair Curriculum (3.0 cr)
- CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
- CI 5941 - Language, Culture, and Education (3.0 cr)
- CI 8111 - Representations of Knowledge in Curriculum and Culture (1.0 - 3.0 cr)
- CI 8461 - Sociocultural Theory, Education, and Literacy (3.0 cr)
- CL 8362 - Modernity and Its Others (4.0 cr)
- COMM 5451W - Intercultural Communication Processes [WI] (3.0 cr)
- CPSY 5251 - Social and Philosophical Foundations of Early Childhood Education (2.0 cr)
- CSCL 5555 - Introduction to Semiotics (3.0 cr)
- CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
- CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
- CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
- CSDS 8910 - Advanced Topics in Comparative Studies in Discourse and Society (3.0 cr)
- DSSC 8920 - Advanced Topics in Comparative Studies in Discourse and Society (3.0 cr)
- HIST 5871 - Readings in U.S. Intellectual History: 19th-20th Centuries (3.0 cr)
- HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
- HIST 8239 - Readings in Gender, Race, Class, and/or Ethnicity in the United States (3.0 cr)
- HIST 8630 - Seminar in World History (3.0 cr)
- HIST 8961 - Research Seminar: Intellectual History (3.0 cr)
• KIN 5371 - Sport and Society (3.0 cr)
• PA 5001 - Intellectual Foundations of Public Action (1.5 cr)
• PA 5414 - Child Human Rights: Work and Education (3.0 cr)
• PHIL 5601 - History of the Philosophy of Science (3.0 cr)
• PHIL 8130 - Seminar: Epistemology (3.0 cr)
• PHIL 8131 - Epistemology Survey (3.0 cr)
• PHIL 8133 - Feminist Theories of Knowledge (3.0 cr)
• POL 8101 - Introduction to Political Science (3.0 cr)
• POL 8215 - Philosophy of Political Inquiry (3.0 cr)
• POL 8225 - American Political Thought (3.0 cr)
• POL 8235 - Democratic Theory (3.0 cr)
• POL 8253 - Late Modern Political Thought (3.0 cr)
• POL 8275 - Contemporary Political Thought (3.0 cr)
• POL 8305 - Interest Groups and Social Movements (3.0 cr)
• SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
• SOC 8731 - Sociology of Knowledge (3.0 cr)
• SOC 8735 - Sociology of Culture (3.0 cr)
• SW 5101 - Historical Origins and Contemporary Policies and Programs in Social Welfare (3.0 - 4.0 cr)

Doctoral Minor Requirements
Doctoral students complete at least 12 graduate credits from the list of approved courses below. These must include a minimum of 6 OLPD course credits and 3 credits from courses outside of OLPD (these courses may be within CEHD).

OLPD Courses
Must take at least 6 credits from the list below.
Take 2 - 3 course(s) from the following:
• OLPD 5041 - Sociology of Education (3.0 cr)
• OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
• OLPD 5103 - Comparative Education (3.0 cr)
• OLPD 5107 - Gender, Education, and International Development (3.0 cr)
• OLPD 5128 - Anthropology of Education (3.0 cr)
• OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
• OLPD 5323 - Women in Leadership (3.0 cr)
• OLPD 5346 - Politics of Education (3.0 cr)
• OLPD 5721 - Race and Ethnicity in Higher Education (3.0 cr)
• OLPD 8022 - Education and Globalization: Anthropological Perspectives (3.0 cr)
• OLPD 8103 - Comparative Education (3.0 cr)

Non-OLPD Courses
Must take at least 3 credits from the list below.
Take 1 - 2 course(s) from the following:
• AFRO 5103 - World History and Africa (3.0 cr)
• AFRO 5120 - Social and Intellectual Movements in the African Diaspora (3.0 cr)
• AFRO 5551 - Methods: Use of Oral Traditions as Resources for History (3.0 cr)
• AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
• AMIN 5890 - Problems in American Indian History (3.0 cr)
• AMST 8288 - Working in the Global Economy: Readings (3.0 cr)
• ANTH 8001 - Ethnography, Theory, History (3.0 cr)
• ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
• ANTH 8207 - Political and Social Anthropology (3.0 cr)
• ANTH 8215 - Anthropology of Gender (3.0 cr)
• CI 5136 - History of the American Curriculum (3.0 cr)
• CI 5137 - Multicultural Gender-Fair Curriculum (3.0 cr)
• CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
• CI 8111 - Representations of Knowledge in Curriculum and Culture (1.0 - 3.0 cr)
• CI 8461 - Sociocultural Theory, Education, and Literacy (3.0 cr)
• CL 8362 - Modernity and Its Others (4.0 cr)
• COMM 5451W - Intercultural Communication Processes [WI] (3.0 cr)
• CPSY 5251 - Social and Philosophical Foundations of Early Childhood Education (2.0 cr)
• CSCL 5555 - Introduction to Semiotics (3.0 cr)
• CSCL 5833 - Marx, Freud, Nietzsche: Intellectual Foundations (3.0 cr)
• CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
• CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
• CSDS 8910 - Advanced Topics in Comparative Studies in Discourse and Society (3.0 cr)
• CSDS 8920 - Advanced Topics in Comparative Studies in Discourse and Society (3.0 cr)
• DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
• DSSC 8310 - Topics in Development Studies and Social Change (1.0 - 3.0 cr)
• EPSY 5157 - Social Psychology of Education (3.0 cr)
• GLOS 5403 - Human Rights Advocacy (3.0 cr)
• GLOS 5602 - Other Worlds: Globality and Culture (3.0 cr)
• GWSS 5190 - Topics: Theory, Knowledge, and Power (3.0 cr)
• GWSS 8101 - Intellectual History of Feminism (3.0 cr)
• GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
• GWSS 8107 - Feminist Pedagogies (3.0 cr)
• GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
• GWSS 8109 - Feminist Knowledge Production (3.0 cr)
• GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
• HIST 5871 - Readings in U.S. Intellectual History: 19th-20th Centuries (3.0 cr)
• HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
• HIST 8239 - Readings in Gender, Race, Class, and/or Ethnicity in the United States (3.0 cr)
• HIST 8630 - Seminar in World History (3.0 cr)
• HIST 8961 - Research Seminar: Intellectual History (3.0 cr)
• KIN 5371 - Sport and Society (3.0 cr)
• PA 5001 - Intellectual Foundations of Public Action (1.5 cr)
• PA 5414 - Child Human Rights: Work and Education (3.0 cr)
• PHIL 5601 - History of the Philosophy of Science (3.0 cr)
• PHIL 8130 - Seminar: Epistemology (3.0 cr)
• PHIL 8131 - Epistemology Survey (3.0 cr)
• PHIL 8133 - Feminist Theories of Knowledge (3.0 cr)
• POL 8101 - Introduction to Political Science (3.0 cr)
• POL 8215 - Philosophy of Political Inquiry (3.0 cr)
• POL 8225 - American Political Thought (3.0 cr)
• POL 8235 - Democratic Theory (3.0 cr)
• POL 8253 - Late Modern Political Thought (3.0 cr)
• POL 8275 - Contemporary Political Thought (3.0 cr)
• POL 8305 - Interest Groups and Social Movements (3.0 cr)
• SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
• SOC 8731 - Sociology of Knowledge (3.0 cr)
• SOC 8735 - Sociology of Culture (3.0 cr)
• SW 5101 - Historical Origins and Contemporary Policies and Programs in Social Welfare (3.0 - 4.0 cr)
Twin Cities Campus

Special Education Initial License M.Ed.

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241)
Email: sped-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/MEd-prospective.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 51
- This program requires summer semesters for timely completion.
- All instruction and practica related to the residency-based sub-plan in EBD are delivered off-campus. Traditional course instruction is delivered in a meeting room in one of the partner district buildings one night per week. Practica are located in public school settings of our partner districts in Federal Setting III and IV EBD classrooms and take place during regular school hours.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduates of the University of Minnesota special education teacher licensure programs are student-centered, collaborative professionals who deliver robust, high-quality, and specialized educational services, adding value to the learning and development of infants, children, and adults with disabilities from diverse cultural backgrounds.

Program graduates are knowledgeable in the following areas:
- Engaging in collaborative problem solving with families and professionals to meet the academic, social, behavioral, and life skills needs of individuals with disabilities;
- Implementing and supporting others’ implementation of evidence-based instruction and intervention with fidelity to improve student outcomes;
- Using reliable and valid assessment data to make individualized educational decisions;
- Systematically selecting and adapting instructional supports to meet individual needs, based on data and knowledge of individual learning, developmental, and cultural differences;
- Maximizing expectations and learning opportunities for individuals with disabilities in the Least Restrictive using the full continuum of services; and
- Upholding principles of professionalism and ethics in their practice.

Accreditation
This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Experience in working with children and/or people with disabilities is preferred.

Special Application Requirements:
The application deadline is March 1 for summer or fall admission.

Upload the following additional materials into the appropriate areas of the online application:
- One to two page applicant statement outlining goals, interests, experiences, etc.
- Résumé
- Two letters of recommendation [.pdf], preferably from individuals in the education field (for the online application, applicant's will be asked to enter recommenders' information into the online application; a message will be automatically sent to those recommenders with further instructions on how to submit their letters)
- MLTE Basic Skills Tests
- Unofficial transcripts from all collegiate institutions attended (Students who are accepted will need to send official transcripts in a sealed envelope. University of Minnesota graduates need not submit University of Minnesota transcripts to Student Services.)
- International applicants should submit a foreign transcript evaluation from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp)

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

**Plan C:** Plan C requires 30 to 51 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.

**Capstone Project:** A portfolio and integrated paper/mini research project/comprehensive exam is required in conjunction with registration for EPSY 5690. The student and advisor will develop the individual's MEd graduate plan.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

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**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

- **Academic Behavioral Strategist**

  Professional development in special education offers a program of study that leads to K-12 licensure as an Academic Behavior Strategist (ABS) and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings with students who have mild to moderate disabilities. Graduates of the program are student-centered, collaborative professionals who implement evidence-based instructional interventions with fidelity to improve learner outcomes. The program incorporates maximizing learner expectations and learning opportunities including cultural and social diversity. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with disabilities and their families.

  Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

- **Required Courses**

  - EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
  - EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
  - EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
  - EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
  - EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
  - EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
  - EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)
Electives
Take 12 or more credit(s) from the following:
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5741 - Student Teaching: Academic and Behavioral Strategist (3.0 - 6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Autism Spectrum Disorder
Professional development in special education offers a program in Autism Spectrum Disorders (ASD) that leads to Birth-12 licensure and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings including home- and school-based programs with children who have been identified with ASD and their families. Graduates are prepared to assess, analyze, and provide intervention and remediation of academic, social, and communicative challenges for students with ASD. This program focuses on the implementation of evidence-based practices, specialized educational services, and outcomes that add value to the learning and development of infants, children, and adults with ASD from diverse cultural backgrounds.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

Required Courses
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

Electives
Take 12 or more credit(s) from the following:
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
- EPSY 5633 - Module 3: Speech-generating Devices and High-Tech AAC (1.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorders (3.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
- EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5742 - Student Teaching: Autism Spectrum Disorders (6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Deaf and Hard of Hearing
The professional development program in special education specializing in deaf/hard of hearing leads to birth-12 classroom licensure and a MEd degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who are deaf or hard of hearing. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for deaf or hard of hearing students and their families, focusing on the objective of providing effective teaching practices and instructional strategies.
Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

**Required Courses**
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

**Electives**
Take 12 or more credit(s) from the following:
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5663 - Module 4: Assistive technology with Deaf/Hard of Hearing Students (2.0 cr)
- EPSY 5641 - Foundations of Education for Individuals Who Are Deaf/Hard of Hearing (2.0 cr)
- EPSY 5642 - Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5646 - Reading and Writing Practices with Deaf/Hard of Hearing Children (2.0 cr)
- EPSY 5647 - Aural and Speech Programming for Persons Who Are Deaf/Hard of Hearing (3.0 cr)
- EPSY 5651 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5741 - Student Teaching: Academic and Behavioral Strategist (3.0 - 6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

**Developmental Disabilities**
The professional development program in special education specializing in developmental disabilities leads to K-12 classroom licensure and a MEd degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have developmental disabilities. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with developmental disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

**Required Courses**
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

**Electives**
Take 12 or more credit(s) from the following:
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5621 - Assessment and Instructional Design for Students with Developmental Disabilities (3.0 cr)
- EPSY 5622 - Programs and Curricula for Students with Developmental Disabilities (3.0 cr)
- EPSY 5624 - Biomedical and Physical Impairments of Students with Developmental Disabilities (2.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
Early Childhood Special Education

The professional development program in special education specializing in early childhood special education (ECSE) leads to teaching licensure for work with children from birth through age five as well as a MEd. This program is designed to prepare teachers to work in a variety of educational settings, including home and school, with children who have a variety of developmental delays and disabilities.

The ECSE program philosophy focuses on cultural and social diversity and meeting the needs of individual children who have disabilities. Further, the ECSE program emphasizes the delivery of evidence-based practices within the natural routines of families and preschools when addressing the individualized needs of children. Graduates are prepared to assess, analyze, monitor, and problem solve the developmental and educational needs of young children and their families. With that, graduates of the ECSE program are prepared to be leaders in the field for the identification early intervention needs, provision of research-based services, and facilitation of successful transitions to kindergarten.

Students complete 30 credits: 17 credits required courses and 13 credits electives. Additional credits (25-30) are required for adding licensure to degree.

Required Courses
- EPSY 5609 - Family-centered Services (2.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

Electives
Take 13 or more credits from the following:
- CPSY 5252W - Facilitating Social and Emotional Learning in Early Childhood Education [WI] (3.0 cr)
- CPSY 5253 - Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)
- CPSY 5254 - Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students With Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
- EPSY 5682 - Education of Infants and Toddlers with Disabilities: Methods and Materials (3.0 cr)
- EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5761 - Student Teaching in Early Childhood Special Education Settings for Children Aged Three to Five Years (3.0 cr)
- EPSY 5762 - Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years (3.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Learning Disabilities

The professional development program in special education specializing in learning disabilities leads to K-12 classroom licensure and a MEd degree. It is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity, and meeting the needs of individual students who have learning disabilities. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with learning disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.
### Required Courses
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

### Electives
Take 12 or more credit(s) from the following:
- • OLPD 5005 - School and Society (2.0 cr)
- • CI 5307 - Technology for Teaching and Learning (1.5 cr)
- • OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- • EPSY 5114 - Psychology of Student Learning (3.0 cr)
- • EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- • EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- • EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
- • EPSY 5615 - Advanced Academic Interventions (3.0 cr)
- • EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- • EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- • EPSY 5627 - Seminar: Advanced issues in Learning Disabilities (3.0 cr)
- • EPSY 5628 - Characteristics of Moderate to Severe Learning Disabilities (3.0 cr)
- • EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
- • EPSY 5656 - Advanced Issues in Emotional Behavior Disorders (3.0 cr)
- • EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- • EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- • EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- • EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- • EPSY 5707 - Practicum in Moderate to Severe Learning Disabilities (3.0 cr)
- • EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- • EPSY 5752 - Student Teaching: Learning Disabilities (1.0 - 6.0 cr)
- • EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

### Emotional and Behavioral Disabilities
**Note:** New student applications to Emotional and Behavioral Disorders are not being accepted.

The professional development program in special education specializing in emotional and behavioral disorders leads to K-12 classroom licensure and a MEd degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have emotional and behavioral disorders. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with emotional and behavioral disorders and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

### Required Courses
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

### Electives
Take 12 or more credit(s) from the following:
- • OLPD 5005 - School and Society (2.0 cr)
- • CI 5307 - Technology for Teaching and Learning (1.5 cr)
- • OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- • EPSY 5114 - Psychology of Student Learning (3.0 cr)
- • EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- • EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- • EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
Emotional and Behavioral Disabilities Residency-Based

The professional development program in special education specializing in emotional and behavioral disorders leads to K-12 classroom licensure and a MEd degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have emotional and behavioral disorders. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with emotional and behavioral disorders and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete required courses for a total of 30 credits. Additional credits (5-6) are required for adding licensure to degree.

Required Courses

Students take the following courses including one credit of EPSY 5991.

- **EPSY 5611W** - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- **EPSY 5614** - Assessment and Due Process in Special Education (3.0 cr)
- **EPSY 5618** - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- **EPSY 5619W** - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- **EPSY 5629** - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
- **EPSY 5637** - Core Practices in Special Education: Foundations of Special Education (1.0 cr)
- **EPSY 5638** - Core Practices in Special Education: IEP Writing (1.0 cr)
- **EPSY 5656** - Advanced Issues in Emotional Behavior Disorders (3.0 cr)
- **EPSY 5657** - Interventions for Behavioral Problems in School Settings (3.0 cr)
- **EPSY 5658** - Characteristics of Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5670** - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- **EPSY 5674** - Practicum in Middle/Secondary Settings (1.0 cr)
- **EPSY 5675** - Practicum in ECSE/Elementary Settings (1.0 cr)
- **EPSY 5676** - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5677** - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5678** - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5679** - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5680** - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5681** - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
- **EPSY 5991** - Independent Study in Educational Psychology (1.0 - 8.0 cr)
Twin Cities Campus  
Special Education M.Ed.  
Educational Psychology  
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:  
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241)  
Email: sped-adm@umn.edu  
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/MEd-prospective.html

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 30 to 51  
- This program requires summer semesters for timely completion.  
- All instruction and practica related to the residency-based sub-plan in EBD are delivered off-campus. Traditional course instruction is delivered in a meeting room in one of the partner district buildings one night per week. Practica are located in public school settings of our partner districts in Federal Setting III and IV EBD classrooms and take place during regular school hours.  
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduates of the University of Minnesota special education teacher licensure programs are student-centered, collaborative professionals who deliver robust, high-quality, and specialized educational services, adding value to the learning and development of infants, children, and adults with disabilities from diverse cultural backgrounds.

Program graduates are knowledgeable in the following areas:  
- Engaging in collaborative problem solving with families and professionals to meet the academic, social, behavioral, and life skills needs of individuals with disabilities;  
- Implementing—and supporting others’ implementation of—evidence-based instruction and intervention with fidelity to improve student outcomes;  
- Using reliable and valid assessment data to make individualized educational decisions;  
- Systematically selecting and adapting instructional supports to meet individual needs, based on data and knowledge of individual learning, developmental, cultural differences;  
- Maximizing expectations and learning opportunities for individuals with disabilities in the Least Restrictive using the full continuum of services; and  
- Upholding principles of professionalism and ethics in their practice.

Accreditation  
This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission  
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:  
Experience in working with children and/or people with disabilities is preferred.

Special Application Requirements:  
The application deadline is March 1 for summer or fall admission.

Upload the following additional materials into the appropriate areas of the online application:  
- One to two page applicant statement outlining goals, interests, experiences, etc.  
- Résumé
- Two letters of recommendation [.pdf], preferably from individuals in the education field (for the online application, applicant’s will be asked to enter recommenders’ information into the online application; a message will be automatically sent to those recommenders with further instructions on how to submit their letters)
- MLTE Basic Skills Tests
- Unofficial transcripts from all collegiate institutions attended (Students who are accepted will need to send official transcripts in a sealed envelope. University of Minnesota graduates need not submit University of Minnesota transcripts to Student Services.)
- International applicants should submit a foreign transcript evaluation from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp)

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 30 to 51 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** A portfolio and integrated paper/mini research project/comprehensive exam is required in conjunction with registration for EPSY 5690. The student and advisor will develop the individual’s MEd graduate plan.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Program Sub-plans**

Students are required to complete one of the following sub-plans.

Students may complete the program with more than one sub-plan.

**Academic Behavioral Strategist**

Professional development in special education offers a program of study that leads to K-12 licensure as an Academic Behavior Strategist (ABS) and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings with students who have mild to moderate disabilities. Graduates of the program are student-centered, collaborative professionals who implement evidence-based instructional interventions with fidelity to improve learner outcomes. The program incorporates maximizing learner expectations and learning opportunities including cultural and social diversity. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with disabilities and their families.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

**Required Courses**

- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

**Electives**
Take 12 or more credit(s) from the following:

- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5741 - Student Teaching: Academic and Behavioral Strategist (3.0 - 6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

**Autism Spectrum Disorder**

Professional development in special education offers a program in Autism Spectrum Disorders (ASD) that leads to Birth-12 licensure and an MEd degree. This degree is designed to prepare teachers to work in a variety of educational settings including home and school based programs with children who have been identified with ASD and their families. Graduates are prepared to assess, analyze, and provide intervention and remediation of academic, social and communicative challenges for students with ASD. This program focuses on the implementation of evidence-based practices, specialized educational services, and outcomes that add value to the learning and development of infants, children and adults with ASD from diverse cultural backgrounds.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

**Required Courses**

- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

**Electives**

Take 12 or more credit(s) from the following:

- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
- EPSY 5633 - Module 3: Speech-generating Devices and High-Tech AAC (1.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorders (3.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
- EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5742 - Student Teaching: Autism Spectrum Disorders (6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

**Deaf and Hard of Hearing**

The professional development program in special education specializing in deaf/hard of hearing leads to Birth-12 classroom licensure and a MEd degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who are deaf or hard of hearing. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for deaf or hard of hearing students and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding
licensure to degree.

Required Courses

- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

Electives

Take 12 or more credit(s) from the following:

- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5634 - Module 4: Assistive technology with Deaf/Hard of Hearing Students (2.0 cr)
- EPSY 5641 - Foundations of Education for Individuals Who Are Deaf/Hard of Hearing (2.0 cr)
- EPSY 5642 - Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5646 - Reading and Writing Practices with Deaf/Hard of Hearing Children (2.0 cr)
- EPSY 5647 - Aural and Speech Programming for Persons Who Are Deaf/Hard of Hearing (3.0 cr)
- EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5741 - Student Teaching: Academic and Behavioral Strategist (3.0 - 6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Developmental Disabilities

The professional development program in special education specializing in developmental disabilities leads to K-12 classroom licensure and a MEd degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have developmental disabilities. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with developmental disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

Required Courses

- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

Electives

Take 12 or more credit(s) from the following:

- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5621 - Assessment and Instructional Design for Students with Developmental Disabilities (3.0 cr)
- EPSY 5622 - Programs and Curricula for Students with Developmental Disabilities (3.0 cr)
- EPSY 5624 - Biomedical and Physical Impairments of Students with Developmental Disabilities (2.0 cr)
- EPSY 5632 - Module 2: Evidence-based Methods for AAC Assessment and Intervention (2.0 cr)
Early Childhood Special Education

The professional development program in special education specializing in early childhood special education (ECSE) leads to teaching licensure for work with children from birth through age five as well as a MEd. This program is designed to prepare teachers to work in a variety of educational settings, including home and school, with children who have a variety of developmental delays and disabilities.

The ECSE program philosophy focuses on cultural and social diversity and meeting the needs of individual children who have disabilities. Further, the ECSE program emphasizes the delivery of evidence-based practices within the natural routines of families and preschools when addressing the individualized needs of children. Graduates are prepared to assess, analyze, monitor, and problem solve the developmental and educational needs of young children and their families. With that, graduates of the ECSE program are prepared to be leaders in the field for the identification of early intervention needs, provision of research-based services, and facilitation of successful transitions to kindergarten.

Students complete 30 credits: 17 credits required courses and 13 credits electives. Additional credits (25-30) are required for adding licensure to degree.

Required Courses

- EPSY 5609 - Family-centered Services (2.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

Electives

Take 13 or more credit(s) from the following:

- CPSY 5252W - Facilitating Social and Emotional Learning in Early Childhood Education [WI] (3.0 cr)
- CPSY 5253 - Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)
- CPSY 5254 - Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
- EPSY 5682 - Education of Infants and Toddlers with Disabilities: Methods and Materials (3.0 cr)
- EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5761 - Student Teaching in Early Childhood Special Education Settings for Children Aged Three to Five Years (3.0 cr)
- EPSY 5762 - Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years (3.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Learning Disabilities

The professional development program in special education specializing in learning disabilities leads to K-12 classroom licensure and a MEd degree. It is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity, and meeting the needs of individual students who have learning disabilities. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with learning disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.
Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

**Required Courses**
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

**Electives**
Take 12 or more credit(s) from the following:
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
- EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
- EPSY 5615 - Advanced Academic Interventions (3.0 cr)
- EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
- EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
- EPSY 5627 - Seminar: Advanced Issues in Learning Disabilities (3.0 cr)
- EPSY 5628 - Characteristics of Moderate to Severe Learning Disabilities (3.0 cr)
- EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
- EPSY 5656 - Advanced Issues in Emotional Behavior Disorders (3.0 cr)
- EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
- EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
- EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
- EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
- EPSY 5707 - Practicum in Moderate to Severe Learning Disabilities (3.0 cr)
- EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
- EPSY 5752 - Student Teaching: Learning Disabilities (1.0 - 6.0 cr)
- EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

**Emotional and Behavioral Disabilities**
The professional development program in special education specializing in emotional and behavioral disorders leads to K-12 classroom licensure and a M.Ed. degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have emotional and behavioral disorders. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with emotional and behavioral disorders and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Students complete 30 credits: 18 credits required courses and 12 credits electives. Additional credits (25-30) are required for adding licensure to degree.

**Required Courses**
- EPSY 5605 - Collaborative Practices for the Special Educator (3.0 cr)
- EPSY 5613 - Foundations of Special Education I [DSJ] (3.0 cr)
- EPSY 5614 - Assessment and Due Process in Special Education (3.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5631 - Module 1: Introduction to Augmentative and Alternative Communication (1.0 cr)
- EPSY 5690 - Experimental Teaching Seminar: MEd Culminating Project (2.0 cr)

**Electives**
Take 12 or more credit(s) from the following:
- OLPD 5005 - School and Society (2.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- EPSY 5114 - Psychology of Student Learning (3.0 cr)
- EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
- EPSY 5611W - Research-based Practices in Academic and Behavior Disabilities [WI] (3.0 cr)
• EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
• EPSY 5615 - Advanced Academic Interventions (3.0 cr)
• EPSY 5617 - Academic and Social Interventions for Students with Mild to Moderate Disabilities (3.0 cr)
• EPSY 5619W - Specialized Interventions in Mathematics for Students with Mild to Moderate Disabilities [WI] (3.0 cr)
• EPSY 5629 - Strategic Instructional Methods for Students Academically At-Risk (3.0 cr)
• EPSY 5656 - Advanced Issues in Emotional Behavior Disorders (3.0 cr)
• EPSY 5657 - Interventions for Behavioral Problems in School Settings (3.0 cr)
• EPSY 5658 - Characteristics of Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
• EPSY 5701 - Practicum: Field Experience in Special Education (1.0 - 2.0 cr)
• EPSY 5704 - Practicum in Middle/Secondary Settings (1.0 cr)
• EPSY 5705 - Practicum in ECSE/Elementary Settings (1.0 cr)
• EPSY 5708 - Practicum in Moderate to Severe Emotional/Behavioral Disorders (3.0 cr)
• EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
• EPSY 5754 - Student Teaching: Social and Emotional Disabilities (1.0 - 6.0 cr)
• EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
Twin Cities Campus

Specialist in Education and General Education Administration Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2016
• Length of program in credits: 60
• This program does not require summer semesters for timely completion.
• Degree: Certificate of Specialist in Educ/Genl Educ/Admin

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the MA and PhD programs choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and Human Resource Development (HRD). Our undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Applications to this certificate currently are not being accepted.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

This program's structure is currently under review. In the past, it has been customized based on the student's prior coursework. A final paper is required for completion.
Twin Cities Campus

Specialist in Education and Special Education Administration Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Spec Educ

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program is not accepting new students.

The Department of Organizational Leadership, Policy, and Development prepares administrators, scholars, and analysts for leadership roles in education. The department is committed to the preparation of leaders who can act effectively and ethically within the structures, processes, and cultural contexts of organized education.

The department also offers various certificate programs (including program evaluation, staff development, disability policy and services, and preK-12 administration), an individualized concentration in youth leadership development, and minors in international education, social and philosophic studies of education, and program evaluation. See the department website for details on minors and certificate programs.

These graduate programs incorporate relevant knowledge from the behavioral and social sciences and the humanities, with primary reliance on sociology, management science, political science, psychology, public affairs, economics, philosophy, history, and anthropology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
This program is not accepting new students

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

This certificate is not accepting new students.

The specialist certificate required a minimum of 60 credits of which at least 30 credits had to be in educational administration, 3 credits in leadership, 3 credits in policy; at least 6 credits in curriculum and instruction; at least 9 credits taken outside of educational administration (collateral field) and/or in additional certificate or licensure areas in educational policy and leadership; and a course in human relations.
Twin Cities Campus
Sport and Exercise Science Master of Education
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Email: kin@umn.edu
Website: http://www.cehd.umn.edu/kin/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The sport and exercise science MEd is a practitioner-oriented, graduate-level program designed to prepare students for advanced study or careers in the coaching of sport, sport or physical performance, or professions related to health and physical activity. Students may focus their studies on one of three career tracks: sport performance for students pursuing coaching careers; athletic training for students who have obtained their Athletic Training Certificate and who are pursuing careers in athletic training and/or teaching at the community college or college level; and health promotion for students pursuing careers as health coaches, personal trainers or employees of health related fields.

With guidance from faculty advisers, students choose at least 30 semester credits, which may include coursework, independent study, internships, workshops, and professional, site-based experiences. Students must maintain a minimum 3.0 GPA.

Accreditation
This program is accredited by N/A--this is not a licensure M.Ed.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

A bachelor's degree, preferably in kinesiology or physical education.

Special Application Requirements:
The college reviews applications on an ongoing basis. Application reviews for specific academic terms begin by the following dates:
November 1: spring semester admission
March 1: summer session admission
July 1: fall semester admission

Admission requirements for this program include the following criteria:

A bachelor's degree, preferably in physical education or kinesiology, with a 2.50 minimum grade point average (GPA) from an accredited institution. Applicants who do not hold a degree in physical education or kinesiology may need to take some undergraduate prerequisite courses after admission.

All applicants must submit the following items:
-Online application from Apply Yourself (http://www.cehd.umn.edu/kin/future/professional.html)
-Application fee ($75 for U.S. applicants; $95 for international applicants)
-Official transcripts of all previous post-secondary academic study must be downloaded to the application (official transcripts will be required if accepted)
-Personal statement describing career goals and rationale for interest in the program
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language (TOEFL, IELTS, MELAB).

Program Requirements

**Plan C:** Plan C requires 20 major credits and 10 credits outside the major. The final exam is written. A capstone project is required.

**Capstone Project:** See department for more details.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Courses**

Students must consult with their advisor to determine their appropriate concentration and coursework. All concentrations require the following courses. Students register for 3 credits of KIN 5995 and must consult with their advisor before registering for the course.

- **KIN 4981** - Understanding Kinesiology Research (3.0 cr)
- **KIN 5995** - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)

**Elective Courses**

Students take a minimum of 24 credits of electives from the list below depending on their career track. Ten credits of electives may be taken from non-KIN courses (see recommended electives below). Students consult with their advisor before registering for electives.

Up to 9 4xxx level credits are allowed to meet MEd requirements.

- **KIN 4385** - Exercise Physiology (4.0 cr)
- **KIN 4641** - Training Theory & Analytics I for Sport Performance (3.0 cr)
- **KIN 4741** - Training Theory & Analytics 2 for Sport Performance (3.0 cr)
- **KIN 5122** - Applied Exercise Physiology (3.0 cr)
- **KIN 5123** - Motivational Interventions in Physical Activity (3.0 cr)
- **KIN 5136** - Psychology of Coaching (3.0 cr)
- **KIN 5142** - Applied Nutrition for Sport Performance and Optimal Health (3.0 cr)
- **KIN 5202** - Current Issues in Health (2.0 cr)
- **KIN 5203** - Health Media, Consumerism, and Communication (2.0 cr)
- **KIN 5371** - Sport and Society (3.0 cr)
- **KIN 5375** - Youth Sport Science (3.0 cr)
- **KIN 5441** - Applied Sport Science Research (3.0 cr)
- **KIN 5585** - Pediatric Physiology and Health: Concepts and Applications (2.0 cr)
- **KIN 5641** - Scientific Theory and Application of Training and Conditioning in Sport (3.0 cr)
- **KIN 5643** - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
- **KIN 5696** - Practicum in Kinesiology (1.0 - 6.0 cr)
- **KIN 5720** - Special Topics in Kinesiology (2.0 - 4.0 cr)
- **KIN 5723** - Psychology of Sport Injury and Rehabilitation (3.0 cr)
- **KIN 5841** - Elite Performance and Environmental Considerations (3.0 cr)
- **KIN 5992** - Readings in Kinesiology (1.0 - 9.0 cr)
Twin Cities Campus
Sport Management M. A.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue SE, Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of arts in sport management provides academic excellence by combining theoretical instruction and practical experience to prepare tomorrow's leaders for success in the sports industry and marketplace. Students develop the tools of research and learn core concepts through an interdisciplinary curriculum with an emphasis on cultivating new ideas and improving operations in the sport industry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit a University of Minnesota application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) or the GMAT (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts. Submission of all application materials by December 1 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students are admitted for the fall semester.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4.5
- GMAT
  - Verbal section score: 33
  - Quantitative section score: 44
  - Analytical writing assessment score: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Listening Score: 14
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 16 major credits, 10 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 16 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is an independent research project with the advisor that meets the following guidelines: involves a total of approximately 120 hours of work; demonstrates familiarity with the tools of research and scholarship in the field of sport management; demonstrates the ability to work independently; demonstrates the ability to effectively present the results of the investigation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The MA is offered under Plan A and Plan B. Plan A requires 36 credits, including 16 core course credits, 6 research core course credits, 4 elective credits, and 10 thesis credits (8777). The program must include 6 course credits in a minor or related field, and may be chosen from the 36 credits required. Plan B also requires 36 credits, including 16 core course credits, 6 research core course credits, 10 elective credits, and 4 credits of a research project (8995). The program must include 6 course credits in a minor or related field, and may be chosen from the 36 credits required. A GPA of at least 3.00 is required to maintain good standing and to graduate. A maximum of 9 credits of 4xxx-level courses are allowed at the discretion of the advisor.

Required core courses in sport management

KIN 5421 - Sport Finance (3.0 cr)
KIN 5631 - Programming and Promotion in Sport (3.0 cr)
KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
KIN 5801 - Legal Aspects of Sport and Recreation (4.0 cr)

Required research core courses

KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)

One additional research analysis course can be taken from the following list (or consult with advisor):

Take 3 or more credit(s) from the following:

• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
• CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)

Electives

For Plan A, a minimum of 4 credits are required and may from chosen from the following list. For Plan B, a minimum of 10 credits are required and may be chosen from the following list. Students must consult with the advisor on selection of courses. Registration for KIN 5992, KIN 5995, and KIN 5720 is limited to 3 credits.

KIN 5371 - Sport and Society (3.0 cr)
or KIN 5375 - Youth Sport Science (3.0 cr)
or KIN 5461 - Issues in the Sport Industry (3.0 cr)
or KIN 5511 - Sport and Gender (3.0 cr)
or KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
or KIN 5992 - Readings in Kinesiology (1.0 - 9.0 cr)
or KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)
or MKTG 6088 - Strategic Marketing (2.0 cr)

Minor or related field
For Plan A and Plan B, a minimum of 6 semester credits in one or more related fields is required. The KIN sport management courses are cross-listed with REC. Courses in the minor or supporting program may be chosen from any field selected by the student and the adviser according to the student's prior academic background and career goals, and are subject to the advisor's approval.

**Thesis credits: master's**

**Plan A**
Take 10 or more credit(s) from the following:
- **KIN 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B**
Take 4 or more credit(s) from the following:
- **KIN 8995** - Research Problems in Kinesiology (1.0 - 12.0 cr)
Twin Cities Campus

Sport Management M.Ed.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The sport management master of education (M.Ed.) is a practitioner-oriented, graduate-level program designed to prepare students for advanced study or careers in sport administration, sport management, or sport and fitness related professions. With guidance from professional program advisers, students choose at least 30 semester credits, which may include coursework, independent study, internships, workshops, and professional site-based experiences. Required courses will provide students with a well-balanced perspective of the industry; multiple options in elective courses allow students to focus on topics they find applicable and interesting in relation to the sport and physical activity industry. Students must maintain a minimum 3.0 GPA.

Accreditation
This program is accredited by N/A--this is not a licensure M.Ed.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

A bachelor's degree, preferably in kinesiology or physical education.

Special Application Requirements:
The college reviews applications on an ongoing basis. Application reviews for specific academic terms begin by the following dates:
- November 1: spring semester admission
- March 1: summer session admission
- July 1: fall semester admission

Admission requirements for this program include the following criteria:

A bachelor's degree, preferably in physical education or kinesiology, with a 2.50 minimum grade point average (GPA) from an accredited institution. Applicants who do not hold a degree in physical education or kinesiology may need to take some undergraduate prerequisite courses after admission.

All applicants must submit the following items:
- Online application from Apply Yourself
- Application fee ($75 for U.S. applicants; $95 for international applicants)
- Unofficial transcripts of all previous post-secondary academic study must be downloaded to the application (official transcripts will be required if accepted)
- Personal statement describing career goals and rationale for interest in the program
- Resume

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

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The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 22 major credits and 8 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: See department for more details.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Departmental Core Courses

Students will complete a total of 30 credits, including 22 credits of core course requirements.

KIN 5421 - Sport Finance (3.0 cr)
KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
KIN 5631 - Programming and Promotion in Sport (3.0 cr)
KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
KIN 5801 - Legal Aspects of Sport and Recreation (4.0 cr)
KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)

Take either KIN 4981 or KIN 5981 in consultation with adviser.

KIN 4981 - Understanding Kinesiology Research (3.0 cr)
KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)

Elective Courses

In consultation with adviser, students select elective courses for a minimum of 8 credits. It is highly recommended that electives be selected from the following list. One course may be selected from outside kinesiology, such as from the Department of Organizational Leadership, Policy and Development, or Carlson School of Management. KIN 5461 is required for students without baseline knowledge of sport management. KIN 5720 is limited to 3-4 credits.

KIN 5111 - Sports Facilities (3.0 cr)
KIN 5115 - Event Management in Sport (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
KIN 5461 - Issues in the Sport Industry (3.0 cr)
KIN 5511 - Sport and Gender (3.0 cr)
KIN 5804 - National Collegiate Athletic Association (NCAA) Compliance (2.0 cr)
KIN 5720 - Special Topics in Kinesiology (2.0 - 4.0 cr)
**Twin Cities Campus**

**Sport Management Minor**

*Kinesiology, School of*

**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sport management is an interdisciplinary field that provides students with academic training and field experience for careers in sport and fitness management professions. The sport management program encompasses many different subjects, including sociology, business, marketing, communications, and psychology.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A sport management master's minor requires at least 6 credits of graduate-level sport management courses chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Master's**
A sport management master's minor requires at least 6 credits of graduate-level sport management courses chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.

**Minor Requirements**
A sport management master's minor requires at least 6 credits of graduate-level sport management courses chosen in consultation with the student's major adviser and the School of Kinesiology's director of graduate studies.
Twin Cities Campus

Talent Development and Gifted Education Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: psyf-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Talent Development/Gifted Education PBac Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This 12-credit certificate program is intended to give teachers, administrators, education professionals, and other individuals with an interest in the education of gifted and talented students the opportunity to obtain the knowledge and skills necessary to develop, implement, and supervise programs in the education of gifted and talented students.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission

Special Application Requirements:
Applicants to this post-baccalaureate certificate must have completed a bachelor's degree from an accredited institution. Student applications will be reviewed by a committee of individuals affiliated with the program. Detailed application instructions are available at the Educational Psychology website under the certificates link. Applications are accepted year-round.

Applicants must submit the following application materials:
- Unofficial transcripts from all post-secondary institutions attended or currently attending, including the University of Minnesota. Transcripts can be uploaded directly into the Apply Yourself online application system (see Educational Psychology's program website).
- For coursework completed outside of the United States, transcripts must be evaluated by a professional credential evaluation center. Request a "course-by-course" evaluation. This process can take 4-6 weeks; please plan accordingly. Students can use any provider that is an accredited member of the National Association of Credential Evaluation Services (NACES). A suggested provider is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400, fax: 414-289-3411).
- Answer the following certificate-specific questions on a separate sheet of paper and upload into the online application system: 1) Why are you interested in the talent development and gifted education certificate program? 2) What are your primary areas of interest related to talent development and gifted education?

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Courses
EPSY 5991 should be taken for 3 credits.
EPSY 5101 - Intelligence and Creativity (3.0 cr)
EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)
Elective course
One course (minimum 3 credits) selected with the approval of the certificate program director. Examples include coursework in learning and cognition, social psychology of education, measurement, or coursework in another discipline such as curriculum and instruction, educational administration, child development, or psychology.
Accreditation

This program is accredited by Minnesota Board of Teaching and the NCATE (National Council for Accreditation of Teacher Education).

Program Delivery

This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Each program area has a subset of prerequisite courses. A transcript review is recommended to be completed before applying in order to determine if an applicant is ready to apply or should continue to work on additional prerequisite coursework. Unofficial transcript(s) can be submitted for evaluation to the attention of the appropriate C&I MEd advisor. Students with international coursework must arrange for a transcript evaluation from a foreign transcript evaluation service.

When ready to apply, applicants must submit the following materials in the online application system:
Upload unofficial transcripts from all schools attended, even if a degree was not earned.
Upload resume
Upload essay
Upload one letter of recommendation
Upload extenuating circumstances statement (if applicable)
Upload TOEFL/IELTS/MELAB score (if applicable)

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 33 to 52 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: For specific language sub-plans only

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Arts in Education

This sub-plan is limited to students completing the program under Plan C.

The arts in education initial licensure program at the University of Minnesota is designed to help students become inquiring, analytical, and reflective professional educators who can help all students understand and appreciate visual art, theater and dance. The program seeks to develop thoughtful practitioners who are enthusiastic about and prepared for leadership roles in the schools.

Master of education (MEd)/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

The teaching MEd arts in education sub-plan requires a minimum of 32.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

MEd Required Coursework

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 5452</td>
<td>Culture, Schools, and Communities (Human Relations)</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>CI 5008</td>
<td>Technology for Teaching and Learning (1.5 cr)</td>
<td></td>
</tr>
<tr>
<td>CI 5307</td>
<td>Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)</td>
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</tr>
<tr>
<td>OLPD 5010</td>
<td>Culture, Schools, and Communities (Human Relations)</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>CI 5163</td>
<td>Child and Adolescent Development for Teaching and Learning I (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>CI 5164</td>
<td>Child and Adolescent Development for Teaching and Learning II (2.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EPSY 5015</td>
<td>Teaching Students with Special Needs in Inclusive Settings (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>EPSY 5016</td>
<td>Teaching Students with Special Needs in Inclusive Settings (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>CI 5617</td>
<td>Academic Language and English Learners I (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>CI 5618</td>
<td>Academic Language and English Learners II (1.0 cr)</td>
<td></td>
</tr>
<tr>
<td>OLPD 5020</td>
<td>Culture, Schools, and Communities (Human Relations)</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>CI 5008</td>
<td>Theory and Practice of Arts Teaching (1.0 - 2.0 cr)</td>
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<tr>
<td>CI 5065</td>
<td>Improving Arts Programs in the Schools (3.0 cr)</td>
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<tr>
<td>CI 5069</td>
<td>Curriculum Innovations in Arts Education (3.0 cr)</td>
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<tr>
<td>CI 5075</td>
<td>The Social, Historical and Cultural Foundations of Arts Education (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>CI 5078</td>
<td>Application of Aesthetic Theory in Education (2.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>

Additional Required Coursework

Students must take one course listed below and one additional course selected in consultation with a faculty advisor for a total of at least 5 credits.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CI 5049</td>
<td>Art Media Theory and Practice (1.0 - 4.0 cr)</td>
<td></td>
</tr>
</tbody>
</table>
or DNCE 5858 - Teaching Dance (4.0 cr)
or TH 5183 - Critical Literacy, Storytelling, and Creative Drama (3.0 cr)

Elementary
This sub-plan is limited to students completing the program under Plan C.

The elementary education initial licensure program is designed to help students become inquiring, analytical, and reflective professional educators who can help students succeed in school. The program also seeks to develop thoughtful practitioners who are enthusiastic about and prepared for leadership roles in the schools.

The MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

The teaching MEd elementary sub-plan requires a minimum of 51.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

The teaching MEd elementary sub-plan for those who completed the University of Minnesota BS elementary education foundations degree, requires a minimum of 39 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

Elementary Education sub-plans

Elementary Education
Total: 51.5 credits
MEd Required Coursework
EPsy 5720 should be taken for 2 credits
EPsy 5001 - Learning, Cognition, and Assessment (3.0 cr)
OLPD 5005 - School and Society (2.0 cr)
CI 5307 - Technology for Teaching and Learning (1.5 cr)
OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
EPsy 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
CI 5111 - Introduction to Elementary School Teaching (3.0 cr)
CI 5283 - Practicum: Applying Instructional Methods in the Elementary Classroom (3.0 cr)
CI 5285 - Clinical Experience in Elementary School Teaching (12.0 cr)
CI 5286 - Student Teaching Seminar: Elementary Education (3.0 cr)
CI 5287 - Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools (3.0 cr)
CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
CI 5645 - Teaching English Learners in the Elementary Classroom (3.0 cr)
CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)

-OR-

Elementary Education - U of M BS Degree Transitioners
Total: 39 credits
MEd Required Coursework
CI 5283 - Practicum: Applying Instructional Methods in the Elementary Classroom (3.0 cr)
CI 5285 - Clinical Experience in Elementary School Teaching (12.0 cr)
CI 5286 - Student Teaching Seminar: Elementary Education (3.0 cr)
CI 5287 - Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools (3.0 cr)
CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
CI 5502 - Science Instruction in the Elementary Grades (3.0 cr)
CI 5645 - Teaching English Learners in the Elementary Classroom (3.0 cr)
CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)

English
This sub-plan is limited to students completing the program under Plan C.
The English education initial licensure program is designed to develop inquiring, analytical, and reflective professional educators prepared to teach in the classroom and lead in the schools. These educators can help students succeed in mastering a wide range of written and spoken communication skills.

The MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

The teaching MEd English sub-plan requires a minimum of 39.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

**MEd Required Coursework**

- CI 5441 should be taken for 3 credits.
- OLPD 5000 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
- CI 5307 - Technology for Teaching and Learning (1.5 cr)
- OLPD 5010 - Cultures, Schools, and Communities (Human Relations) (2.0 cr)
- CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
- CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
- EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
- CI 5617 - Academic Language and English Learners I (1.0 cr)
- CI 5618 - Academic Language and English Learners II (1.0 cr)
- OLPD 5020 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
- CI 5441 - Teaching Literature in the Secondary School (2.0 - 3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5461 - Teaching Composition in the Secondary School (3.0 cr)
- CI 5481 - Developments in Teaching English and Speech (3.0 cr)
- CI 5471 - Clinical Experience in Teaching Secondary English (3.0 cr)

**Additional Required Coursework**

A minimum of 12 credits from the following courses is required. If student chooses CI 5150, the course should be taken for 3 credits under the topic “Teaching Pop Music: Youth Music, Youth Culture”. If student chooses CI 5410, the course should be taken for 3 credits.

- CI 5150 - Curriculum Topics (3.0 cr)
- or CI 5156 - Popular Culture, Teaching, and Learning (3.0 cr)
- or CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- or CI 5440 - Special Topics in the Teaching of Literacy (3.0 cr)
- or CI 5422 - Teaching Writing in Schools (3.0 cr)
- or CI 5442 - Literature for Adolescents (3.0 cr)
- or CI 5462 - Evaluating and Assessing Writing (3.0 cr)
- or CI 5472 - Teaching Critical Media Analysis in Schools (3.0 cr)
- or CI 5474 - New Literacies Frameworks and Instruction: Digital Texts and Digital Reading (3.0 cr)
- or CI 5475 - Teaching Digital Writing (3.0 cr)
- or CI 5641 - Language, Culture, and Education (3.0 cr)
- or CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)

**Mathematics**

This sub-plan is limited to students completing the program under Plan C.

The mathematics education initial licensure program at the University of Minnesota is designed to help students become accomplished professional mathematics educators, and inquiring, analytical, and reflective professional educators prepared to teach in the classroom and lead in the schools.

MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

The teaching MEd mathematics sub-plan requires a minimum of 34.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

**MEd Required Coursework**

- CI 5452 and EPSY 5720 should each be taken for 2 credits.
- OLPD 5000 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
CI 5307 - Technology for Teaching and Learning (1.5 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
OLPD 5010 - Cultures, Schools, and Communities (Human Relations) (2.0 cr)
CI 5617 - Academic Language and English Learners I (1.0 cr)
CI 5618 - Academic Language and English Learners II (1.0 cr)
OLPD 5020 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
MTHE 5011 - Arithmetic Structures in School Mathematics (3.0 cr)
MTHE 5021 - Algebraic Structures in School Mathematics (3.0 cr)
MTHE 5031 - Geometric Structures in School Mathematics (3.0 cr)
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
MTHE 5993 - Directed Studies in Mathematics Education (2.0 cr)

Additional Required Coursework
A minimum of three credits is required. If student chooses to complete MTHE 5100, it should be taken for 3 credits.

MTHE 5100 - Topics in Mathematics Education (1.0 - 6.0 cr)
MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
MTHE 5171 - Teaching Problem Solving (3.0 cr)
MTHE 5172 - Teaching Probability and Statistics (3.0 cr)
MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Science
This sub-plan is limited to students completing the program under Plan C.

Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence. The college offers a solid mix of theory and practice, as well as all of the resources that come with studying at a top research institution.

MED/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

The teaching MED science sub-plan requires a minimum of 39.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

MED Required Coursework
CI 5452 and EPSY 5720 should each be taken for 2 credits.
OLPD 5000 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
CI 5307 - Technology for Teaching and Learning (1.5 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
OLPD 5010 - Cultures, Schools, and Communities (Human Relations) (2.0 cr)
CI 5617 - Academic Language and English Learners I (1.0 cr)
CI 5618 - Academic Language and English Learners II (1.0 cr)
OLPD 5020 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
CI 5531 - Teaching Middle School Science (3.0 cr)
CI 5532 - Teaching Secondary School Science (3.0 cr)
CI 5541 - Teaching History and Nature of Science (3.0 cr)
CI 5596 - Clinical Experience in Middle School Science (4.0 cr)

Additional Required Coursework
A minimum of nine credits is required. No more than 3 credits of CI 5540 can be taken without faculty advisor approval. If student takes CI 5551, student must also take CI 5552. CI 5539 is equivalent to CI 5551/5552. No courses outside of this list will be approved unless exceptional circumstances exist.

CI 5535 - Foundations of Science Education (3.0 cr)
CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)
CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)
CI 5551 - Reflecting on Science Classroom Practices I (1.5 cr)
CI 5552 - Reflecting on Science Classroom Practices II (1.5 cr)

Second Language Education
This sub-plan is limited to students completing the program under Plan C.
The Second Language Education (SLE) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

The teaching MEd English as a Second Language (ESL) focus area requires a minimum of 36.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

The teaching MEd world language focus area requires a minimum of 33.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

Students seeking two language licenses will have additional credit requirements beyond what is listed.

MEd Required Coursework

CI 5452 should be taken for 1 credit.
OLPD 5000 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
CI 5307 - Technology for Teaching and Learning (1.5 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
OLPD 5010 - Cultures, Schools, and Communities (Human Relations) (2.0 cr)
CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
OLPD 5020 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)

Additional Required Coursework

A minimum of three credits is required. If student chooses to complete CI 5660, it should be taken for 3 credits.
CI 5641 - Language, Culture, and Education (3.0 cr)
CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
CI 5648 - Advanced Practices in Teaching Academic Language (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Second Language Education for Working Professionals

This sub-plan is limited to students completing the program under Plan C.

The Second Language Education (SLE) for working professionals initial licensure post-baccalaureate program at the University of Minnesota is designed for practicing teachers in the areas of ESL and/or any of the 14 world languages available for licensure through the state of Minnesota. This part-time program provides educators with the specific knowledge base and skill set needed to be a K-12 teacher of ESL or a world language.

The teaching MEd English as a second language (ESL) focus area requires a minimum of 40.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

The teaching MEd world languages focus area requires a minimum of 33.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

Students seeking two language licenses will have additional credit requirements beyond what is listed.
ESL or World Languages

SLE Working Professionals - ESL
M.Ed. Required Coursework
CI 5452 should be taken for 1 credit
PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)
OLPD 5005 - School and Society (2.0 cr)
OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

Technology focus
CI 5307 - Technology for Teaching and Learning (1.5 cr)
or LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)

Special Education focus
Choose either EPSY 5720 for 2 credits, or EPSY 5015 + EPSY 5016
Take exactly 2 credit(s) from the following:
• EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
• EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
• EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

Psychology focus
Choose either EPSY 5001 + CPSY 5301 or CI 5163 + CI 5164
Take exactly 2 course(s) totaling 3 - 6 credit(s) from the following:
• EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
• CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
• CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
• CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)

Additional Required Coursework
CI 5697 should be taken for 4 credits
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
CI 5641 - Language, Culture, and Education (3.0 cr)
CI 5642 - Assessing English Learners (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5662 - Second Language Curriculum Design (3.0 cr)
CI 5697 - Practicum: ESL in the Elementary School (2.0 - 6.0 cr)
LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)

-OR-

SLE Working Professionals - World Languages
MEd Required Coursework
CI 5452 should be taken for 1 credit
PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)
OLPD 5005 - School and Society (2.0 cr)
OLPD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

Technology focus
CI 5307 - Technology for Teaching and Learning (1.5 cr)
or LGTT 5110 - Technology in the Second Language Classroom (2.0 cr)

Special Education focus
Choose either EPSY 5720 for 2 credits, or EPSY 5015 + EPSY 5016
Take exactly 2 credit(s) from the following:
• EPSY 5720 - Special Topics: Special Education (1.0 - 4.0 cr)
• EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
• EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)

Psychology focus
Choose either EPSY 5001 + CPSY 5301 or CI 5163 + CI 5164
Take exactly 2 course(s) totaling 3 - 6 credit(s) from the following:
• EPSY 5001 - Learning, Cognition, and Assessment (3.0 cr)
• CPSY 5301 - Advanced Developmental Psychology (3.0 cr)
• CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
• CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)

Additional Required Coursework
CI 5696 should be taken for 4 credits
CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5658 - Foreign Language Testing and Assessment (3.0 cr)
CI 5662 - Second Language Curriculum Design (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)
CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
CI 5625 - Developing Assessments for the Second Language Classroom (2.0 cr)
CI 5626 - Parallel Language Instruction and Curriculum Development (2.0 cr)
CI 5650 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5658 - Foreign Language Testing and Assessment (3.0 cr)

Social Studies
This sub-plan is limited to students completing the program under Plan C.

The social studies education initial licensure program is designed to help students become an inquiring, analytical, and reflective professional educators prepared to teach in grades 5-12 classrooms and lead in the schools. The program seeks to develop educators who are advocates for young people and the social studies, and can help youth to become thoughtful and active citizens in a culturally diverse, democratic society.

The MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

The teaching MEd social studies sub-plan requires a minimum of 32.5 credits. Additional requirements and credits will be required to earn the initial licensure, which is awarded through the Minnesota Department of Education.

MEd Required Coursework
CI 5452 should be taken for 2 credits
OLPD 5000 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
CI 5307 - Technology for Teaching and Learning (1.5 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
OLPD 5010 - Cultures, Schools, and Communities (Human Relations) (2.0 cr)
CI 5163 - Child and Adolescent Development for Teaching and Learning I (1.0 cr)
CI 5164 - Child and Adolescent Development for Teaching and Learning II (2.0 cr)
EPSY 5015 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
EPSY 5016 - Teaching Students with Special Needs in Inclusive Settings (1.0 cr)
CI 5617 - Academic Language and English Learners I (1.0 cr)
CI 5618 - Academic Language and English Learners II (1.0 cr)
OLPD 5020 - Cultures, Schools, and Communities (Human Relations) (1.0 cr)
CI 5741 - Introduction to Social Studies Education (3.0 cr)
CI 5742 - Advanced Methods of Teaching the Social Studies (3.0 cr)
CI 5743 - The Social Sciences and the Social Studies (3.0 cr)
CI 5744 - Seminar: Reflecting on Professional Development in Social Studies Education (3.0 cr)
CI 5745 - Engaging Youth With Social Studies Texts (3.0 cr)

Electives
A minimum of three credits is required, chosen from the list below.
CI 5746 - Global and Multicultural Education in the Secondary Classroom (3.0 cr)
or CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)

Alternative Pathway: Elementary Education
This sub-plan is limited to students completing the program under Plan C.

The alternative pathway elementary education initial licensure program is designed to help students become inquiring, analytical, and reflective professional educators who can help students succeed in school. The program also seeks to develop thoughtful practitioners who are enthusiastic about and prepared for leadership roles in the schools. Alternative pathway MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching. This Alternative Pathway to Teaching program is for designated cohorts with department approval.
Students must maintain a 2.8 GPA throughout their MEd program in addition to earning a C- or higher in each individual course. 36 credits are required to complete this sub-plan. Required coursework includes 15 credits in common content area, 15 credits in elementary education track, and 6 elective credits selected in consultation with faculty advisor.

**Common Content Coursework**
CI 5980 will be taken a total of four semesters: 1 credit each semester. CI 5452 should be taken for 1 credit.
CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

**Elementary Education Coursework**
CI 5211 - Elementary Education Content and Pedagogy I (4.0 cr)
CI 5212 - Elementary Education Content and Pedagogy II (3.0 cr)
CI 5213 - Elementary Education Content and Pedagogy III (3.0 cr)
CI 5214 - Elementary Education Content and Pedagogy IV (3.0 cr)
CI 5215 - Elementary Education Content and Pedagogy V (2.0 cr)

**Elective Coursework**
A minimum of six credits is required, selected in consultation with faculty advisor.

**Alternative Pathway: Secondary Mathematics**
This sub-plan is limited to students completing the program under Plan C.

The alternative pathway mathematics education initial licensure program at the University of Minnesota is designed to help students become accomplished professional mathematics educators, and inquiring, analytical, and reflective professional educators prepared to teach in the classroom and lead in the schools. alternative pathway MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching. This Alternative Pathway to Teaching program is for designated cohorts with department approval.

Students must maintain a 2.8 GPA throughout their MEd program in addition to earning a C- or higher in each individual course. 36 credits are required to complete this sub-plan. Required coursework includes 15 credits in common content area, 15 credits in secondary mathematics track, and 6 elective credits selected in consultation with faculty advisor.

**Common Content Coursework**
CI 5980 will be taken a total of four semesters: 1 credit each semester. CI 5452 should be taken for 1 credit.
CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

**Secondary Mathematics Coursework**
CI 5811 - Introduction to Teaching Secondary Mathematics (4.0 cr)
CI 5812 - Teaching Algebra (3.0 cr)
CI 5813 - Teaching Geometry (3.0 cr)
CI 5814 - Teaching and Learning Mathematics (3.0 cr)
CI 5815 - Leadership in Mathematics Education (2.0 cr)

**Elective Coursework**
A minimum of six credits is required, selected in consultation with faculty advisor.

**Alternative Pathway: Secondary Science**
This sub-plan is limited to students completing the program under Plan C.
Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence, taking advantage of the college's solid mix of theory and practice, as well as all the resources that come with studying at a top research institution. Alternative pathway MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching. This alternative pathway to teaching program is for designated cohorts with department approval.

Students must maintain a 2.8 GPA throughout their MEd program in addition to earning a C- or higher in each individual course. 36 credits are required to complete this sub-plan. Required coursework includes 15 credits in common content area, 15 credits in secondary science track, and 6 elective credits selected in consultation with faculty advisor.

Common Content Coursework
CI 5980 will be taken a total of four semesters; 1 credit each semester. CI 5452 should be taken for 1 credit.
CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

Secondary Science Coursework
CI 5511 - Introduction to Secondary Science: Laboratory-based Instruction (4.0 cr)
CI 5512 - Secondary Science Methods: Understanding the Nature of Science (3.0 cr)
CI 5513 - Secondary Science Methods: Equity in Science Teaching (3.0 cr)
CI 5514 - Secondary Science Methods: The Science Learning Environment (2.0 cr)
CI 5515 - Secondary Science Methods: Developing Adaptive Expertise (3.0 cr)

Elective Coursework
A minimum of six credits is required, selected in consultation with faculty advisor.

Alternative Pathway: English as a Second Language
This sub-plan is limited to students completing the program under Plan C.

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching—a nationally recognized approach to teacher education. Alternative pathway MEd/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching. This alternative pathway to teaching program is for designated cohorts with department approval.

Students must maintain a 2.8 GPA throughout their MEd program in addition to earning a C- or higher in each individual course. 36 credits are required to complete this sub-plan. Required coursework includes 15 credits in common content area, 15 credits in English as a Second Language track, and 6 elective credits selected in consultation with faculty advisor.

Common Content Coursework
CI 5980 will be taken a total of four semesters; 1 credit each semester. CI 5452 should be taken for 1 credit.
CI 5980 - Clinical Experiences for K-12 Teaching (1.0 - 4.0 cr)
CI 5981 - Introduction to Equity-Based Pedagogy (1.0 cr)
CI 5982 - Enacting Equity-Based Pedagogy (2.0 cr)
CI 5983 - Equity-Based Pedagogy/Advocacy (1.0 cr)
CI 5984 - Planning Design and Management (1.0 cr)
CI 5985 - Academic Language and English Learners in the Content Areas (1.0 cr)
CI 5986 - Foundations of Special Education (1.0 cr)
CI 5987 - Child and Adolescent Development for Teaching, Learning, and Assessment (1.0 cr)
CI 5988 - Clinical Experience: Improvement of Teaching (2.0 cr)
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)

English as a Second Language Coursework
CI 5622 - Second Language Acquisition Basics for Teachers (2.0 cr)
CI 5611 - Principles of Linguistics (2.0 cr)
CI 5612 - ESL Methods for Multilingual Development (3.0 cr)
**Elective Coursework**

A minimum of six credits is required, selected in consultation with faculty advisor.
Twin Cities Campus
Teaching Writing and Critical Literacy Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: CIinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Teaching, Writing & Critical Literacy PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in teaching writing and critical literacy prepares preK-college educators to strengthen their skills and knowledge of current practice and research in the teaching of critical reading and writing (note that a university certificate program or certificate is distinct from a state certificate or certification).

Writing and reading complement one another, and their interconnectedness is critical to literacy instruction. This certificate will offer advanced knowledge of the teaching of literacy through a focused, rigorous program while developing practicing educators’ skills as teachers and writers in a supportive learning community.

Changing literacy needs of students from all socioeconomic and educational backgrounds demand highly qualified teachers of reading and writing at the K-12 and postsecondary levels. Educators must prepare K-12 students to meet testing requirements at the state and national levels. In addition, teachers must meet the increasing literacy needs that accompany Minnesota’s changing demographics of growing immigrant and English language learner (ELL) populations. Educators also must prepare students to communicate effectively by using new technologies.

The certificate program seeks to accomplish the following goals:
- Develop effective strategies for teaching the writing process to English-language learners and diverse populations, as well as reading and writing across the curriculum.
- Engage educators in current research about composition, reading, and learning theory.
- Create learning communities where educators reflect on their own teaching, reading, and writing.
- Give educators opportunities to learn from other practicing educators.

This program begins with a three-week, 3-credit Minnesota Writing Project (MWP) Invitational Institute and then extends to allow educators to choose from a wider range of courses from multiple University departments throughout the academic year.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A completed bachelor’s degree is required for admission.

Applicants must be licensed teachers or administrators. Non-licensed teachers may be admitted with faculty letters of recommendation if program space is available.

Special Application Requirements:
Applicants must submit transcripts from every college attended (even those where a degree wasn’t earned), scores from the TOEFL/IELTS/MELAB (if applicable), a resume, a goal statement that explains the relationship of courses and research to your
professional goals, and two letters of recommendation addressing your teaching accomplishments and potential for further study. Certificate applications are reviewed by the department three times per academic year: Fall, Spring and Summer.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language (TOEFL). Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Core Courses (9 credits)**

- CI 5469 should be taken for 3 credits
- CI 5463 - Minnesota Writing Project Annual Invitational Summer Institute (3.0 cr)
- CI 5469 - Minnesota Writing Project Directed Studies (1.0 - 3.0 cr)

**Teaching Core**

Students must complete one of the following courses in the teaching of reading and/or writing.

- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5462 - Evaluating and Assessing Writing (3.0 cr)

**Elective Courses (6 credits)**

Take 2 or more course(s) totaling 6 or more credit(s) from the following:

- CI 5145 - Critical Pedagogy (3.0 cr)
- CI 5177 - Practical Research (1.0 - 3.0 cr)
- CI 5404 - Multicultural Literature for Children and Adolescents (3.0 cr)
- CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5418 - Literature for Adolescents (3.0 cr)
- CI 5442 - Literature for Adolescents (3.0 cr)
- CI 5462 - Evaluating and Assessing Writing (3.0 cr)
- CI 5475 - Teaching Digital Writing (3.0 cr)
- CI 5541 - Language, Culture, and Education (3.0 cr)
- CI 5564 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5566 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
- LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
- ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
- LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
- LING 5461 - Conversation Analysis (3.0 cr)
- LING 5900 - Topics in Linguistics (1.0 - 4.0 cr)
- WRIT 5531 - Introduction to Writing Theory and Pedagogy (3.0 cr)
- EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
- EPSY 5615 - Advanced Academic Interventions (3.0 cr)
- EPSY 5618 - Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5646 - Reading and Writing Practices with Deaf/Hard of Hearing Children (2.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
Twin Cities Campus
Undergraduate Multicultural Teaching and Learning Postbaccalaureate Certificate

Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Ugrd Multicultural Tchng & Lrng PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The post baccalaureate certificate in undergraduate multicultural teaching and learning aims to improve the quality of instruction and academic support for all undergraduates, particularly those who traditionally have been underprepared for and underserved in higher education. The required core courses are designed to provide opportunities to apply multicultural theory to practice and engage as reflective practitioners.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Special Application Requirements:
Students may apply to the undergraduate multicultural teaching and learning graduate certificate any time; there is no set application deadline. All applicants must complete the ApplyYourself online application and submit a personal statement. The personal statement should address: interest in the program; professional/academic or community qualifications; what the student will bring to the program, and; how completion of the certificate will build on the applicant's capacity to transform.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 2.80 is required for students to remain in good standing.

To obtain the undergraduate multicultural teaching and learning graduate certificate, students must take 3 core courses (9 credits) and 1 elective course (3 credits), for a minimum of 12 course credits. The 3 core courses are listed below. Contact the director of Graduate Studies for information regarding the 3-credit elective requirement.

**Core Courses**
- CI 5105 - Increasing Access and Success in Undergraduate Classrooms (3.0 cr)
- CI 5106 - Multicultural Teaching and Learning in Diverse College Contexts (3.0 cr)
- OLPD 5712 - Multicultural Theories of College Student Development Applied to Teaching and Learning (3.0 cr)
Twin Cities Campus
Work and Human Resource Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant St SE, Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. The department’s research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the MA and PhD programs choose from one of five complementary but distinct program tracks: education policy and leadership (EPL), evaluation studies (ES), higher education (HE), comparative and international development education (CIDE), and human resource development (HRD). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Professional experience in a Work and Human Resource Education field or an undergraduate major in education with an appropriate content field.

Special Application Requirements:
Admission to the Work and Human Resource Education (WHRE) MED program are currently suspended.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 17 to 21 major credits and 9 to 13 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Work and Human Resource Education (WHRE) MED program is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Required Coursework

Two plans are offered:

Plan I is for licensed educators planning to pursue advanced professional study and requires a minimum of 17 semester credits of OLPD courses.

Plan II is for professionals seeking additional education and requires a minimum of 21 semester credits. Students must complete all Plan I requirements. However, the Plan II specialization area must include at least one methods of instruction course.

General Aspects

OLPD 5806 - Philosophy and Practice of Career and Technical Education (2.0 cr)
OLPD 5811 - Education for Work (3.0 cr)
OLPD 5813 - Enhancing Work-based Learning Through Collaboration (2.0 cr)
OLPD 5823 - Work-Based Learning Policies (2.0 cr)

Specialization

8-12 credits of OLPD courses with advisor approval depending if Plan I or Plan II.

Research

OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

Students electing Plan II must take an advisor approved methods of instruction course.

Electives

Up to 13 credits with advisor approval, a minimum of 6 credits must come from outside the OLPD department.

Integrating Project

Students work with their faculty advisor to select specialization courses consistent with their professional goals, select the course(s) to meet the general aspects requirement, and design and complete the integrating project. The proposed program must be reviewed and approved by departmental faculty.

OLPD 5893 - Directed Study in OLPD (1.0 - 4.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Comprehensive Work and Human Resource Education

This sub-plan is limited to students completing the program under Plan C.

All subplans in this major use same curriculum. The Work and Human Resource Education (WHRE) MED program is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.

Rochester

This sub-plan is limited to students completing the program under Plan C.

Requirements for this sub-plan are the same as those listed in general description. Students may take courses on the Twin Cities or Rochester campuses. The Work and Human Resource Education (WHRE) MED program is not accepting new students at this time. Information about degree requirements for current students can be found at http://www.cehd.umn.edu/olpd/grad-programs/.
Twin Cities Campus
Youth Development Leadership M.Ed.
School of Social Work
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Social Work, University of Minnesota, 105 Peters Hall, 1404 Gortner Avenue, St. Paul, MN 55108 (612-625-1220)
Email: pavlo002@umn.edu
Website: http://www.cehd.umn.edu/ssw/Current/ydl/default.asp

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Youth development leadership (YDL) is a graduate degree offered for people who work with youth in traditional and nontraditional settings, and who are committed to the healthy development of young people. Effectiveness depends upon keeping up with the challenges facing today's youth, which requires continual learning and professional growth. This degree is an excellent career opportunity for anyone working with youth, regardless of his or her previous academic background.

The M.Ed. in youth development leadership emphasizes:
- a community-based model of positive youth development;
- experiential learning models;
- leadership and community building by encouraging consultation among faculty, professional youth workers, fellow students, and young people;
- diverse, flexible, and interdisciplinary faculty and curriculum that provide an informed understanding of practices, policies, and ethics of youth development work;
- positive professional development;
- collaborative approach to learning;
- interdisciplinary curriculum;
- cohort of other youth work professionals, for supportive learning environment;
- diverse faculty dedicated to healthy youth development and committed to helping students develop a course of study that meets their professional and personal needs and interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited institution.

Other requirements to be completed before admission:
At least two years of experience working with youth.

Special Application Requirements:
All applicants must upload the following items to their online application in Apply Yourself:
- Résumé
- Personal statement describing career goals and rationale for interest in the M.Ed. program (limit two pages)
- Unofficial transcripts from all post-secondary institutions you have attended or are currently attending, including the University of Minnesota
- Letters of recommendation from at least two persons (e.g., administrators, colleagues, instructors) familiar with the applicant's performance who can attest to his or her capacity for youth development leadership
- Application fee, charged when the online application is submitted. Fee must be paid with a credit card.
Applications are accepted on a year-round basis.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 20 major credits and 10 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** The portfolio is a demonstration and personal assessment of individual learning and leadership in youth development work and in the YDL program. Successful completion of the portfolio presentation to the student’s faculty committee of two or more faculty is the final requirement of the YDL program.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Coursework**

Students must take a total four credits of YOST 5960, in one credit increments, during their time in the program.

- **YOST 5952** - Everyday Lives of Youth (3.0 cr)
- **YOST 5954** - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
- **YOST 5956** - Organizational Approaches to Youth Development (3.0 cr)
- **YOST 5958** - Community: Context for Youth Development Leadership (3.0 cr)
- **YOST 5960** - Seminar in Youth Development Leadership (1.0 - 4.0 cr)
- **YOST 5962** - Leadership Field Experience: Youth Development (4.0 cr)

**Elective Credits**

10 or more elective credits must be selected with approval of faculty adviser.
Twin Cities Campus
Animal Sciences M.S.
Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/graduate-program

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Animal Sciences M.S. concentrate on one of the animal sciences emphasis areas: genetics; growth biology; nutrition; physiology; or production systems. Students have the option of tailoring their individual programs to include study in more than one emphasis area.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.
Capstone Project: The Plan B project requires approximately 120 hours to complete. The nature and extent of the project is agreed
upon in advance by the student and faculty advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Plan A requires a minimum of 14 semester credits in the major and 6 credits in a designated minor or related field outside the major. Selection of courses to fulfill this requirement and development of the thesis project are primarily the responsibility of the student and faculty advisor. Students also must register for a minimum of 10 thesis credits.

Plan B requires a minimum of 30 credits, which must include 14 or more credits in the major area and at least 6 credits in one or more related fields outside the major. The balance of credits is chosen by agreement between the advisor and student. In addition to coursework, students must complete the Plan B capstone project, which requires approximately 120 hours. The nature and extent of the project is agreed upon in advance by the student and faculty advisor.

**Ethics Requirement**

All students are required to be trained in ethical issues in science. Please select one course from the list below to meet this requirement.

- ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
- or APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
- or APEC 8902 - Graduate Research Development Seminar (1.0 cr)
- or APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- or BBE 8001 - Seminar I (1.0 cr)
- or BBE 8002 - Seminar II (1.0 cr)
- or CONS 8001 - Conservation Biology Seminar (1.0 cr)
- or ENT 8061 - Scientific Communication and Ethics (1.0 cr)
- or FSCN 8318 - Current Issues in Food Science (2.0 cr)
- or NUTR 8621 - Presentation Skills (1.0 cr)
- or PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- or SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- or WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Seminar Requirement**

All master’s students are required to take 4 credits of AnSc 8510 Graduate Seminar

- ANSC 8510 - Graduate Seminar (1.0 cr)
Twin Cities Campus

Animal Sciences Minor

Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/GraduateProgram/index.htm

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students pursuing the Animal Sciences minor concentrate on one of the animal sciences emphasis areas: genetics; growth biology; nutrition; physiology; or production systems. Students have the option of tailoring their minor to include study in more than one emphasis area.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Requirements are designed to fit the student's needs. A master's minor requires 6 credits in areas not closely related to the major; no more than 2 of these credits may be in research or special problems. A doctoral minor requires 12 credits in areas not closely related to the major; no more than 3 of these credits may be in research or special problems.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Minor Requirements
The AnSci program does not require specific courses for completion of the minor. The minor requires at least 6 credits of graduate-level courses to be chosen in consultation with the student's major adviser, the AnSci faculty member who will serve on the student's examination committee as the minor program representative, and the AnSci Director of Graduate Studies.

Doctoral
Minor Requirements
The AnSci program does not require specific courses for completion of the minor. The minor requires at least 12 credits of graduate-level courses to be chosen in consultation with the student's major adviser, the AnSci faculty member who will serve on the student's examination committee as the minor program representative, and the AnSci Director of Graduate Studies.
Twin Cities Campus

Animal Sciences Ph.D.

Animal Science

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/GraduateProgram/index.htm

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 76
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Ph.D. program concentrate on one of the animal sciences emphasis areas: genetics, nutrition, physiology, or production systems. Students have the option of tailoring their program to include study in more than one emphasis area and to emphasize basic or applied science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in agriculture or a biological field with training in biology, chemistry, physics, and mathematics is required.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
40 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Ethics Requirement**
All students are required to be trained in ethical issues in science. Please select one course from the list below to meet this requirement.

- ANSC 8134 - Ethical Conduct of Animal Research (3.0 cr)
- or APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
- or APEC 8902 - Graduate Research Development Seminar (1.0 cr)
- or APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- or BBE 8001 - Seminar I (1.0 cr)
- or BBE 8002 - Seminar II (1.0 cr)
- or CONS 8001 - Conservation Biology Seminar (1.0 cr)
- or ENT 8061 - Scientific Communication and Ethics (1.0 cr)
- or FSCN 8318 - Current Issues in Food Science (2.0 cr)
- or NUTR 8621 - Presentation Skills (1.0 cr)
- or PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- or SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- or WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Seminar Requirement**
All doctoral students are required to take 6 credits of AnSc 8510 Graduate Seminar

- ANSC 8510 - Graduate Seminar (1.0 cr)

**Thesis Requirement**
All doctoral students are required to take 24 thesis credits of AnSc 8888 Graduate Seminar

- ANSC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Applied Economics M.S.
Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g004.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. degree in applied economics prepares students for employment opportunities in the public and private sectors, and for further graduate study. This rigorous but flexible program includes core coursework in economic theory and quantitative methods, and offers opportunities for specialized coursework and research in all the fields of study offered by the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
The following coursework is considered the minimum preparation for the M.S. program: micro and macroeconomic theory at the intermediate undergraduate level, statistics, two semesters of calculus, and introductory linear algebra. Additional coursework in economics, statistics, and math is highly desirable and recommended, especially for students who intend to apply for the doctoral program after completion of the M.S. degree.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with the applicant's scholarship and research potential, a complete set of college or university transcripts, and a clearly written statement of academic and career interests, goals, and objectives. For complete application instructions, visit the website: http://www.apecgrad.umn.edu/Admissions/index.htm. Students should apply by the December deadline to ensure priority consideration for admissions and funding.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 12 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: A project that demonstrates familiarity with the theoretical and empirical tools of economics. The Plan B project requires between 4 and 6 project credits (APEC 8793).

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

M.S. students are required to complete graduate-level courses in microeconomic theory, macroeconomic theory, and econometrics or statistics, and are required to participate in two 1-credit M.S. seminars. Both Plan A and Plan B require a minimum of 30 credits, 14 credits of which must be in the major field (APEC, ECON, or STAT classes). These 14 major field credits must include a minimum of 9 credits in applied economics (excluding thesis and special topics, independent study, and APEC 8901-02). Plan A requires 10 thesis credits. Plan B requires a 4- to 6-credit project.

Required Courses

All students must complete 11 credits taken A-F only excluding seminars.

APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
APEC 5152 - Applied Macroeconomics: Income and Employment (3.0 cr)
APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
APEC 8902 - Graduate Research Development Seminar (1.0 cr)

Plan A

Electives
9 credits required (A-F only). Courses can be chosen from APEC, ECON, STAT (excluding STAT 5021, 5022, 5031) at 5xxx or 8xxx in consultation with advisor. Recommended course APEC 5032.

APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
10 credits required in APEC 8777.

APEC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B

Electives
13 credits required (A-F only). Courses can be chosen from APEC, ECON, STAT (excluding STAT 5021, 5022, and 5031) at 5xxx, or 8xxx in consultation with advisor. Recommended course APEC 5032.

APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)

Plan B Project
4 to 6 credits required in APEC 8793.

APEC 8793 - Master's Paper: Plan B Project (1.0 - 6.0 cr)

Joint- or Dual-degree Coursework: MS-Applied Economics/MBA
Student may take a total of 18 credits in common among the academic programs.
Twin Cities Campus

Applied Economics Minor
Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apedgra@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g004.html

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 15
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate study in applied economics requires an operational knowledge of economic theory and modern methods of quantitative analysis, as well as practical application in specialized fields of inquiry, which include consumer behavior; household economics; health economics; labor economics; policy analysis; production and marketing economics; resource and environmental economics; and trade and development economics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Courses for the minor must be approved by the director of graduate studies in the Applied Economics Graduate Program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
At least 9 credits of 5xxx or 8xxx coursework in applied economics, approved by the Applied Economics director of Graduate Studies, are required. All courses in the minor must be taken A-F and completed with a GPA of 3.00 or higher.

Doctoral
At least 15 credits of 5xxx or 8xxx courses in applied economics, approved by the Applied Economics director of Graduate Studies, are required. All courses in the minor must be taken A-F and completed with a GPA of 3.00 or higher.
Twin Cities Campus
Applied Economics Ph.D.
Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g004.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48 to 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD degree program in applied economics prepares students for careers in academia, government, and the private sector. This rigorous program includes core coursework in economic theory, quantitative methods, and two fields of specialization selected from the following: consumer behavior and household economics; production and marketing economics; trade and development economics; natural resource and environmental economics; health economics; labor economics; and policy analysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The minimum preferred undergraduate GPA for admittance to the program is a B average (3.00/4.00). Most admitted students will have a higher GPA.

Other requirements to be completed before admission:
Applicants for the PhD degree should have completed an MS degree in economics, agricultural economics, or a related field; or have equivalent coursework and research experience. Applicants without a master's degree are, except in a few special cases, considered for admission into the MS program.

Prior training should include micro- and macro-economic theory at the master's level, multivariate calculus, differential equations and linear algebra, and mathematical statistics. Students lacking background in economics or quantitative methods may be required to complete additional coursework before entering the program.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with the applicant's scholarship and research potential, a complete set of college or university transcripts, and a clearly written statement of academic and career interests, goals, and objectives. For complete application instructions, visit the website: http://www.apecgrad.umn.edu/Admissions/index.htm. Students should apply by the December deadline to ensure priority consideration for admissions and funding.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements

24 to 42 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Most students take at least 42 credits of coursework and must take 24 doctoral thesis credits. Required courses in microeconomic theory, macroeconomic theory and applied econometrics, and at least two-thirds of the remaining credits included in the PhD degree program are to be completed on the A-F grade basis.

Students must complete at least 18 course credits in applied economics at the 8xxx-level while enrolled as a current student in the graduate program (not including APEC 8901-04 and APEC 8991), PA, PUBH, and HRIR courses included in the list of fields noted in the Graduate Student Handbook can be applied to this requirement. Up to 6 credits of Department of Economics 8xxx-level field courses may be substituted for these credits (excluding ECON 8001-04, 8101-04, 8105-06, and 8205-08).

Students must pass a written preliminary exam in microeconomic theory and at least one field examination in one of the seven PhD fields offered by the Applied Economics graduate program. In addition, there is a requirement for a qualifying paper written in the second year of the program.

For more details, please see the Graduate Student Handbook at: http://www.apec.umn.edu/sites/apec.umn.edu/files/2015-16_apec_graduatestudenthandbook_final.pdf

Microeconomic Theory

All students must complete one of the three microeconomics theory sequences noted below (A-F only).

APEC - Applied Microeconomic Theory
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)

or ECON - Microeconomic Analysis (Minors Sequence)
- ECON 8001 - Microeconomic Analysis (2.0 cr)
- ECON 8002 - Microeconomic Analysis (2.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)

or ECON - Microeconomic Theory (Majors Sequence)
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)

Macroeconomic Theory

All students must complete the following two courses (A-F only).
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
Econometrics
All students must complete the following two courses (A-F only).
APEC
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)

First Year Seminars
All students must complete the following two courses (S-N only).
APEC 8901 - Graduate Seminar: MS & PhD (1.0 cr)
APEC 8902 - Graduate Research Development Seminar (1.0 cr)

Second Year Seminars
All students must complete the following two courses (S-N only).
APEC 8903 - PhD Qualifying Paper Seminar I (1.0 cr)
APEC 8904 - PhD Qualifying Paper Seminar II (1.0 cr)

Electives
(A-F only).
Take 18 or more credit(s) from the following:
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- APEC 8341 - Applied Public Finance (3.0 cr)
- APEC 8401 - Consumer Behavior and Household Economics (2.0 cr)
- APEC 8402 - Information and Behavioral Economics (2.0 cr)
- APEC 8403 - Consumer Theory and Demand Analysis (3.0 cr)
- APEC 8501 - Labor Economics I (2.0 cr)
- APEC 8502 - Labor Economics II (2.0 cr)
- APEC 8601 - Natural Resource Economics (3.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- APEC 8701 - International Economic Development, Growth, and Trade (3.0 cr)
- APEC 8702 - Economic and Trade Policy: Sectoral and Institutional Issues (3.0 cr)
- APEC 8703 - Microeconomic Analysis of Economic Development (3.0 cr)
- APEC 8801 - Applied Production Theory (3.0 cr)
- APEC 8803 - Marketing Economics (3.0 cr)
- APEC 8804 - Managerial Economics (3.0 cr)
- HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
- PA 8302 - Applied Policy Analysis (4.0 cr)
- PA 8312 - Analysis of Discrimination (4.0 cr)
- PUBH 6832 - Economics of the Health Care System (3.0 cr)
- PUBH 8811 - Research Methods in Health Care (3.0 cr)
- PUBH 8821 - Health Economics II (3.0 cr)

Doctoral Thesis Credits
Students must enroll for a minimum of 24 thesis credits.
Take 24 or more credit(s) from the following:
- APEC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Applied Plant Sciences M.S.
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsc@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applied plant sciences is an interdisciplinary program for educating students to become professional scientists well grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Plant Biology; Plant Pathology; Soil, Water, and Climate; Ecology, Evolution and Behavior; and Fisheries, Wildlife and Conservation Biology. The faculty embrace the University of Minnesota's position that promoting and supporting diversity among the student body is central to our academic mission.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a BS or BA degree in agriculture, biology, or other related life science. Students with a BS or BA degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements:
Applicants must submit scores from the General (Aptitude) Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; and a clearly written personal statement of career interests, goals, and objectives as part of the online application. Students should apply by December 5 for admission into fall semester of the following year. Students should apply by October 1 for admission into spring semester of the following year.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

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- Paper Based - Total Score: 550
- IELTS - Total Score: 6.5
- MELAB - Final score: 550

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Determined in consultation with advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

MS students must complete the core curriculum, requirements for their specialization track, and present one graduate seminar. Additional course requirements are flexible and determined in consultation with the students advisor(s) and advisory committee.

Required Courses

- AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
- AGRO 8270 - Graduate Seminar (1.0 cr)
- APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
  or NR 5021 - Statistics for Agriculture and Natural Resource Professionals (3.0 cr)

Plan A Thesis Credits

Plan A students must take at least 10 master's thesis credits.

APSC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Agronomy and Agroecology

Students conduct research to increase their knowledge of cropping systems and weed science, including alternative approaches and management strategies. Emphasis is on improving production efficiency and profitability in an environmentally sound approach that benefits society. Mechanisms of crop physiology and ecology underlying plant responses to the environment are a particular emphasis of this track.

In addition to the APS core curriculum, students pursuing the Agronomy and Agroecology specialization track must complete remaining MS credit requirements, which will include at least two agroecology/agronomy courses, one plant biology course, and one additional course. Other specialization courses can be substituted with agreement of the advisor, the advisory committee, and director of graduate studies.

Agroecology/Agronomy Courses

Students must complete two courses from this group.

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AGRO 4401 - Plant Genetics and Breeding (4.0 cr)
or AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
or AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
or AGRO 5021 - Plant Breeding Principles (3.0 cr)
or AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
or AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
or AGRO 8201 - Advanced Plant Breeding (3.0 cr)
or AGRO 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
or SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Plant Biology
Students must complete one course in plant biology such as:
PBIO 5516 - Plant Cell Biology (3.0 cr)
or PBIO 5412 - Plant Physiology and Development (3.0 cr)
or PBIO 5601 - Topics in Plant Biochemistry (3.0 cr)

Suggested Additional Courses
Students must take at least one course from the following courses
BIOL 5407 - Ecology (3.0 cr)
or EEB 4068 - Plant Physiological Ecology (3.0 cr)
or EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
or EEB 5609 - Ecosystem Ecology (3.0 cr)
or ESPM 5108 - Ecology of Managed Systems (4.0 cr)
or ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
or ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
or HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
or PLPA 5480 - Principles of Plant Pathology (3.0 cr)
or PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
or SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
or SOIL 5611 - Soil Biology and Fertility (4.0 cr)

Horticulture
Students conduct research related to fruits, vegetables, potatoes, flowers, ornamental trees and shrubs, or turf; on the physiology, production, environmental impact of cropping systems; and use of horticultural crops. Research areas include the effect of horticultural commodities on human health, hormonal, and stress physiology; flower development and flowering physiology; integrated pest management; post harvest physiology; and cropping system strategies. Students get a broad range of experiences in the field, greenhouse, and/or laboratory using genetic, molecular, biochemical, and ecological tools to answer research questions.

In addition to the APS core curriculum, students pursuing the horticulture specialization track must complete remaining MS credit requirements, which will include at least two courses in Area 1 (cross commodity horticulture), and at least two courses in Area 2 (commodity-based horticulture).

Area 1: Cross Commodity Horticulture
Students must complete at least two courses in Area 1.
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
or AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
or HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or HORT 4661 - Horticultural Marketing (3.0 cr)
or HORT 4850 - Pollinator Protection in Managed Landscapes (3.0 cr)
or HORT 5007 - Advanced Plant Propagation (3.0 cr)
or HORT 5023 - Public Garden Management (2.0 cr)
or HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
or HORT 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
or MBA 6210 - Marketing Management (3.0 cr)
or MKTG 6051 - Marketing Research (4.0 cr)
or MKTG 6082 - Brand Management (4.0 cr)
or SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Area 2: Commodity-based Horticulture
Students must complete at least two courses in Area 2.
HORT 4061W - Turfgrass Management [WI] (3.0 cr)
or HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
or HORT 4063 - Turfgrass Science (3.0 cr)
or HORT 5011 - Common Chinese Medicinal Plants: Classification, Identification, and Application (3.0 cr)
or HORT 5012 - Common Chinese Medicinal Plants: Growing and Processing (3.0 cr)
or HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
or HORT 5032 - Organic Vegetable Production (3.0 cr)
or HORT 5051 - Plant Production II (4.0 cr)
or HORT 5061 - Advanced Turfgrass Science (2.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)

**Area 3: Additional Coursework**
Courses other than those listed below can be substituted with agreement of the advisor, advisory committee, and director of graduate studies.

AGRO 5021 - Plant Breeding Principles (3.0 cr)
or AGRO 8023 - Evolution of Crop Plants (3.0 cr)
or AGRO 8201 - Advanced Plant Breeding (3.0 cr)
or BIOL 5407 - Ecology (3.0 cr)
or EEB 4068 - Plant Physiological Ecology (3.0 cr)
or EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
or EEB 5609 - Ecosystem Ecology (3.0 cr)
or ESPM 5108 - Ecology of Managed Systems (4.0 cr)
or ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
or ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
or HORT 5058 - Plant Cytogenetics (2.0 cr)
or HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
or PBIO 5412 - Plant Physiology and Development (3.0 cr)
or PBIO 5516 - Plant Cell Biology (3.0 cr)
or PBIO 5601 - Topics in Plant Biochemistry (3.0 cr)
or PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 5480 - Principles of Plant Pathology (3.0 cr)
or PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
or SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
or SOIL 5611 - Soil Biology and Fertility (4.0 cr)

**Plant Breeding and Plant Molecular Genetics**
This track allows students to select from genetic research projects ranging from applied plant breeding projects emphasizing breeding procedures and methodologies to molecular genetic projects doing biotechnology, genetic engineering, and genomic research in agronomic and horticultural crops. These research projects give students the opportunity to integrate the latest developments in the laboratory with applied applications in the field to reach the overarching goal of developing new germplasm that will improve the sustainability of our food/feed/fiber/fuel systems.

In addition to the APS core curriculum, students pursuing the plant breeding and plant molecular genetics specialization track must complete remaining MS credit requirements, which will include at least one course from each of the following areas: genetics, molecular genetics, and plant breeding area, with any additional credits determined in consultation with the students advisor and advisory committee.

**Genetics**
Take at least one course from the following:
EEB 5042 - Quantitative Genetics (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)

**Molecular Genetics**
Take at least one course from the following:
GCD 4034 - Molecular Genetics (3.0 cr)
or AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)

**Plant Breeding**
Take at least one course from the following:
AGRO 8201 - Advanced Plant Breeding (3.0 cr)
or AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)

**Other suggested courses**
Courses other than those listed below can be substituted with approval of the advisor, advisory committee, and director of graduate studies.
AGRO 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
or AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
or SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
or PBIO 4601 - Topics in Plant Biochemistry (3.0 cr)
or BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
or BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or HORT 5058 - Plant Cytogenetics (2.0 cr)
or HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
or AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
Applied Plant Sciences
Students who choose to complete the MS without a track must complete the APS core curriculum: at least one course from the areas of genetics and plant breeding, organismal biology, and cropping systems, communities, and commodities; and any remaining credits to meet MS credit requirements.

Genetics and Plant Breeding
Take at least one course from the following:
- AGRO 5021 - Plant Breeding Principles (3.0 cr)
- AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
- AGRO 8023 - Evolution of Crop Plants (3.0 cr)
- AGRO 8201 - Advanced Plant Breeding (3.0 cr)
- AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
- AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- GCD 4034 - Molecular Genetics (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
- HORT 5058 - Plant Cytogenetics (2.0 cr)
- HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
- PBIO 5301 - Plant Genomics (3.0 cr)

Organismal Biology
Take at least one course from the following:
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
- HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
- PBIO 5412 - Plant Physiology and Development (3.0 cr)
- PBIO 5516 - Plant Cell Biology (3.0 cr)
- PBIO 5601 - Topics in Plant Biochemistry (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 8444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (2.0 cr)

Cropping Systems, Communities, and Commodities
Take at least one course from the following:
- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
- HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
or HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
or HORT 5032 - Organic Vegetable Production (3.0 cr)
or HORT 5051 - Plant Production II (4.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
or HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
or PLPA 5202 - Field Plant Pathology (2.0 cr)
or PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
or SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
Twin Cities Campus

Applied Plant Sciences Minor
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsc@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in applied plant sciences provides students in other fields an opportunity to gain knowledge and expertise in plant sciences at the molecular, organismal and community levels with applications to sustainable production of horticultural and agronomic crops. Applied Plant Sciences is an interdisciplinary program for educating students to become professional scientists well-grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/molecular genetics. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Departments of Agronomy and Plant Genetics and Horticultural Science; but also from the Departments of Plant Biology; Plant Pathology; Soil, Water, and Climate; Ecology, Evolution and Behavior; and Fisheries, Wildlife and Conservation Biology. The faculty embrace the University of Minnesotas position that promoting and supporting diversity among the student body is central to our academic mission.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a BS or BA degree in agriculture, biology, or other related life science. Students with a BS or BA degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Coursework is determined in consultation with the applied plant sciences director of graduate studies and may include but is not limited to the recommended courses listed below.
Recommended Courses

Select from these recommended courses. Take 12 or more credit(s) from the following:

- AGRO 4401 - Plant Genetics and Breeding (4.0 cr)
- AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
- AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
- AGRO 4888 - Issues in Sustainable Agriculture (2.0 cr)
- AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
- AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
- AGRO 8201 - Advanced Plant Breeding (3.0 cr)
- AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
- AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
- AGRO 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- GCD 4034 - Molecular Genetics (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
- HORT 4063 - Turfgrass Science (3.0 cr)
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
- HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
- HORT 4461 - Horticultural Marketing (3.0 cr)
- HORT 4850 - Pollinator Protection in Managed Landscapes (3.0 cr)
- HORT 5007 - Advanced Plant Propagation (3.0 cr)
- HORT 5011 - Common Chinese Medicinal Plants: Classification, Identification, and Application (3.0 cr)
- HORT 5012 - Common Chinese Medicinal Plants: Growing and Processing (3.0 cr)
- HORT 5023 - Public Garden Management (2.0 cr)
- HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
- HORT 5032 - Organic Vegetable Production (3.0 cr)
- HORT 5051 - Plant Production II (4.0 cr)
- HORT 5058 - Plant Cytogenetics (2.0 cr)
- HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
- HORT 5061 - Advanced Turfgrass Science (2.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
- HORT 5204 - Manipulation of Plant Growth and Reproduction (2.0 cr)
- HORT 8201 - Advanced Plant Breeding (3.0 cr)
- HORT 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
- PBIO 5301 - Plant Genomics (3.0 cr)
- PBIO 5412 - Plant Physiology and Development (3.0 cr)
- PBIO 5516 - Plant Cell Biology (3.0 cr)
- PBIO 5601 - Topics in Plant Biochemistry (3.0 cr)
- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
- PLPA 5301 - Plant Genomics (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (2.0 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Coursework is determined in consultation with the applied plant sciences director of graduate studies and may include but is not limited to the list of recommended courses.
Doctoral Coursework is determined in consultation with the applied plant sciences director of graduate studies and may include but is not limited to the list of recommended courses.
Twin Cities Campus
Applied Plant Sciences Ph.D.
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsc@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applied plant sciences is an interdisciplinary program for educating students to become professional scientists well grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Plant Biology; Plant Pathology; Soil, Water, and Climate; Ecology, Evolution and Behavior; and Fisheries, Wildlife and Conservation Biology. The faculty embrace the University of Minnesota's position that promoting and supporting diversity among the student body is central to our academic mission.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a BS or BA degree in agriculture, biology, or other related life science. Students with a BS or BA degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements:
Applicants must submit scores from the General (Aptitude) Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written personal statement of career interests, goals, and objectives as part of the online application. Students should apply by December 1 for admission into fall semester of the following year. Students should apply by October 1 for admission into spring semester of the following year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS - Total Score: 6.5
- MELAB - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

PhD students must complete the core curriculum, requirements for their specialization, and present one graduate seminar. Additional course requirements are flexible and determined in consultation with the students advisor(s) and advisory committee.

Required Courses
PhD students are exempt from APSC 8123 if completed while pursuing the APS masters at the University.
AGRO 5311 - Research Methods in Crop Improvement and Production (1.0 cr)
AGRO 8270 - Graduate Seminar (1.0 cr)
AGRO 8280 - Current Topics in Applied Plant Sciences (1.0 cr)
APSC 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
GRAD 8101 - Teaching in Higher Education (3.0 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
NR 5021 - Statistics for Agriculture and Natural Resource Professionals (3.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Agronomy and Agroecology
Students conduct research to increase their knowledge of cropping systems and weed science, including alternative approaches and management strategies. Emphasis is on improving production efficiency and profitability in an environmentally sound approach that benefits society. Mechanisms of crop physiology and ecology underlying plant responses to the environment are a particular emphasis of this track.

Students pursuing the agroecology/agronomy specialization track must complete at least two agroecology/agronomy courses, one plant biology course, and one ecology course.

Courses listed within agroecology/agronomy, plant biology, and ecology/plant pathology/soil science groups are provided as a guide for students and faculty. Other specialization courses can be substituted with agreement of the advisor, the advisory committee, and director of graduate studies.

Agronomy/Agroecology
Students must complete two courses from this group.
AGRO 4401 - Plant Genetics and Breeding (4.0 cr)
or AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
or AGRO 4605 - Strategies for Agricultural Production and Management (3.0 cr)
or AGRO 5021 - Plant Breeding Principles (3.0 cr)
or AGRO 5231 - Ecology of Agricultural Systems (3.0 cr)
or AGRO 5999 - Special Topics: Workshop in Agronomy (1.0 - 6.0 cr)
or AGRO 8201 - Advanced Plant Breeding (3.0 cr)
or HORT 4401 - Plant Genetics and Breeding (4.0 cr)
or HORT 8201 - Advanced Plant Breeding (3.0 cr)
or SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)

**Plant Biology**

Students must complete one course in plant biology such as:
- PBIO 5516 - Plant Cell Biology (3.0 cr)
or PBIO 5412 - Plant Physiology and Development (3.0 cr)

**Ecology/Plant Pathology/Soil Science**

Students must complete at least one course from the following list:
- BIOL 5407 - Ecology (3.0 cr)
or EEB 4068 - Plant Physiological Ecology (3.0 cr)
or EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
or EEB 5609 - Ecosystem Ecology (3.0 cr)
or ESPM 5108 - Ecology of Managed Systems (4.0 cr)
or ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
or ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
or HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
or PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 5202 - Field Plant Pathology (2.0 cr)
or PLPA 5480 - Principles of Plant Pathology (3.0 cr)
or PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
or SOIL 4111 - Introduction to Precision Agriculture (3.0 cr)
or SOIL 5611 - Soil Biology and Fertility (4.0 cr)

**Horticulture**

Students conduct research related to fruits, vegetables, potatoes, flowers, ornamental trees and shrubs, or turf; and on the physiology, production, environmental impact of cropping systems, and use of horticultural crops. Research areas include the effect of horticultural commodities on human health, hormonal, and stress physiology; flower development and flowering physiology; integrated pest management; post harvest physiology; and cropping system strategies. Students get a broad range of experiences in the field, greenhouse, and/or laboratory using genetic, molecular, biochemical, and ecological tools to answer research questions.

Students pursuing the PhD with a horticulture specialization track must take a minimum of four courses from Areas 1 and 2, with at least one course from each of the two areas.

**Area 1 - Cross Commodity Horticulture**

Students must complete at least one Area 1 course.
- HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
or HORT 4461 - Horticultural Marketing (3.0 cr)
or HORT 4850 - Pollinator Protection in Managed Landscapes (3.0 cr)
or HORT 5007 - Advanced Plant Propagation (3.0 cr)
or HORT 5023 - Public Garden Management (2.0 cr)
or AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
or MKTG 6051 - Marketing Research (4.0 cr)
or MKTG 6055 - Buyer Behavior (4.0 cr)
or MKTG 6082 - Brand Management (4.0 cr)
or MBA 6210 - Marketing Management (3.0 cr)
or HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)

**Area 2 - Commodity-based Horticulture**

Students must complete at least one Area 2 course.
- HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
or HORT 4063 - Turfgrass Science (3.0 cr)
or HORT 5011 - Common Chinese Medicinal Plants: Classification, Identification, and Application (3.0 cr)
or HORT 5012 - Common Chinese Medicinal Plants: Growing and Processing (3.0 cr)
or HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
or HORT 5032 - Organic Vegetable Production (3.0 cr)
or HORT 5051 - Plant Production I (4.0 cr)
or HORT 5061 - Advanced Turfgrass Science (2.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
Area 3 - Related Fields

Students must complete at least one Area 3 course. Courses other than those listed below can be substituted with agreement of the advisor, advisory committee, and director of graduate studies.

**AGRO 5021** - Plant Breeding Principles (3.0 cr)

or **AGRO 8023** - Evolution of Crop Plants (3.0 cr)

or **AGRO 8201** - Advanced Plant Breeding (3.0 cr)

or **BIOL 5407** - Ecology (3.0 cr)

or **EEB 4068** - Plant Physiological Ecology (3.0 cr)

or **EEB 5053** - Ecology: Theory and Concepts (4.0 cr)

or **EEB 5609** - Ecosystem Ecology (3.0 cr)

or **ESPM 5108** - Ecology of Managed Systems (4.0 cr)

or **ESPM 5245** - Sustainable Land Use Planning and Policy (3.0 cr)

or **ESPM 5295** - GIS in Environmental Science and Management (4.0 cr)

or **HORT 5058** - Plant Cytogenetics (2.0 cr)

or **HORT 5059** - Plant Cytogenetics Lab (1.0 cr)

or **HORT 8201** - Advanced Plant Breeding (3.0 cr)

or **PBIO 5412** - Plant Physiology and Development (3.0 cr)

or **PBIO 5516** - Plant Cell Biology (3.0 cr)

or **PBIO 5609** - Topics in Plant Biochemistry (3.0 cr)

or **PBIO 5103** - Plant-Microbe Interactions (3.0 cr)

or **PBIO 5202** - Field Plant Pathology (2.0 cr)

or **PBIO 5480** - Principles of Plant Pathology (3.0 cr)

or **PBIO 5660** - Plant Disease Resistance and Applications (3.0 cr)

or **SOIL 4111** - Introduction to Precision Agriculture (3.0 cr)

or **SOIL 5611** - Soil Biology and Fertility (4.0 cr)

**Plant Breeding and Plant Molecular Genetics**

This track allows students to select from genetic research projects ranging from applied plant breeding projects emphasizing breeding procedures and methodologies to molecular genetic projects doing biotechnology, genetic engineering, and genomic research in agronomic and horticultural crops. These research projects give students the opportunity to integrate the latest developments in the laboratory with applied applications in the field to reach the overarching goal of developing new germplasm that will improve the sustainability of our food/feed/fiber/fuel systems.

Students pursuing the PhD with a plant breeding and plant molecular genetics track must complete at least one course from each of these three areas: genetics, molecular genetics, and plant breeding.

**Required courses**

- **AGRO 5311** - Research Methods in Crop Improvement and Production (1.0 cr)
- **AGRO 8270** - Graduate Seminar (1.0 cr)
- **APSC 8123** - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)
- **SAGR 8010** - Colloquium in Sustainable Agriculture (2.0 cr)
- **STAT 5021** - Statistical Analysis (4.0 cr)

**Genetics**

Take at least one course from the following:

- **EEB 5042** - Quantitative Genetics (3.0 cr)
- or **GCD 8131** - Advanced Molecular Genetics and Genomics (3.0 cr)

**Molecular Genetics**

Take at least one course from the following:

- **GCD 4034** - Molecular Genetics (3.0 cr)
- or **AGRO 8241** - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)

**Plant Breeding**

Take at least one course from the following:

- **AGRO 8201** - Advanced Plant Breeding (3.0 cr)
- or **HORT 8201** - Advanced Plant Breeding (3.0 cr)
- or **AGRO 8202** - Breeding for Quantitative Traits in Plants (3.0 cr)

**Other Suggested Courses**

Courses other than those listed below can be substituted with approval of the advisor, advisory committee, and director of graduate studies.

**Agroecology**

- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- or **SAGR 8010** - Colloquium in Sustainable Agriculture (2.0 cr)

**Biochemistry**

- **BIOC 8001** - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- or **BIOC 8002** - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or PBIO 5601 - Topics in Plant Biochemistry (3.0 cr)

or Biotechnology/Genetics/Genomics
AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
or HORT 4071W - Applications of Biotechnology to Plant Improvement [WI] (4.0 cr)
or HORT 5058 - Plant Cytogenetics (2.0 cr)
or HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
or PBIO 5301 - Plant Genomics (3.0 cr)
or PBIO 5516 - Plant Cell Biology (3.0 cr)
or PLPA 5301 - Plant Genomics (3.0 cr)

or Evolution
AGRO 8023 - Evolution of Crop Plants (3.0 cr)
or EEB 5221 - Molecular Evolution (3.0 cr)

or Physiology
HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
or PBIO 5412 - Plant Physiology and Development (3.0 cr)
or PBIO 5516 - Plant Cell Biology (3.0 cr)

or Plant Pathology
PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 5202 - Field Plant Pathology (2.0 cr)
or PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
or PLPA 5480 - Principles of Plant Pathology (3.0 cr)
or PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
or PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 8104 - Plant Virology (2.0 cr)
or PLPA 8105 - Plant Bacteriology (2.0 cr)

or Statistics
AGRO 5121 - Applied Experimental Design (4.0 cr)
or ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
or ENT 5126 - Spatial and Temporal Analysis of Ecological Data (3.0 cr)
or ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
or FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
or GIS 5555 - Basic Spatial Analysis (3.0 cr)
or STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5401 - Applied Multivariate Methods (3.0 cr)
or STAT 5421 - Analysis of Categorical Data (3.0 cr)

Applied Plant Sciences
Students who choose to pursue the PhD without a specialization track must complete the APS required core curriculum and at least one course from these three areas: genetics and plant breeding; organismal biology; and cropping systems, communities, and commodities.

Genetics and Plant Breeding
Take at least one course from the following:
AGRO 5021 - Plant Breeding Principles (3.0 cr)
or AGRO 5431 - Applied Plant Genomics and Bioinformatics (3.0 cr)
or AGRO 8023 - Evolution of Crop Plants (3.0 cr)
or AGRO 8201 - Advanced Plant Breeding (3.0 cr)
or AGRO 8202 - Breeding for Quantitative Traits in Plants (3.0 cr)
or AGRO 8241 - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
or EEB 5042 - Quantitative Genetics (3.0 cr)
or GCD 4034 - Molecular Genetics (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or HORT 5058 - Plant Cytogenetics (2.0 cr)
or HORT 5059 - Plant Cytogenetics Lab (1.0 cr)
or HORT 8201 - Advanced Plant Breeding (3.0 cr)
or PLPA 5301 - Plant Genomics (3.0 cr)

Organismal Biology
Take at least one course from the following:
HORT 5007 - Advanced Plant Propagation (3.0 cr)
or HORT 8044 - Manipulation of Plant Growth and Reproduction (2.0 cr)
or PBIO 5412 - Plant Physiology and Development (3.0 cr)
or PBIO 5516 - Plant Cell Biology (3.0 cr)
or PBIO 5601 - Topics in Plant Biochemistry (3.0 cr)
or PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
or PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
or PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
or PLPA 5480 - Principles of Plant Pathology (3.0 cr)
or PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
or PLPA 8104 - Plant Virology (2.0 cr)
or PLPA 8105 - Plant Bacteriology (2.0 cr)

Cropping Systems, Communities, and Commodities
Take at least one course from the following:
AGRO 4505 - Biology, Ecology, and Management of Invasive Plants (3.0 cr)
or AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
or HORT 4062 - Turfgrass Weed and Disease Science (3.0 cr)
or HORT 4063 - Turfgrass Science (3.0 cr)
or HORT 4141W - Scheduling Crops for Protected Environments [WI] (4.0 cr)
or HORT 5031 - Fruit Production and Viticulture for Local and Organic Markets (3.0 cr)
or HORT 5032 - Organic Vegetable Production (3.0 cr)
or HORT 5051 - Plant Production II (4.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
or HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3.0 cr)
or PLPA 5202 - Field Plant Pathology (2.0 cr)
or PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
or SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
Twin Cities Campus
Bioproducts and Biosystems Science, Eng and Mgmt M.S.
Bioproducts and Biosystems Engineering
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: http://www.bbe.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science degree in the bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security, while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in sustainable conversion of biomass into bio-based industrial and consumer products, and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources, including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more.

Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles, which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management.

Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students seeking a master's degree should have a bachelor's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university. Applicants should have a performance level of at least a 3.0 GPA (on a 4.0 grading scale) on previous academic work required for a degree.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students complete a project that involves a total of about 120 hours of work, and write a Plan B paper on their project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All master's level students must take BBE 8013, Parameter Estimation (3 cr), unless they can demonstrate to the BBE 8013 instructor that they have already mastered the course material or can identify a suitable alternative.

Students and their advisors must include a letter of explanation if submitting a graduate degree plan that includes more than 4 credits of special problems or advanced problems coursework.

**Required Courses**

- **BBE 8001** - Seminar I (1.0 cr)
- **BBE 8002** - Seminar II (1.0 cr)
- **BBE 8013** - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)

**Master's Plan A and Master's Plan B**

**Master's Plan A**

Take at least 15 additional credits, in consultation with advisor and approved by the director of Graduate Studies. Students need to take a total of 10 thesis credits.

- **BBE 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)
- OR-

**Master's Plan B**

Take an additional 25 credits, in consultation with advisor and approved by the director of Graduate Studies.
Twin Cities Campus

Bioproducts and Biosystems Science, Engineering and Management Minor

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)  
Email: bbe@umn.edu  
Website: http://www.bbe.umn.edu

- Program Type: Graduate minor related to major  
- Requirements for this program are current for Fall 2016  
- Length of program in credits (Masters): 6  
- Length of program in credits (Doctorate): 12  
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the sustainable utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more. Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management. Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
The student must be in good standing in their degree program to apply for this minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Select at least 6 credits of graduate-level BBE coursework in consultation with an adviser and approved by the director of graduate studies in bioproducts and biosystems science engineering and management.

**Doctoral**
Select at least 12 credits of graduate-level BBE coursework in consultation with an adviser and approved by the director of graduate studies in bioproducts and biosystems science engineering and management.
Bioproducts and Biosystems Science, Engineering and Management Ph.D.

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: http://www.bbe.umn.edu

○ Program Type: Doctorate
○ Requirements for this program are current for Fall 2016
○ Length of program in credits: 69
○ This program does not require summer semesters for timely completion.
○ Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD offered by the bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources, including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more.

Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles, which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management.

Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong, diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Students seeking the PhD should have a bachelor's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university.

Special Application Requirements:
Students seeking the PhD should also have a master's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university. Applicants should have a performance level on previous academic work required for a degree of at least a 3.2 GPA (on a 4.0 grading scale). Students expecting to pursue a PhD normally complete a master of science Plan A degree before starting their PhD programs. Exceptional students who want to go straight to the PhD from the bachelor's level may be admitted subject to conditions agreed upon by the advisor, the director of graduate studies, and the graduate program coordinator.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **Paper Based** - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

36 credits are required in the major.
9 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

All doctoral level students must take BBE 8001, Seminar I (1 cr), and BBE 8002, Seminar II (1 cr), and BBE 8013, Parameter Estimation (3 cr), unless they can demonstrate to the BBE 8013 instructor that they have already mastered the course material, or have justified the selection of a suitable alternative.

BBE 8001, BBE 8002, and BBE 8013, if taken at the master's level, count toward the PhD and do not have to be retaken.

The PhD in bioproducts and biosystems science engineering and management requires extended study and intense intellectual effort, conducting cutting-edge research and advancing the forefront of knowledge in the subject matter area. Students develop skills that enable them to define problems or research questions, plan research, conduct independent research and/or lead research efforts, analyze data, and effectively communicate research results to a variety of audiences.

All PhD degree programs must include a minimum of 45 graduate course credits beyond the B.S. degree, and a minimum of 24 doctoral thesis credits (BBE 8888). PhD degree programs should contain a minimum of 9 course credits in a concentrated area of scientific or theoretical development that is related to the student's research, and may contain up to 3 credits of enrichment courses.

**Required Courses**

- **BBE 8001** - Seminar I (1.0 cr)
- **BBE 8002** - Seminar II (1.0 cr)
- **BBE 8013** - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)

31 Credits in Major Area of Study

31 credits in major area of study selected with advisor, and approved by the director of Graduate Studies. The student is encouraged to take up to 3 credits of enrichment courses, which are included in the 31-credit requirement.

9 Credits of Scientific or Mathematical Theoretical Development

9 credits of scientific or mathematical theoretical development that is related to the student's research, selected with advisor and approved by the director of Graduate Studies.

24 Thesis Credits

- **BBE 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Conservation Sciences M.S.
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 135 B Skok Hall, 2003 Upper Buford Circle, St. Paul, MN 55108 (612-624-7751)
Email: conssci@umn.edu
Website: http://www.conssci.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The conservation sciences (CS) program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select one of the two tracks, 1) conservation science or 2) fisheries and aquatic biology. Students may also pursue a joint degree in law and conservation sciences through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A BS/BA degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but may be required to take selected courses in biology.

Special Application Requirements:
A statement of career goals and three letters of recommendation evaluating the applicant's potential for graduate study are required. Scores less than five years old from the General Test of the GRE are required. TOEFL is required for applicants who speak English as a second language. Applicants to the joint law degree program must also apply to the Law School. Application deadline is December 15. Typically, students only are admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
- MN Batt
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B master's students must demonstrate familiarity with the tools of research or scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project. The Plan B project should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The advisory committee specifies both the nature and extent of the options available to satisfy this requirement, subject to approval by the director of graduate studies. The Plan B project must be satisfied independent of the courses in the student's program.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Core Course
Take the following course for 3 credits:
FW 8452 - Conservation Biology (3.0 cr)

Seminar Requirement
Take 2 semesters of CBIO 8001. Students in the fisheries and aquatic biology track may substitute one semester of CBIO 8001 with FW 8200.
Take 2 or more credit(s) from the following:
- CONS 8001 - Conservation Biology Seminar (1.0 cr)
- FW 8200 - Seminar (1.0 - 4.0 cr)

Statistics Requirement
Take at least one 3-credit statistics or systematics course from following list, or select other 5xxx- or 8xxx-level coursework in consultation with the advisory committee.
Take 3 or more credit(s) from the following:
- BIOL 5272 - Applied Biostatistics (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
- EEB 5371 - Principles of Systematics (3.0 cr)

Plan Options

Plan A
Take at least 10 master's thesis credits.
CONS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Take an additional 10 elective course credits, chosen in consultation with the advisor. Coursework may be from the electives section of the chosen track, or other 5xxx- or 8xxx-level courses.

Joint- or Dual-degree Coursework: JD/Conservation Sciences-MS
Student may take a total of 12 credits in common among the academic programs.
Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Conservation Science

The conservation science track is available for students wishing to emphasize this concentration within the conservation sciences degree. The track provides structure and oversight for students interested in the interface of population, species, and ecosystem biology with disciplines of social sciences, education, economics. The conservation science track name will be posted to the transcript.

Conservation Science - Electives

Take at least 12 (Plan A) or at least 22 (Plan B) elective credits from the following list, or select other 5xxx- or 8xxx-level coursework in consultation with the advisory committee.

Take 12 or more credit(s) from the following:

- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5327 - Behavioral Ecology (3.0 cr)
- EEB 5409 - Evolution (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- ENT 4231 - Insect Behavior (3.0 cr)
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5041 - Insect Ecology (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
- FW 5625 - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
- GEOG 8280 - Biogeography (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- LA 5202 - Landscape Analysis Workshop (1.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5253 - Designing Planning and Participation Processes (3.0 cr)
- PA 5501 - Theories and Policies of Development (3.0 cr)
- PA 5511 - Community Economic Development (3.0 cr)
- VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

Fisheries and Aquatic Biology

Three-quarters of the global ecosystem is water and most is a global commons. Many biologists and economists argue that freshwater is one of the most critical global resources and that the functional integrity and biodiversity within freshwater and marine ecosystems are highly threatened. The fisheries and aquatic biology (FAB) track is available for MS, PhD, and joint degree students wishing to emphasize this concentration. The track name will be posted to the transcript, and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in fisheries or aquatic biology. Combined with a typical undergraduate degree in biology or natural resource science, careful selection of courses in the graduate program will satisfy the educational requirements for professional certification by the American Fisheries Society.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Requests for admission to the track may be made during the application process or at any time after the student is admitted to conservation sciences. Students in the track must meet all MS degree requirements.

Students who designate this track will be expected to work closely with their Student Advisory Committee (SAC) to develop an appropriate course of study. The track coordinator will review each student's academic program to examine how track expectations are met and forward it with a recommendation to the director of graduate studies for approval.
Fisheries & Aquatic Biology - Required Courses
Take a minimum of 6 credits from the following list. Other advanced courses or colloquia on fisheries or aquatic biology, not listed here, may satisfy track requirements; consult with the track coordinator.
Take 6 or more credit(s) from the following:
• EEB 5601 - Limnology (3.0 cr)
• EEB 5605 - Limnology Laboratory (2.0 cr)
• EEB 8601 - Introduction to Stream Restoration (3.0 cr)
• EEB 8602 - Stream Restoration Practice (2.0 cr)
• ENT 5361 - Aquatic Insects (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
• FW 4401 - Fish Physiology and Behavior (3.0 cr)
• FW 5136 - Ichthyology (4.0 cr)
• FW 5601 - Fisheries Population Analysis (3.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 8459 - Stream and River Ecology (3.0 cr)
• FW 8465 - Fish Habitats and Restoration (3.0 cr)

Fisheries & Aquatic Biology - Electives
Take at least 6 (Plan A) or 16 (Plan B) course credits from following list, or select 5xxx- or 8xxx-level coursework in consultation with the advisory committee.
Take 6 or more credit(s) from the following:
• APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
• APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
• EEB 5042 - Quantitative Genetics (3.0 cr)
• EEB 5327 - Behavioral Ecology (3.0 cr)
• EEB 5409 - Evolution (3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• ENT 4231 - Insect Behavior (3.0 cr)
• ENT 5011 - Insect Structure and Function (4.0 cr)
• ENT 5041 - Insect Ecology (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 8221 - Psychological Scaling (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 5051 - Analysis of Populations (4.0 cr)
• GEOG 8280 - Biogeography (3.0 cr)
• HORT 5071 - Ecological Restoration (4.0 cr)
• LA 5202 - Landscape Analysis Workshop (1.0 cr)
• LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
• PA 5251 - Strategic Planning and Management (3.0 cr)
• PA 5253 - Designing Planning and Participation Processes (3.0 cr)
• PA 5511 - Community Economic Development (3.0 cr)
• VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
Twin Cities Campus
Conservation Sciences Minor
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 135 B Skok Hall, 2003 Upper Buford Circle, St. Paul, MN 55108 (612-624-7751)
Email: consbio@umn.edu
Website: http://www.consbio.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The conservation sciences (CS) program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select a named track, fisheries and aquatic biology, which offers an aquatic specialization. Students may also pursue a joint degree in law and conservation biology through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Core Course
FW 8452 - Conservation Biology (3.0 cr)
Seminar
CONS 8001 - Conservation Biology Seminar (1.0 cr)
Electives
Three credits of electives in consultation with the director of graduate studies.

Doctoral
Core Course
FW 8452 - Conservation Biology (3.0 cr)

**Seminar**
2 credits required including at least one credit of CBIO 8001.
Take 2 or more credit(s) from the following:
- CONS 8001 - Conservation Biology Seminar (1.0 cr)
- FW 8200 - Seminar (1.0 - 4.0 cr)

**Electives**
7 credits of electives in consultation with the director of graduate studies.
Twin Cities Campus
Conservation Sciences Ph.D.
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 135 B Skok Hall, 2003 Upper Buford Circle, St. Paul, MN 55108 (612-624-7751)
Email: consbio@umn.edu
Website: http://www.consbio.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The conservation sciences (CS) program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select one of two tracks, conservation science track or fisheries and aquatic biology track. Students may also pursue a joint degree in law and conservation sciences through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
A BS/BA degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but these individuals may be required to take selected courses in biology. In general, PhD applicants holding a baccalaureate degree are first expected to complete a master’s degree.

Special Application Requirements:
A statement of career goals and three letters of recommendation evaluating the applicant's potential for graduate study are required. Three letters of recommendation are required. Scores less than five years old from the General Test of the GRE are required. TOEFL is required for applicants who speak English as a second language. Applicants to the joint law degree program must also apply to the Law School. Application deadline is January 1. Typically, students are admitted only for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of December 20, 2016
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

PhD students complete 48 credits, 24 credits in courses and 24 thesis credits. Students are expected to show competency in both the biological and social sciences. With their advisory committee, students develop a program that emphasizes the ecological and social aspects of conservation. Dissertation research may require proficiency in supporting areas (e.g., statistics, computing, communications).

Core Courses
All PhD students are required to take following core courses
FW 8452 - Conservation Biology (3.0 cr)
CONS 8095 - Contemporary Problems in Conservation Biology (1.0 cr)

Seminar Requirement
PhD students are required to take 3 semesters of conservation biology seminar, CBIO 8001. FAB track PhD students may substitute 1-2 semesters of FW 8200 to meet 3 semester conservation biology seminar requirement.
Take 3 or more credit(s) from the following:
•CONS 8001 - Conservation Biology Seminar (1.0 cr)
•FW 8200 - Seminar (1.0 - 4.0 cr)

Statistics Requirement
PhD students should take one statistics course (minimum of 3 semester credits) from the following list, or choose from 5- or 8-xxx level courses in other departments in consultation with the advisor and/or SAC.
Take 3 or more credit(s) from the following:
•BIOL 5272 - Applied Biostatistics (3.0 cr)
•EPSY 8251 - Statistical Methods in Education I (3.0 cr)
•EPSY 8252 - Statistical Methods in Education II (3.0 cr)
•EPSY 8261 - Statistical Methods in Education I (3.0 cr)
•EPSY 8262 - Statistical Methods in Education II (3.0 cr)
•FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
•PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
•PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
•PUBH 6810 - Survey Research Methods (3.0 cr)
•PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
•STAT 5021 - Statistical Analysis (4.0 cr)
•STAT 5302 - Applied Regression Analysis (4.0 cr)
•STAT 5303 - Designing Experiments (4.0 cr)
•STAT 5421 - Analysis of Categorical Data (3.0 cr)
•STAT 5601 - Nonparametric Methods (3.0 cr)

Thesis
All PhD students are required to take 24 thesis semester credits
CONS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework: Joint degree in conservation sciences and law
Student may take a total of 12 credits in common among the academic programs.
Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Conservation Science

Conservation science track is available for MS, PhD, and joint degree students wishing to emphasize this concentration within a conservation sciences. This track name will be indicated on the student's transcript. This track provides structure and oversight for students interested in the interface of population, species, and ecosystem biology with disciplines of social sciences, education, economics.

Conservation Science - Electives

Doctoral students should take a minimum of 14 credits from the following list, or choose 5- or 8-xxx level courses from other departments in consultation with SAC to meet minimum credit requirements.

Take 14 or more credit(s) from the following:

- **APEC 5151** - Applied Microeconomics: Firm and Household (3.0 cr)
- **APEC 5651** - Economics of Natural Resource and Environmental Policy (3.0 cr)
- **EEB 4129** - Mammalogy (4.0 cr)
- **EEB 4134** - Introduction to Ornithology (4.0 cr)
- **EEB 5042** - Quantitative Genetics (3.0 cr)
- **EEB 5327** - Behavioral Ecology (3.0 cr)
- **EEB 5409** - Evolution (3.0 cr)
- **EEB 5601** - Limnology (3.0 cr)
- **EEB 5609** - Ecosystem Ecology (3.0 cr)
- **EEB 8550** - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- **ENT 4021** - Honey Bees and Insect Societies (3.0 cr)
- **ENT 4231** - Insect Behavior (3.0 cr)
- **ENT 5011** - Insect Structure and Function (4.0 cr)
- **ENT 5041** - Insect Ecology (3.0 cr)
- **EPSY 5221** - Principles of Educational and Psychological Measurement (3.0 cr)
- **EPSY 5243** - Principles and Methods of Evaluation (3.0 cr)
- **EPSY 8221** - Psychological Scaling (3.0 cr)
- **FNRM 5104** - Forest Ecology (4.0 cr)
- **FNRM 5114** - Hydrology and Watershed Management (3.0 cr)
- **FNRM 5131** - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- **FNRM 5203** - Forest Fire and Disturbance Ecology (3.0 cr)
- **FNRM 5204** - Landscape Ecology and Management (3.0 cr)
- **FNRM 5262** - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- **FW 5003** - Human Dimensions of Biological Conservation (3.0 cr)
- **FW 5051** - Analysis of Populations (4.0 cr)
- **FW 5401** - Fish Physiology and Behavior (3.0 cr)
- **FW 5603W** - Habitats and Regulation of Wildlife [WI] (3.0 cr)
- **FW 5625** - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
- **GEOG 8280** - Biogeography (3.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)
- **GRAD 8102** - Practicum for Future Faculty (3.0 cr)
- **HORT 5071** - Ecological Restoration (4.0 cr)
- **ISG 5010** - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
- **ISG 5020** - Risk Analysis Modeling for Introduced Species and Genotypes (1.0 cr)
- **ISG 8031** - Discussions in Introduced Species and Genotypes (1.0 cr)
- **ISG 8021** - Problem Solving Practicum in Risk Analysis (3.0 cr)
- **ISG 8031** - Cooperative Learning Practicum (1.0 cr)
- **LA 5202** - Landscape Analysis Workshop (1.0 cr)
- **LA 5204** - Metropolitan Landscape Ecology (3.0 cr)
- **PA 5251** - Strategic Planning and Management (3.0 cr)
- **PA 5253** - Designing Planning and Participation Processes (3.0 cr)
- **PA 5501** - Theories and Policies of Development (3.0 cr)
- **PA 5511** - Community Economic Development (3.0 cr)
- **VMED 5181** - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

Fisheries and Aquatic Biology

Three-quarters of the global ecosystem is water and most is a global commons. Many biologists and economists argue that freshwater is one of the most critical global resources and that the functional integrity and biodiversity within freshwater and marine ecosystems are highly threatened. The fisheries and aquatic biology (FAB) track is available for MS, PhD, and joint degree students wishing to
emphasize this concentration within a CS major. The track name will be indicated on the student's transcript and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in fisheries or aquatic biology. Combined with a typical undergraduate degree in biology or natural resource science, careful selection of courses in the graduate program will satisfy the educational requirements for professional certification by the American Fisheries Society.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Request for admission to the track may be made during the application process or any time after the student is admitted to the CS graduate program. Students in the track must meet all requirements for the PhD in CS.

Students who designate this track will be expected to work closely with their Student Advisory Committee (SAC) to develop an appropriate course of study. The track coordinator will review each student's academic program to examine how track expectations are met and forward it with a recommendation to the director of graduate studies for approval.

Fisheries and Aquatic Biology - Required Courses

In addition to course requirements for the conservation sciences major, PhD students in fisheries and aquatic biology track are required to take minimum of 8 semester credits from following list. Other advanced courses or colloquia on fisheries or aquatic biology that are not listed here may also satisfy needs of students in the track. Please check with FAB track coordinator to add other courses.

Take 8 or more credit(s) from the following:

- EEB 5601 - Limnology (3.0 cr)
- EEB 5605 - Limnology Laboratory (2.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- ENT 5361 - Aquatic Insects (4.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- FW 4401 - Fish Physiology and Behavior (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- FW 5136 - Ichthyology (4.0 cr)
- FW 5601 - Fisheries Population Analysis (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)

Fisheries and Aquatic Biology - Electives

PhD students should take a minimum of 6 semester credits either from the following list, or choose 5- or 8-xxxx courses from other departments in consultation with the advisor and/or SAC.

Take 6 or more credit(s) from the following:

- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
- EEB 5042 - Quantitative Genetics (3.0 cr)
- EEB 5327 - Behavioral Ecology (3.0 cr)
- EEB 5409 - Evolution (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- ENT 4231 - Insect Behavior (3.0 cr)
- ENT 5011 - Insect Structure and Function (4.0 cr)
- ENT 5041 - Insect Ecology (3.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
- FW 5401 - Fish Physiology and Behavior (3.0 cr)
- FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
- FW 5625 - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
- GEOG 8280 - Biogeography (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8102 - Practicum for Future Faculty (3.0 cr)
• HORT 5071 - Ecological Restoration (4.0 cr)
• ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
• ISG 5020 - Risk Analysis Modeling for Introduced Species and Genotypes (1.0 cr)
• ISG 8001 - Discussions in Introduced Species and Genotypes (1.0 cr)
• ISG 8021 - Problem Solving Practicum in Risk Analysis (3.0 cr)
• ISG 8031 - Cooperative Learning Practicum (1.0 cr)
• LA 5202 - Landscape Analysis Workshop (1.0 cr)
• LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
• PA 5251 - Strategic Planning and Management (3.0 cr)
• PA 5253 - Designing Planning and Participation Processes (3.0 cr)
• PA 5501 - Theories and Policies of Development (3.0 cr)
• PA 5511 - Community Economic Development (3.0 cr)
• VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
Twin Cities Campus

Entomology M.S.

Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Avenue, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
A bachelor's degree with a major in a biological science is a prerequisite. Preference is given to students with a broad background in the basic sciences. Admission depends primarily on applicant's undergraduate record, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements:
Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, and objectives. Three letters of recommendation are required from persons well acquainted with the student's academic record, and should be either uploaded or sent directly to the department.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 18 major credits and 12 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with advisor approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework
ENT 5011 - Insect Structure and Function (4.0 cr)
ENT 5021 - Insect Biodiversity and Evolution (4.0 cr)
ENT 5041 - Insect Ecology (3.0 cr)
or ENT 5045 - Insect Population Dynamics (3.0 cr)

Plan Options
Plan A Requirements
Graduate Seminar
Take at least 1 credit of the following:
ENT 8300 - Graduate Seminar (1.0 - 2.0 cr)

Ethics Course Requirement
Take the following course for 1 credit. A different course or activity(ies) can be substituted with the approval of the Entomology director of graduate studies.
ENT 8061 - Scientific Communication and Ethics (1.0 cr)

Electives
Take at least 7 credits in consultation with the advisor.

Master's Thesis Credits
Take at least 10 master's thesis credits.
ENT 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Requirements
Take the following course for at least 6 credits:
ENT 5910 - Special Problems in Entomology (1.0 - 6.0 cr)

Ethics Course Requirement
Take the following course for 1 credit. A different course or activity(ies) can be substituted with the approval of the Entomology director of graduate studies.
ENT 8061 - Scientific Communication and Ethics (1.0 cr)

Electives
Take at least 12 credits in consultation with the advisor.
Twin Cities Campus
Entomology Minor
Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Ave, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Courses are chosen in consultation with the student's major advisor and the Entomology director of graduate studies.

Master's Course List
Take at least six credits from the following:
ENT 4xxx
ENT 5xxx
ENT 8xxx

Doctoral
Courses are chosen in consultation with the student's major advisor and the Entomology director of graduate studies.

Doctoral Course List
Take at least 12 credits from the following:
Twin Cities Campus
Entomology Ph.D.
Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Avenue, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A GPA of 3.00 (on a 4.00 scale).

A 3.50 GPA (on a 4.00 scale) for prior graduate work is preferred for admission.

Other requirements to be completed before admission:
A bachelor's degree with a major in a biological science is a prerequisite. Preference is given to students with a broad background in the basic sciences. Admission depends primarily on applicant's undergraduate record, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements:
Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, and objectives. Three letters of recommendation are required from persons well acquainted with the student's academic record, and should be either uploaded or sent directly to the department.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
13 to 24 credits are required in the major.
0 to 11 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

In addition to coursework, students must accumulate three written examination points.

Core Courses
11 credits required
ENT 5021 - Insect Biodiversity and Evolution (4.0 cr)
ENT 5011 - Insect Structure and Function (4.0 cr)
ENT 5041 - Insect Ecology (3.0 cr)
or ENT 5045 - Insect Population Dynamics (3.0 cr)

Seminar Requirement
2 credits required
ENT 8300 - Graduate Seminar (1.0 - 2.0 cr)

Electives
Up to 11 credits required.

Students must work with their advisor(s) when selecting electives outside of the entomology program. Elective courses must be taken at the graduate (4xxx-8xxx) level. Elective courses can be taken from entomology or any University of Minnesota department.

Thesis Credits
24 credits required
ENT 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Food Science M.S.
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/graduate_programs/foodsciencegraduate/index.htm

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Students may spend a maximum of five (5) years in this degree program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree, or its international equivalent, in any field.

Other requirements to be completed before admission:
The minimum requirements are general chemistry with laboratory, organic chemistry with laboratory, physics with laboratory, biology with laboratory, and calculus. If preparation appears inadequate, certain additional courses may be required after admission.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of December 20, 2016
Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is equivalent to 120 hours of work or three full weeks of research and writing. It should consist of one of the following options, which are intended to familiarize the candidate with the tools of research or scholarship in the field and serve to demonstrate the ability to work independently: 1) The candidate may prepare one paper equivalent to 120 hours of work in one advanced course, over and above the normal course requirement as approved by the instructor in consultation with the advisor. This course must be from the major field of interest. 2) The candidate may prepare one paper equivalent to the requirement of 120 hours in some related field or course as approved in consultation with the instructor and the adviser. 3) The student may do an equivalent amount of library or laboratory research and write a research report to satisfy the requirement as approved by the adviser. This may take the form of a research proposal.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All students are expected to participate as teaching assistants during their graduate careers. Up to 9 credits of 4xxx-level courses are allowed.

Required Courses
All students take the following required courses for 11 credits:
- FSCN 4112 - Food Chemistry and Functional Foods (3.0 cr)
- FSCN 4121 - Food Microbiology (3.0 cr)
- FSCN 4332 - Food Processing Operations (3.0 cr)
- FSCN 8318 - Current Issues in Food Science (2.0 cr)

Take one of the following courses for a total of 2 to 4 credits:
- FSCN 5122 - Food Fermentations and Biotechnology (2.0 cr)
- FSCN 5131 - Food Quality for Graduate Credit (3.0 cr)
- FSCN 5312 - Food Analysis (4.0 cr)

Additional FSCN Credits
Take at least 3 additional FSCN credits, in consultation with the advisor.
- FSCN 5xxx
- FSCN 8xxx

Electives
Choose remaining credits in consultation with the advisor to meet minimum credit requirements.

Plan Options

Plan A
Take 10 master’s thesis credits.
- FSCN 8777 - Thesis Credits: Master’s (1.0 - 18.0 cr)
- OR-

Plan B
Plan B students do not have additional requirements.
Twin Cities Campus
Food Science Minor
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/foodsciencegraduate/index.htm

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 10
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Students wishing to complete the Food Science minor must consult with the Food Science director of graduate studies to establish specific requirements and goals for an acceptable minor program of study.

Required Courses
FSCN 4112 - Food Chemistry and Functional Foods (3.0 cr)
FSCN 4121 - Food Microbiology (3.0 cr)
FSCN 4332 - Food Processing Operations (3.0 cr)

Doctoral
Required Courses
Students wishing to complete the food science minor must consult with the Food Science director of graduate studies to establish specific requirements and goals for an acceptable minor program of study.
In addition to the 3 courses listed below, students pursuing the doctoral minor must take at least 3 5xxx- or 8xxx-level FSCN credits.

- FSCN 4112 - Food Chemistry and Functional Foods (3.0 cr)
- FSCN 4121 - Food Microbiology (3.0 cr)
- FSCN 4332 - Food Processing Operations (3.0 cr)
- FSCN 5xxx
- FSCN 8xxx
Twin Cities Campus
Food Science Ph.D.
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/graduate_programs/foodsciencegraduate/index.htm

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent along with demonstrated research ability such as a MS degree or publications.

Other requirements to be completed before admission:
The minimum requirements are general chemistry with laboratory, organic chemistry with laboratory, physics with laboratory, biology with laboratory, and calculus. If preparation appears inadequate, certain additional courses may be required after admission. Graduate Record Examination (GRE) General Test scores, and the TOEFL (for international students) are also required.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All students also must participate as teaching assistants during their graduate career.

Required Courses
All students must take the following courses
FSCN 4112 - Food Chemistry and Functional Foods (3.0 cr)
FSCN 4121 - Food Microbiology (3.0 cr)
FSCN 4332 - Food Processing Operations (3.0 cr)
FSCN 8318 - Current Issues in Food Science (2.0 cr)

Course Options
Students must choose one of the following courses.
FSCN 5122 - Food Fermentations and Biotechnology (2.0 cr)
or FSCN 5131 - Food Quality for Graduate Credit (3.0 cr)
or FSCN 5312 - Food Analysis (4.0 cr)

FSCN Elective Credits
Students must take at least three (3) FSCN course credits at the 5xxx or 8xxx level in addition to the courses listed above.

Thesis Credits
Food Science PhD students must take 24 thesis credits.
FSCN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Elective Courses
Students complete additional 5xxx and 8xxx level FSCN courses, in consultation with their advisor, to total at least 24 credits.
FSCN 5xxx
FSCN 8xxx
**Twin Cities Campus**

**Land and Atmospheric Science M.S.**

**Soil, Water, & Climate**

**College of Food, Agricultural and Natural Resource Sciences**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Email: kjarcho@umn.edu
Website: [http://www.laas.umn.edu](http://www.laas.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Land and atmospheric science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The land and atmospheric science graduate program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.20.

BS degree in a related field of science, or a graduate or professional degree.

**Required prerequisites**

**Basic Sciences**
Students are expected to have taken a minimum of four of the following courses (or their equivalent).

- MATH 1271 - Calculus I [MATH] (4.0 cr)
or MATH 1142 - Short Calculus [MATH] (4.0 cr)
or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
- PHYS 1101W - Introductory College Physics I [PHYS, WI] (4.0 cr)
or PHYS 1102W - Introductory College Physics II [PHYS, WI] (4.0 cr)
oor ESPM 3131 - Environmental Physics (3.0 cr)
- CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
or CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
- BIOL 1009 - General Biology [BIOL] (4.0 cr)
oor CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
- CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)
- CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
oor STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

**Environmental Sciences**
Students are expected to have taken a minimum of two of the following (or similar) courses:
Take 2 - 6 course(s) from the following:
- ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
- ESPM 1425 - Introduction to Weather and Climate [PHYS, ENV] (4.0 cr)
- SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
- ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
Other requirements to be completed before admission:
Student course admission prerequisites are as shown below. Students who are admitted with deficiencies would be provided with a list of courses they are required to take before the completion of their degree. This list would be developed by the directors of graduate studies in consultation with the student’s faculty advisor.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 10 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project typically consists of a technical paper of a topic and length acceptable to the student’s advisory committee.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Core Courses
All students must complete the 5-credit core curriculum.
Take exactly 3 course(s) totaling exactly 5 credit(s) from the following:
• LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)
• LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)
• SOIL 8123 - Research Ethics in the Plant and Environmental Sciences (0.5 cr)

LAAS and Related Courses
Plan A students must select at least 15 credits (9 major credits and 6 related fields) from this list, and Plan B students must select at least 25 credits (15 major credits and 10 related fields). Courses are selected based on relevance to research interests and with the consent of the advisor.
Take 15 or more credit(s) from the following:
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
• LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
• LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
• BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>BBE 5608</td>
<td>Environmental and Industrial Microbiolog (3.0 cr)</td>
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<td>CEGE 4502</td>
<td>Water and Wastewater Treatment (3.0 cr)</td>
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<td>CEGE 4562</td>
<td>Environmental Remediation Technology (3.0 cr)</td>
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<td>CEGE 5180</td>
<td>Special Topics (1.0 - 4.0 cr)</td>
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<td>CEGE 5511</td>
<td>Urban Hydrology and Water Quality (4.0 cr)</td>
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<td>CEGE 5541</td>
<td>Environmental Water Chemistry (3.0 cr)</td>
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<td>CEGE 5542</td>
<td>Experimental Methods in Environmental Engineering (3.0 cr)</td>
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<td>CEGE 5543</td>
<td>Introductory Environmental Fluid Mechanics (4.0 cr)</td>
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<td>CEGE 5551</td>
<td>Environmental Microbiology (3.0 cr)</td>
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<tr>
<td>CEGE 5561</td>
<td>Air Quality Engineering (3.0 cr)</td>
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<td>CEGE 8501</td>
<td>Environmental Fluid Mechanics I (4.0 cr)</td>
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<td>CEGE 8502</td>
<td>Environmental Fluid Mechanics II (4.0 cr)</td>
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<td>CEGE 8503</td>
<td>Environmental Mass Transport (4.0 cr)</td>
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<td>CEGE 8506</td>
<td>Stochastic Hydrology (4.0 cr)</td>
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<td>CEGE 8521</td>
<td>The Atmospheric Boundary Layer (4.0 cr)</td>
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<tr>
<td>CEGE 8541</td>
<td>Aquatic Chemistry (3.0 cr)</td>
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<td>CEGE 8542</td>
<td>Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)</td>
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<td>CEGE 8551</td>
<td>Environmental Microbiology: Molecular Theory and Methods (4.0 cr)</td>
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<td>CEGE 8561</td>
<td>Analysis and Modeling of Aquatic Environments I (3.0 cr)</td>
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<tr>
<td>CEGE 8562</td>
<td>Analysis and Modeling of Aquatic Environments II (3.0 cr)</td>
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<td>CEGE 8572</td>
<td>Computational Environmental Fluid Dynamics (4.0 cr)</td>
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<td>EEB 4068</td>
<td>Plant Physiological Ecology (3.0 cr)</td>
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<td>EEB 4611</td>
<td>Biogeochemical Processes (3.0 cr)</td>
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<td>EEB 5053</td>
<td>Ecology: Theory and Concepts (4.0 cr)</td>
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<td>EEB 5601</td>
<td>Limnology (3.0 cr)</td>
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<td>EEB 5605</td>
<td>Limnology Laboratory (2.0 cr)</td>
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<td>ESCI 5102</td>
<td>Climate Change and Human History (3.0 cr)</td>
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<td>ESCI 5205</td>
<td>Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)</td>
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<td>ESCI 5351</td>
<td>Geochemical Modeling of Aqueous Systems (3.0 cr)</td>
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<tr>
<td>ESCI 5402</td>
<td>Science and Politics of Global Warming (3.0 cr)</td>
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<tr>
<td>ESCI 8401</td>
<td>Aqueous Environmental Geochemistry (3.0 cr)</td>
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<tr>
<td>ESCI 8402</td>
<td>Biogeochemical Cycles in the Ocean (3.0 cr)</td>
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<tr>
<td>ESCI 8801</td>
<td>Geomicrobiology (3.0 cr)</td>
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<tr>
<td>ESPM 5061</td>
<td>Water Quality and Natural Resources (3.0 cr)</td>
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<tr>
<td>ESPM 5111</td>
<td>Hydrology and Water Quality Field Methods (3.0 cr)</td>
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<tr>
<td>ESPM 5245</td>
<td>Sustainable Land Use Planning and Policy (3.0 cr)</td>
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<td>ESPM 5402</td>
<td>Biometeorology (3.0 cr)</td>
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<td>ESPM 5601</td>
<td>Principles of Waste Management (3.0 cr)</td>
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<td>FNRM 5114</td>
<td>Hydrology and Watershed Management (3.0 cr)</td>
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<td>FNRM 5131</td>
<td>Geographical Information Systems (GIS) for Natural Resources (4.0 cr)</td>
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<td>FNRM 5153</td>
<td>Forest Hydrology &amp; Watershed Biogeochemistry (3.0 cr)</td>
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<td>FNRM 5262</td>
<td>Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)</td>
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<td>FW 8459</td>
<td>Stream and River Ecology (3.0 cr)</td>
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<td>GEOG 5401</td>
<td>Geography of Environmental Systems and Global Change (4.0 cr)</td>
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<td>GEOG 5426</td>
<td>Climatic Variations (3.0 cr)</td>
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<td>GEOG 5531</td>
<td>Numerical Spatial Analysis (4.0 cr)</td>
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<td>GEOG 5552</td>
<td>GIS Development Practicum (3.0 cr)</td>
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<td>GEOG 5565</td>
<td>Geographical Analysis of Human-Environment Systems (3.0 cr)</td>
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<td>GEOG 5839</td>
<td>Introduction to Dendrochronology (3.0 cr)</td>
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<td>GEOG 8270</td>
<td>Seminar: Climatology (3.0 cr)</td>
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<td>GIS 5555</td>
<td>Basic Spatial Analysis (3.0 cr)</td>
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<td>MICB 4111</td>
<td>Microbial Physiology and Diversity (3.0 cr)</td>
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<td>PBIO 5412</td>
<td>Plant Physiology and Development (3.0 cr)</td>
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<tr>
<td>PLPA 8103</td>
<td>Plant-Microbe Interactions (3.0 cr)</td>
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<tr>
<td>PUBH 6100</td>
<td>Topics: Environmental Health (0.5 - 4.0 cr)</td>
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<td>PUBH 6190</td>
<td>Environmental Chemistry (3.0 cr)</td>
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<td>PUBH 6191</td>
<td>Air Pollution (3.0 cr)</td>
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<td>SAQR 8010</td>
<td>Colloquium in Sustainable Agriculture (2.0 cr)</td>
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<td>SOIL 5232</td>
<td>Vadose Zone Hydrology (3.0 cr)</td>
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<td>SOIL 5555</td>
<td>Wetland Soils (3.0 cr)</td>
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<td>SOIL 5611</td>
<td>Soil Biology and Fertility (4.0 cr)</td>
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<td>SOIL 8252</td>
<td>Advanced Soil Physics (2.0 cr)</td>
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<td>SOIL 8510</td>
<td>Advanced Topics in Pedology (2.0 - 4.0 cr)</td>
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<td>SOIL 8541</td>
<td>Aquatic and Soil Chemistry (3.0 cr)</td>
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<tr>
<td>STAT 5021</td>
<td>Statistical Analysis (4.0 cr)</td>
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</tbody>
</table>
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• WRS 5101 - Water Policy (3.0 cr)

Plan Options

Plan A
Take 10 or more credit(s) from the following:
• LAAS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Plan B students do not have additional requirements other than those described above.
Twin Cities Campus

Land and Atmospheric Science Minor
Soil, Water, & Climate
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Email: kiarcho@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and Atmospheric Science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and Atmospheric Science Graduate Program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

B.S. degree in a related science field.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All minor courses must be taken A-F, unless approved by the Graduate Advisory Committee, or if they are offered on the S-N basis only. Courses for use in the minor must be selected with the consultation of the Land and Atmospheric Science graduate faculty member serving as the minor advisor and approved by the director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Integrated Topics
All students are required to take the following course.

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Information current as of December 20, 2016
Take exactly 1 course(s) totaling exactly 3 credit(s) from the following:
• LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)

Other LAAS courses
Take 6 credits for M.S. minor from the following options, or others approved by the DGS and the LAAS graduate faculty member serving as the minor advisor.
Take 6 or more credit(s) from the following:
• LAAS 5051 - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
• LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
• LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
• LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)

Doctoral
Integrated Topics
All students are required to take the following course.
Take exactly 1 course(s) totaling exactly 3 credit(s) from the following:
• LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)

Other LAAS courses
Take 9 credits for PhD minor from the following options, or others approved by the DGS and the LAAS graduate faculty member serving as the minor advisor.
Take 9 or more credit(s) from the following:
• LAAS 5051 - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
• LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
• LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
• LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)
Twin Cities Campus
Land and Atmospheric Science Ph.D.
Soil, Water, & Climate
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Email: laas@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 50
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and atmospheric science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and atmospheric science graduate program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Applicants to the LAAS PhD program are expected to have an MS degree or equivalent in a related field of science.

Required prerequisites
Basic Sciences
Students are expected to have taken a minimum of four of the following courses (or their equivalent):
MATH 1271 - Calculus I [MATH] (4.0 cr)
or MATH 1142 - Short Calculus [MATH] (4.0 cr)
or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
PHYS 1101W - Introductory College Physics I [PHYS, WI] (4.0 cr)
PHYS 1102W - Introductory College Physics II [PHYS, WI] (4.0 cr)
or ESPM 3131 - Environmental Physics (3.0 cr)
or BIOL 1009 - General Biology [BIOL] (4.0 cr)
or CHEM 1061 - Chemical Principles I [PHYS] (3.0 cr)
CHEM 1065 - Chemical Principles I Laboratory [PHYS] (1.0 cr)
CHEM 1062 - Chemical Principles II [PHYS] (3.0 cr)
CHEM 1066 - Chemical Principles II Laboratory [PHYS] (1.0 cr)
or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

Environmental Sciences
Students are expected to have taken a minimum of two of the following (or similar) courses:
Take 2 - 6 course(s) from the following:
• ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
• ESPM 1425 - Introduction to Weather and Climate [PHYS, ENV] (4.0 cr)
• SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
• ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
Other requirements to be completed before admission:

Students with a BS degree and outstanding scholarship can request direct admission to the LAAS PhD program. Each request will be considered on a case-by-case basis by the Graduate Advisory Committee. Evidence of outstanding scholarship may include: peer-reviewed publications, a pre-doctoral fellowship, a National Science Foundation PhD Fellowship, high GPA/GRE scores, or strong previous research experience. Current MS candidates who exhibit outstanding scholarship may request transfer to a PhD degree program after completion of their first two semesters of coursework.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

16 credits are required in the major.

10 credits are required outside the major.

24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Core Courses**

All doctoral students must complete the 10-credit core curriculum.

Take exactly 5 course(s) totaling exactly 10 credit(s) from the following:

- **LAAS 5050** - Integrated Topics in Land & Atmospheric Science (3.0 cr)
- **LAAS 8128** - Land and Atmospheric Science Seminar (1.5 cr)
- **SOIL 8123** - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- **LAAS 5051** - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)

**LAAS and Related Courses**

Choose courses relevant to particular area of research with consent of advisor. Take at least 6 credits from the following list to complete the 16-credit minimum for the major, and at least 10 credits for the supporting program minimum.

Take 16 or more credit(s) from the following:

- **LAAS 5311** - Soil Chemistry and Mineralogy (3.0 cr)
- **LAAS 5425** - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
- **LAAS 5426** - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
- **LAAS 5515** - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
- **AGRO 5121** - Applied Experimental Design (4.0 cr)
- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- **BBE 5535** - Assessment and Diagnosis of Impaired Waters (3.0 cr)
• BBE 5608 - Environmental and Industrial Microbiol (3.0 cr)
• CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
• CEGE 4562 - Environmental Remediation Technology (3.0 cr)
• CEGE 5180 - Special Topics (1.0 - 4.0 cr)
• CEGE 5511 - Urban Hydrology and Water Quality (4.0 cr)
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
• CEGE 5543 - Introductory Environmental Fluid Mechanics (4.0 cr)
• CEGE 5551 - Environmental Microbiology (3.0 cr)
• CEGE 5561 - Air Quality Engineering (3.0 cr)
• CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
• CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
• CEGE 8503 - Environmental Mass Transport (4.0 cr)
• CEGE 8506 - Stochastic Hydrology (4.0 cr)
• CEGE 8521 - The Atmospheric Boundary Layer (4.0 cr)
• CEGE 8541 - Aquatic Chemistry (3.0 cr)
• CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
• CEGE 8551 - Environmental Microbiology: Molecular Theory and Methods (4.0 cr)
• CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
• CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
• CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
• EEB 4068 - Plant Physiological Ecology (3.0 cr)
• EEB 4611 - Biogeochemical Processes (3.0 cr)
• EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• EEB 5605 - Limnology Laboratory (2.0 cr)
• ESCI 5102 - Climate Change and Human History (3.0 cr)
• ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
• ESCI 5351 - Geochemical Modeling of Aqueous Systems (3.0 cr)
• ESCI 5402 - Science and Politics of Global Warming (3.0 cr)
• ESCI 8401 - Aquatic Environmental Geochemistry (3.0 cr)
• ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
• ESCI 8801 - Geomicrobiology (3.0 cr)
• ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5402 - Biometeorology (3.0 cr)
• ESPM 5601 - Principles of Waste Management (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
• FW 8459 - Stream and River Ecology (3.0 cr)
• GEOG 5401 - Geography of Environmental Systems and Global Change (4.0 cr)
• GEOG 5426 - Climatic Variations (3.0 cr)
• GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
• GEOG 5552 - GIS Development Practicum (3.0 cr)
• GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
• GEOG 5839 - Introduction to Dendrochronology (3.0 cr)
• GEOG 8270 - Seminar: Climatology (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• MICB 4111 - Microbial Physiology and Diversity (3.0 cr)
• PBIO 5412 - Plant Physiology and Development (3.0 cr)
• PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
• PUBH 6100 - Topics: Environmental Health (0.5 - 4.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)
• PUBH 6191 - Air Pollution (3.0 cr)
• SAQR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
• SOIL 5232 - Vadose Zone Hydrology (3.0 cr)
• SOIL 5555 - Wetland Soils (3.0 cr)
• SOIL 5611 - Soil Biology and Fertility (4.0 cr)
• SOIL 8252 - Advanced Soil Physics (2.0 cr)
• SOIL 8510 - Advanced Topics in Pedology (2.0 - 4.0 cr)
• SOIL 8541 - Aquatic and Soil Chemistry (3.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- WRS 5101 - Water Policy (3.0 cr)

**Thesis credits**
Take 24 or more credit(s) from the following:
- LAAS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Natural Resources Science and Management M.S.
Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 116d Green Hall, 1530 Cleveland Avenue N, St. Paul MN 55108 (612-624-7683; fax: 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Natural Resources Science and Management program emphasize one of the following tracks: 1) forests: biology, ecology, conservation, and management; 2) economics, policy, management, and society; 3) assessment, monitoring, and geospatial analysis; 4) recreation resources, tourism, and environmental education; 5) forest hydrology and watershed management; 6) forest products; 7) paper science and engineering; or 8) wildlife ecology and management.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Most admitted students have earned degrees in natural resource-related majors. Applicants with exceptional academic records but no related background are eligible; if admitted, they may complete the prerequisites for advanced courses during the early stages of their graduate program. These prerequisites will vary depending upon the student's track and major advisor.

Applicants will not be admitted unless a member of the program faculty agrees to advise them ahead of time. This decision depends on admissibility (the applicant's overall credentials), mutual research interests, and the faculty member's ability to take on a new student. Some faculty members will not advise students unless they have funding for the student. Applicants are encouraged to review faculty profiles on the program website and begin making contacts prior to and during the application process.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B project(s) is(are) designed in consultation with the student's advisor and committee. It(They) must develop and demonstrate competence in the student's track.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. is offered under Plan A (with thesis) and Plan B (without thesis). Plan A requires at least 20 coursework credits and Plan B requires at least 30 coursework credits. Plan A students must also register for 10 thesis credits. Plan A students usually design a program to support their specific thesis project. In consultation with faculty members, Plan B students design a program that develops competence in at least one track. Students present a seminar on the thesis or the Plan B project. Specific requirements vary by track and research project; prospective students should contact the director of graduate studies or a prospective faculty advisor for specific information. Students must also receive training in the ethical conduct of research and present a formal seminar to faculty and peers. This presentation is separate from the final exam seminar.

Required Seminar

All students in NRSM must take the Forest Resources Seminar course. This is the only required course for all students. Please see the specific subplan for further course suggestions.

FNRM 8107 - Seminar: Forest Resources (1.0 cr)

Joint- or Dual-degree Coursework: Law, Science & Technology

Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Assessment, Monitoring, and Geospatial Analysis

Addresses measurements and related technology applications and resource analysis. Graduate students in this track may choose to specialize in topics such as: geographic information systems (GIS); remote sensing; geospatial analysis; survey design (including forest inventory and monitoring), measurement, modeling; and biometrics. Studies typically focus on landscape, region, or global levels.

Assessment, Monitoring, and Geospatial Analysis - Suggested Course List

NRSM students in the assessment, monitoring, and geospatial analysis track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- ECON 8201 - Econometric Analysis (2.0 cr)
- ECON 8203 - Econometric Analysis (2.0 cr)
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<tr>
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<td>ECON 8204</td>
<td>Econometric Analysis</td>
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<td>EEB 5068</td>
<td>Plant Physiological Ecology</td>
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<td>EEB 5609</td>
<td>Ecosystem Ecology</td>
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<td>EPSY 5221</td>
<td>Principles of Educational and Psychological Measurement</td>
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<td>EPSY 5244</td>
<td>Survey Design, Sampling, and Implementation</td>
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<td>EPSY 5247</td>
<td>Qualitative Methods in Educational Psychology</td>
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<td>EPSY 5261</td>
<td>Introductory Statistical Methods</td>
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<td>EPSY 5262</td>
<td>Intermediate Statistical Methods</td>
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<td>Statistical Methods in Education I</td>
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<td>EPSY 8262</td>
<td>Statistical Methods in Education II</td>
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<td>EPSY 8266</td>
<td>Statistical Analysis Using Structural Equation Methods</td>
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<td>ESM 5031</td>
<td>Applied Global Positioning Systems for Geographic Information Systems</td>
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<td>EPSY 5071</td>
<td>Ecological Restoration</td>
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<td>EPSY 5101</td>
<td>Conservation of Plant Biodiversity</td>
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<td>ESM 5111</td>
<td>Hydrology and Water Quality Field Methods</td>
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<td>EPSY 5211</td>
<td>Survey, Measurement, and Modeling for Environmental Analysis</td>
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<td>ESM 5242</td>
<td>Methods for Environmental and Natural Resource Policy Analysis</td>
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<td>ESM 5261</td>
<td>Economics and Natural Resources Management</td>
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<td>ESM 5295</td>
<td>GIS in Environmental Science and Management</td>
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<td>ESM 5603</td>
<td>Environmental Life Cycle Analysis</td>
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<td>FNRM 5114</td>
<td>Hydrology and Watershed Management</td>
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<td>FNRM 5131</td>
<td>Geographical Information Systems (GIS) for Natural Resources</td>
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<td>FNRM 5218</td>
<td>Measuring and Modeling Forests</td>
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<td>FNRM 5228</td>
<td>Advanced Topics in Assessment and Modeling of Forests</td>
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<td>FNRM 5262</td>
<td>Remote Sensing and Geospatial Analysis of Natural Resources and Environment</td>
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<td>FNRM 5412</td>
<td>Advanced Remote Sensing and Geospatial Analysis</td>
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<td>FNRM 5471</td>
<td>Forest Planning and Management</td>
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<td>FNRM 8101</td>
<td>Research Problems: Physiological Ecology</td>
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<td>FNRM 8102</td>
<td>Research Problems: Forest-Tree Genetics</td>
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<td>FNRM 8103</td>
<td>Research Problems: Forest Hydrology</td>
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<td>FNRM 8104</td>
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<td>FNRM 8105</td>
<td>Research Problems: Silviculture</td>
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<td>FNRM 8106</td>
<td>Research Problems: Urban Forestry--Biology and Management</td>
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<td>FNRM 8201</td>
<td>Research Problems: Forest Economics</td>
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<td>FNRM 8202</td>
<td>Research Problems: Forest Biometry and Measurements</td>
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<td>FNRM 8203</td>
<td>Research Problems: Forest Recreation</td>
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<td>FNRM 8204</td>
<td>Research Problems: Spatial Data Analysis</td>
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<td>FNRM 8206</td>
<td>Research Problems: Forest Management</td>
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<td>FNRM 8207</td>
<td>Economic Analysis of Natural Resource Projects</td>
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<td>FNRM 8208</td>
<td>Research Problems: Environmental Learning and Leadership</td>
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<td>GEOG 5531</td>
<td>Numerical Spatial Analysis</td>
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<td>GIS Development Practicum</td>
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<td>GIS 5555</td>
<td>Basic Spatial Analysis</td>
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<td>Practical Surveying for GIS</td>
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<td>GIS 5577</td>
<td>Spatial Database Design and Administration</td>
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<td>GIS 5578</td>
<td>GIS Programming</td>
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<td>OLPD 5061</td>
<td>Ethnographic Research Methods</td>
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<td>OLPD 5528</td>
<td>Focus Group Interviewing Research Methods</td>
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<td>PA 5002</td>
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<td>PA 5031</td>
<td>Empirical Analysis I</td>
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<td>PA 5035</td>
<td>Survey Research and Data Collection</td>
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<td>PA 5920</td>
<td>Skills Workshop</td>
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<td>POL 8126</td>
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<td>SOC 8801</td>
<td>Sociological Research Methods</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOC 8811</td>
<td>Advanced Social Statistics</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOIL 5555</td>
<td>Wetland Soils</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5511 - Time Series Analysis (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.

Economics, Policy, Management, and Society
For students interested in focusing on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Graduate students in this track can specialize in areas such as: economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning. Studies might consider choices, impacts, and tradeoffs in protecting, restoring, developing, and allocating natural and environmental resources. The research conducted by students in this track may address a wide range of issues and problems from local to international in scope.

Economics, Policy, Management, and Society - Suggested Course List
NRSM students in the economics, policy, management, and society track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.
Take 0 or more course(s) from the following:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
• APEC 5152 - Applied Macroeconomics: Income and Employment (3.0 cr)
• APEC 5321 - Regional Economic Analysis (3.0 cr)
• APEC 5561 - Economics of Natural Resource and Environmental Policy (3.0 cr)
• APEC 5721 - Economics of Science and Technology Policy (3.0 cr)
• APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
• APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
• APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• APEC 8601 - Natural Resource Economics (3.0 cr)
• APEC 8602 - Economics of the Environment (3.0 cr)
• BIOL 5407 - Ecology (3.0 cr)
• CEGE 5570 - Design for Sustainable Development: Discovery (3.0 - 9.0 cr)
• CEGE 5573 - Design for Sustainable Development: Create II (1.0 - 5.0 cr)
• CI 5537 - Principles of Environmental Education (3.0 cr)
• CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• COMM 5250 - Environmental Communication (3.0 cr)
• COMM 5402 - Advanced Interpersonal Communication (3.0 cr)
• COMM 5441 - Communication in Human Organizations (3.0 cr)
• COMM 8452 - Seminar: Methods of Intercultural/Diversity Facilitation (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• ECON 8105 - Macroeconomic Theory (2.0 cr)
• ECON 8106 - Macroeconomic Theory (2.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5101 - Conservation of Plant Biodiversity (3.0 cr)
• ESPM 5111 - Ecology of Managed Systems (4.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
• ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
• ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
• ESPM 5502 - Regulations and Corporate Environmental Management (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
• ESPM 5811 - Environmental Interpretation (3.0 cr)
• FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5313 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5815 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
• FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
• FNRM 5471 - Forest Planning and Management (3.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 4001 - Biometry (4.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 8494 - Research in Wildlife (1.0 - 4.0 cr)
• GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
• GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
• GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GIS 5571 - ArcGIS I (3.0 cr)
• GIS 5572 - ArcGIS II (3.0 cr)
- LA 5004 - Regional Environmental Landscape Planning (4.0 cr)
- LAW 6062 - Energy Law (3.0 cr)
- MGMT 6033 - Managing the Strategy Process (2.0 cr)
- MGMT 6050 - Management of Innovation and Change (2.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
- OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
- OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5011 - Management of Organizations (3.0 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5035 - Survey Research and Data Collection (1.5 cr)
- PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
- PA 5122 - Law and Public Affairs (3.0 cr)
- PA 5242 - Environmental Planning, Policy, and Decision Making (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5253 - Designing Planning and Participation Processes (3.0 cr)
- PA 5271 - Geographic Information Systems: Applications in Planning and Policy Analysis (3.0 cr)
- PA 5311 - Program Evaluation (3.0 cr)
- PA 5301 - Theories and Policies of Development (3.0 cr)
- PA 5503 - Economics of Development (3.0 cr)
- PA 5721 - Energy and Environmental Policy (3.0 cr)
- PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
- PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
- PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (1.0 - 5.0 cr)
- PA 5920 - Skills Workshop (0.5 - 4.0 cr)
- PA 5890 - Advanced Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
- POL 5315 - State Governments: Laboratories of Democracy (4.0 cr)
- POL 8126 - Qualitative Methods (3.0 cr)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- SCO 8735 - Supply Chain Management (3.0 cr)
- SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
- SOC 8701 - Sociological Theory (4.0 cr)
- SOC 8801 - Sociological Research Methods (4.0 cr)
- SOC 8811 - Advanced Social Statistics (4.0 cr)
- SOIL 5611 - Soil Biology and Fertility (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)
- WRS 5101 - Water Policy (3.0 cr)

Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.

**Forest Hydrology and Watershed Management**

Brings together the integrally related areas of earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Graduate students in this track may specialize in areas such as: forest hydrology, water quality, and watershed management. Research would focus on forest, riparian, and wetland ecosystems.

**Forest Hydrology and Watershed Management - Suggested Course List**

NRSM students in the forest hydrology and watershed management track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 5523 - Ecological Engineering Design (3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 8506 - Stochastic Hydrology (4.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
- CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 4702 - General Hydrogeology (3.0 cr)
- ESCI 4703 - Glacial Geology (4.0 cr)
- ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
- ESPM 4216 - Contaminant Hydrology (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- ESPM 5402 - Biometeorology (3.0 cr)
- ESPM 5555 - Wetland Soils (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)
- ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
- ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

Plan B
Plan B students do not need to complete additional research credits.

Forest Products
For students who wish to specialize in areas such as: wood and fiber as raw materials; deterioration of wood; wood mechanics and structural design; wood moisture interactions and drying; processing and performance of composites; economics of manufacturing systems; technology and processing of solid wood products; marketing, design and production of housing components; and energy-
efficient building construction.

Forest Products - Suggested Course List
NRSM students in the forest products track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
• BBE 5023 - Process Control and Instrumentation (3.0 cr)
• BBE 5031 - Applied Surface and Colloid Science (3.0 cr)
• BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
• BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
• BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
• BBE 5402 - Bio-based Products Engineering Lab I (1.0 cr)
• BBE 5403 - Bio-based Products Engineering Lab II (1.0 cr)
• BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
• BBE 5412 - Biocomposites and Biomass Energy (4.0 cr)
• BBE 5414 - Advanced Residential Building Science (4.0 cr)
• BBE 5416 - Building Testing & Diagnostics (2.0 cr)
• BBE 5608 - Environmental and Industrial Microbiolog (3.0 cr)
• BBE 5713 - Biological Process Engineering (3.0 cr)
• BBE 5733 - Renewable Energy Technologies (3.0 cr)
• BBE 8001 - Seminar I (1.0 cr)
• BBE 8002 - Seminar II (1.0 cr)
• BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
• CHEM 4214 - Polymers (3.0 cr)
• CHEM 4221 - Introduction to Polymer Chemistry (3.0 cr)
• CHEM 5210 - Materials Characterization (4.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• ENTR 6041 - Initiating New Product Design and Business Development (2.0 - 4.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-TREE Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
• PA 5920 - Skills Workshop (0.5 - 4.0 cr)
• POL 8126 - Qualitative Methods (3.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• PUBH 7407 - Analysis of Categorical Data (3.0 cr)
• SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.

Forests: Biology, Ecology, Conservation, and Management
Focuses on forest resources and allows students to choose from specializations in the following areas: forest biology, ecology, ecophysiology; genetics and tree improvement; tree physiology; reproductive biology and forest regeneration; forest growth and vegetation dynamics; timber harvesting, silviculture, and sustainable forest management; landscape ecology, restoration, and management; conservation of biodiversity and wildlife habitat management; forest health; disturbance (including fire) ecology; urban and community forestry; and agroforestry. Research normally focuses on forest and related ecosystems.

Forests: Biology, Ecology, Conservation, and Management - Suggested Course List
NRSM students in the forests: biology, ecology, conservation, and management track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
• BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
• BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• EEB 4609W - Ecosystem Ecology [ENV, WI] (3.0 cr)
• EEB 5068 - Plant Physiological Ecology (3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
• ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5101 - Conservation of Plant Biodiversity (3.0 cr)
• ESPM 5108 - Ecology of Managed Systems (4.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
• ESPM 5555 - Wetland Soils (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5205 - Productivity and Ecology of Forest Soils (3.0 cr)
• FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5554 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry-Biology and Management (1.0 - 5.0 cr)
• FNRM 8107 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
• FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
• FW 8452 - Conservation Biology (3.0 cr)
• GEOG 5426 - Climatic Variations (3.0 cr)
• GEOG 5839 - Introduction to Dendrochronology (3.0 cr)
• GEOG 8260 - Seminar: Physical Geography (2.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• HORT 5071 - Ecological Restoration (4.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
• PA 5920 - Skills Workshop (0.5 - 4.0 cr)
• PA 8201 - Environment and Infrastructure Planning (4.0 cr)
• PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
• PLPA 5480 - Principles of Plant Pathology (3.0 cr)
• POL 8126 - Qualitative Methods (3.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.

Paper Science and Engineering
Specializes in areas such as: the chemistry and biotechnology of lignocellulosic materials; material science of paper and fiber products; paper recycling; energy and manufacturing efficiency in the pulp and paper-making process; novel and environmentally friendly pulping and bleaching, transport processes through porous media, surface and colloid science of papermaking; chemical engineering applications in pulp and paper processes; and statistical process control.

Paper Science and Engineering - Suggested Course List
NRSM students in the paper science and engineering track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
- BBE 5023 - Process Control and Instrumentation (3.0 cr)
- BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
- BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
- BBE 5305 - Pulp and Paper Technology [WI] (3.0 cr)
- BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
- BBE 5402 - Bio-based Products Engineering Lab I (1.0 cr)
- BBE 5403 - Bio-based Products Engineering Lab II (1.0 cr)
- BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
- BBE 5412 - Biocomposites and Biomass Energy (4.0 cr)
- BBE 5608 - Environmental and Industrial Microbiolog (3.0 cr)
- BBE 5713 - Biological Process Engineering (3.0 cr)
- BBE 5733 - Renewable Energy Technologies (3.0 cr)
- BBE 8001 - Seminar I (1.0 cr)
- BBE 8002 - Seminar II (1.0 cr)
- BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
- BBE 8300 - Research Problems (1.0 - 10.0 cr)
- CHEM 5210 - Materials Characterization (4.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
• PA 5920 - Skills Workshop (0.5 - 4.0 cr)
• POL 8126 - Qualitative Methods (3.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• PUBH 7407 - Analysis of Categorical Data (3.0 cr)
• SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.

Recreation Resources, Tourism, and Environmental Education
Focuses on the use and management of natural resources for recreation and tourism. Graduate students in this track may specialize in areas such as recreational land management, resource-based tourism, planning for recreation and tourism, and the human dimensions of natural resource uses. Additionally, students may focus on environmental education and leadership for effective communication with diverse publics about natural resources.

Recreation Resources, Tourism, and Environmental Education - Suggested Course List

NRSM students in the recreation resources, tourism, and environmental education track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 4311 - Tourism Development: Principles, Processes, Policies (3.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- CI 5537 - Principles of Environmental Education (3.0 cr)
- CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8281 - Statistical Methods in Education I (3.0 cr)
- EPSY 8282 - Statistical Methods in Education II (3.0 cr)
- EPSY 8286 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
- ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
- ESPM 5811 - Environmental Interpretation (3.0 cr)
- FNRM 5101 - Park and Protected Area Tourism (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5201 - Introduction to Travel and Tourism (3.0 cr)
- FNRM 5232 - Managing Recreational Lands (4.0 cr)
- FNRM 5259 - Visitor Behavior Analysis (3.0 cr)
- FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
- FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
- FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
- FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
- FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
- FNRM 8106 - Research Problems: Urban Forestry--Biologie and Management (1.0 - 5.0 cr)
- FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
- FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
- FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
- FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
- FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
- FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
- FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
- FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
- FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- LS 5950 - Special Topics (1.0 - 4.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
• OLPD 5502 - Theory and Models of Evaluation (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
• PA 4101 - Nonprofit Management and Governance (3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5011 - Management of Organizations (3.0 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
• PA 5111 - Financing Public and Nonprofit Organizations (3.0 cr)
• PA 5501 - Theories and Policies of Development (3.0 cr)
• PA 5920 - Skills Workshop (0.5 - 4.0 cr)
• POL 8126 - Qualitative Methods (3.0 cr)
• PSY 5202 - Attitudes and Social Behavior (3.0 cr)
• PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• PUBH 7407 - Analysis of Categorical Data (3.0 cr)
• SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
• SOC 8701 - Sociological Theory (4.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.

Wildlife Ecology and Management
For students interested in working with leaders in ecology, physiology, evolution, genetics, statistics, computer science, forestry, natural resource policy, and the social sciences as they relate to wildlife; ecology and management; and conservation biology.

Wildlife Ecology and Management - Suggested Course List
NRSM students in the wildlife ecology and management track should refer to this list when enrolling in courses that are appropriate for their area of study. Plan A students must enroll in 19 coursework credits in addition to their seminar requirement and thesis credits, and Plan B students must enroll in 29 credits in addition to their seminar requirement. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APEC 5321 - Regional Economic Analysis (3.0 cr)
• APEC 5711 - U.S. Agricultural and Environmental Policy (3.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• BIOL 5407 - Ecology (3.0 cr)
• CONS 8001 - Conservation Biology Seminar (1.0 cr)
• CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
• CONS 8201 - How to Excel in Graduate School (2.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• EEB 4129 - Mammalogy (4.0 cr)
• EEB 4134 - Introduction to Ornithology (4.0 cr)
• EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
• EEB 5322 - Evolution and Animal Cognition (3.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• ENT 5910 - Special Problems in Entomology (1.0 - 6.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8251 - Statistical Methods in Education I (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• ESPM 5108 - Ecology of Managed Systems (4.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
• ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
• ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 4001 - Biometry (4.0 cr)
• FW 4101 - Herpetology (4.0 cr)
• FW 4103 - Principles of Wildlife Management (3.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 5051 - Analysis of Populations (4.0 cr)
• FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
• FW 5625 - Wildlife Handling and Immobilization for Research and Management (2.0 cr)
• FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
• FW 8200 - Seminar (1.0 - 4.0 cr)
• FW 8452 - Conservation Biology (3.0 cr)
• FW 8494 - Research in Wildlife (1.0 - 4.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
-PA 5920 - Skills Workshop (0.5 - 4.0 cr)
-PBIO 4321 - Minnesota Flora (3.0 cr)
-POL 8126 - Qualitative Methods (3.0 cr)
-PUBH 6420 - Introduction to SAS Programming (1.0 cr)
-PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
-PUBH 7407 - Analysis of Categorical Data (3.0 cr)
-SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
-SOC 8801 - Sociological Research Methods (4.0 cr)
-SOC 8811 - Advanced Social Statistics (4.0 cr)
-STAT 5021 - Statistical Analysis (4.0 cr)
-STAT 5102 - Theory of Statistics II (4.0 cr)
-STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
-STAT 5302 - Applied Regression Analysis (4.0 cr)
-STAT 5303 - Designing Experiments (4.0 cr)
-STAT 5401 - Applied Multivariate Methods (3.0 cr)
-STAT 5421 - Analysis of Categorical Data (3.0 cr)
-STAT 5601 - Nonparametric Methods (3.0 cr)
-STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
-STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
-STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
-STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
-STAT 8101 - Theory of Statistics 1 (3.0 cr)
-STAT 8102 - Theory of Statistics 2 (3.0 cr)
-WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Degree Plan Options

Plan A
Plan A students are required to complete 10 thesis credits of NR 8777.

-OR-

Plan B
Plan B students do not need to complete additional research credits.
Natural Resources Science and Management Minor

Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 116d Green Hall, 1530 Cleveland Avenue N., St. Paul MN 55108 (612-624-7683; fax 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.


Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students majoring in other programs who wish to declare a minor in Natural Resources Science and Management must file a proposal with the NRSM program office.

The NRSM program does not require specific courses for completion of the minor. Rather, the student should work in consultation with their major advisor(s) and with the NRSM faculty member who will serve on the student's examination committee as the representative of the program minor.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Minor Requirements
The NRSM program does not require specific courses for completion of this minor. The minor requires at least 8 credits of graduate-level courses to be chosen in consultation with the student's major advisor and the NRSM faculty member who will serve on the student's examination committee as the minor program representative.

The proposed coursework will be reviewed by NRSM's Director of Graduate Studies, and must be approved before the student can submit their Graduate Degree Plan.
Doctoral Requirements

The NRSM program does not require specific courses for completion of this minor. The minor requires at least 12 credits of graduate-level courses to be chosen in consultation with the student's major advisor and the NRSM faculty member who will serve on the student's examination committee as the minor program representative.

The proposed coursework will be reviewed by NRSM's Director of Graduate Studies, and must be approved before the student can submit their Graduate Degree Plan.
Twin Cities Campus

Natural Resources Science and Management Ph.D.
Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 116d Green Hall, 1530 Cleveland Avenue N, St. Paul MN 55108 (612-624-7683; fax: 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 59 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Natural Resources Science and Management (NRSM) PhD program emphasize one of the following tracks: 1) forests: biology, ecology, conservation, and management; 2) economics, policy, management, and society; 3) assessment, monitoring, and geospatial analysis; 4) recreation resources, tourism, and environmental education; 5) forest hydrology and watershed management; 6) forest products; 7) paper science and engineering; or 8) wildlife ecology and management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Most admitted students have earned degrees in natural resource-related majors. Applicants with exceptional academic records but no related background are eligible; if admitted, they may complete the prerequisites for advanced courses during the early stages of their graduate program. These prerequisites will vary depending upon the student's chosen track and major advisor.

Applicants will not be admitted unless a member of the program faculty agrees to advise the student ahead of time. This decision depends on admissibility (the applicant's overall credentials), mutual research interests, and the faculty member's ability to take on a new student. Some faculty members will not advise students unless they have funding for the student. Applicants are encouraged to review faculty profiles on the program website and begin making contacts prior to and during the application process.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
35 to 48 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

Plan A: Plan A requires up to null major credits, up to null credits outside the major, and up to null thesis credits. The final exam is oral.

Plan B: Plan B requires up to null major credits and up to null credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The University of Minnesota requires at least 48 credits for a doctoral degree, 24 of which must be thesis credits [NR 8888]. The NRSM graduate program will typically expect to see 40 to 48 course credits. If a student enters the program with a relevant master's degree, relevant credits from the prior degree can be transferred in to apply toward the doctoral degree pending advisor, committee, graduate program, and college approval. Normally, a student who enters the doctoral program with a master's degree will complete 30-40 additional credits in the major program. There are no minor courses required, but students have the option of formally declaring a minor.

Course selection and thesis proposals are developed by each student in consultation with the faculty advisor and are approved by the Natural Resources Science and Management Graduate Studies Committee. Students must also receive training in the ethical conduct of research and present a formal seminar to faculty and peers. This presentation is separate from the final exam seminar.

Required Seminar
All students in NRSM must take the Forest Resources Seminar course. This is the only required course for all students. Please see the specific subplan for further course suggestions.

FNRM 8107 - Seminar: Forest Resources (1.0 cr)

Joint- or Dual-degree Coursework: Law, Science & Technology
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Assessment, Monitoring, and Geospatial Analysis
Addresses measurements and related technology applications and resource analysis. Graduate students in this track may choose to specialize in topics such as: geographic information systems (GIS); remote sensing; geospatial analysis; survey design (including forest inventory and monitoring), measurement, modeling; and biometrics. Studies typically focus on landscape, region, or global levels.

Assessment, Monitoring, and Geospatial Analysis - Suggested Course List
NRSM students in the assessment, monitoring, and geospatial analysis track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:
- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
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<td>Skills Workshop (0.5 - 4.0 cr)</td>
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<td>Designing and Conducting Focus Group Interviews (1.0 cr)</td>
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<td>PUBH 7407</td>
<td>Analysis of Categorical Data (3.0 cr)</td>
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Economics, Policy, Management, and Society

For students interested in focusing on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Graduate students in this track can specialize in areas such as: economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning. Studies might consider choices, impacts, and tradeoffs in protecting, restoring, developing, and allocating natural and environmental resources. The research conducted by students in this track may address a wide range of issues and problems from local to international in scope.

Economics, Policy, Management, and Society - Suggested Course List

NRSM students in the economics, policy, management, and society track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 5151 - Applied Microeconomics: Firm and Household (3.0 cr)
- APEC 5152 - Applied Macroeconomics: Income and Employment (3.0 cr)
- APEC 5321 - Regional Economic Analysis (3.0 cr)
- APEC 6651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
- APEC 5721 - Economics of Science and Technology Policy (3.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
- APEC 8203 - Applied Welfare Economics and Public Policy (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- APEC 8601 - Natural Resource Economics (3.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- BIOL 5407 - Ecology (3.0 cr)
- CEGE 5570 - Design for Sustainable Development: Discovery (3.0 - 9.0 cr)
- CEGE 5573 - Design for Sustainable Development: Create II (1.0 - 5.0 cr)
- CI 5537 - Principles of Environmental Education (3.0 cr)
- CI 5574 - Global and Environmental Education: Content and Practice (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- COMM 5250 - Environmental Communication (3.0 cr)
- COMM 5402 - Advanced Interpersonal Communication (3.0 cr)
- COMM 5441 - Communication in Human Organizations (3.0 cr)
- COMM 8452 - Seminar: Methods of Intercultural/Diversity Facilitation (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
- EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5101 - Conservation of Plant Biodiversity (3.0 cr)
• ESPM 5108 - Ecology of Managed Systems (4.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
• ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
• ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
• ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
• ESPM 5602 - Regulations and Corporate Environmental Management (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
• ESPM 5611 - Environmental Interpretation (3.0 cr)
• FNRM 5101 - Forestry and Protected Area Tourism (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
• FNRM 5431 - Timber Harvesting and Road Planning (2.0 cr)
• FNRM 5471 - Forest Planning and Management (3.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 4001 - Biometry (4.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 8494 - Research in Wildlife (1.0 - 4.0 cr)
• GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
• GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
• GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GIS 5571 - ArcGIS I (3.0 cr)
• GIS 5572 - ArcGIS II (3.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
• LA 5004 - Regional Environmental Landscape Planning (4.0 cr)
• LAW 6062 - Energy Law (3.0 cr)
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<td>0.5 - 4.0 cr</td>
</tr>
<tr>
<td>PA 8790</td>
<td>Advanced Topics in Science, Technology, and Environmental Policy</td>
<td>1.0 - 3.0 cr</td>
</tr>
<tr>
<td>POL 5315</td>
<td>State Governments: Laboratories of Democracy</td>
<td>4.0 cr</td>
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<tr>
<td>POL 8126</td>
<td>Qualitative Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PSY 5202</td>
<td>Attitudes and Social Behavior</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PSY 5960</td>
<td>Topics in Psychology</td>
<td>1.0 - 4.0 cr</td>
</tr>
<tr>
<td>PUBH 7250</td>
<td>Designing and Conducting Focus Group Interviews</td>
<td>1.0 cr</td>
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<tr>
<td>PUBH 7407</td>
<td>Analysis of Categorical Data</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>SCO 8725</td>
<td>Supply Chain Management</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>SOC 5811</td>
<td>Social Statistics for Graduate Students [MATH]</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOC 8701</td>
<td>Sociological Theory</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOC 8801</td>
<td>Sociological Research Methods</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOC 8811</td>
<td>Advanced Social Statistics</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>SOIL 5611</td>
<td>Soil Biology and Fertility</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 5021</td>
<td>Statistical Analysis</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 5201</td>
<td>Sampling Methodology in Finite Populations</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 5302</td>
<td>Applied Regression Analysis</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 5303</td>
<td>Designing Experiments</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>STAT 5401</td>
<td>Applied Multivariate Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 5421</td>
<td>Analysis of Categorical Data</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 5601</td>
<td>Nonparametric Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 8051</td>
<td>Advanced Regression Techniques: linear, nonlinear and nonparametric methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 8052</td>
<td>Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 8053</td>
<td>Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>STAT 8054</td>
<td>Statistical Methods 4: Advanced Statistical Computing</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>WRIT 5051</td>
<td>Graduate Research Writing Practice for Non-native Speakers of English</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>WRS 5101</td>
<td>Water Policy</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>

**Forest Hydrology and Watershed Management**

Brings together the integrally related areas of earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Graduate students in this track may specialize in areas such as: forest hydrology, water quality, and watershed management. Research would focus on forest, riparian, and wetland ecosystems.

**Forest Hydrology and Watershed Management - Suggested Course List**

NRSM students in the forest hydrology and watershed management track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of
NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee. Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 5523 - Ecological Engineering Design (3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 5606 - Stochastic Hydrology (4.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
- CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 4702 - General Hydrogeology (3.0 cr)
- ESCI 4703 - Glacial Geology (4.0 cr)
- ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
- ESPM 4216 - Contaminant Hydrology (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5071 - Ecological Restoration (4.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- ESPM 5402 - Biometeorology (3.0 cr)
- ESPM 5555 - Wetland Soils (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)
- ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
- ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
- ESPM 5811 - Environmental Interpretation (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
- FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
- FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
- FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
- FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
- FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
- FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
Forest Products

For students who wish to specialize in areas such as: wood and fiber as raw materials; deterioration of wood; wood mechanics and structural design; wood moisture interactions and drying; processing and performance of composites; economics of manufacturing systems; technology and processing of solid wood products; marketing, design and production of housing components; and energy-efficient building construction.

Forest Products - Suggested Course List

NRSM students in the forest products track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
- BBE 5023 - Process Control and Instrumentation (3.0 cr)
- BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
- BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
- BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Forests: Biology, Ecology, Conservation, and Management
Focuses on forest resources and allows students to choose from specializations in the following areas: forest biology, ecology, ecophysiology; genetics and tree improvement; tree physiology; reproductive biology and forest regeneration; forest growth and vegetation dynamics; timber harvesting, silviculture, and sustainable forest management; landscape ecology, restoration, and management; conservation of biodiversity and wildlife habitat management; forest health; disturbance (including fire) ecology; urban and community forestry; and agroforestry. Research normally focuses on forest and related ecosystems.

Forests: Biology, Ecology, Conservation, and Management - Suggested Course List
NRSM students in the forests: biology, ecology, conservation, and management track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:
• AGRO 5121 - Applied Experimental Design (4.0 cr)
• APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
• APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
• APECS 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
• BBE 5302 - Biodegradation of Bioproducts (3.0 cr)
• BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
• CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• EEB 4609W - Ecosystem Ecology [ENV, WI] (3.0 cr)
• EEB 5068 - Plant Physiological Ecology (3.0 cr)
• EEB 5609 - Ecosystem Ecology (3.0 cr)
• EEB 8200 - Sustainability Science Distributed Graduate Seminar (3.0 cr)
• EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
• ENT 4251 - Forest and Shade Tree Entomology (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
• EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 8262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• ESPM 5071 - Ecological Restoration (4.0 cr)
• ESPM 5101 - Conservation of Plant Biodiversity (3.0 cr)
• ESPM 5108 - Ecology of Managed Systems (4.0 cr)
• ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
• ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
• ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
• ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)
• ESPM 5555 - Wetland Soils (3.0 cr)
• ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
• ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
• FNRM 5104 - Forest Ecology (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
• FNRM 5203 - Forest Fire and Disturbance Ecology (3.0 cr)
• FNRM 5204 - Landscape Ecology and Management (3.0 cr)
• FNRM 5205 - Productivity and Ecology of Forest Soils (3.0 cr)
• FNRM 5218 - Measuring and Modeling Forests (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5264 - Advanced Forest Management Planning (3.0 cr)
• FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
• FNRM 5413 - Managing Forest Ecosystems: Silviculture Lab (1.0 cr)
• FNRM 5501 - Urban Forest Management: Managing Greenspaces for People (3.0 cr)
• FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
• FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
• FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
• FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
• FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
• FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
• FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
• FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
• FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
• FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
• FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
• FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
• FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
• FW 5603W - Habitats and Regulation of Wildlife [WI] (3.0 cr)
• FW 8051 - Statistical Modeling of Ecological Data using R and WinBugs/JAGS (4.0 cr)
• FW 8452 - Conservation Biology (3.0 cr)
• GEOG 5426 - Climatic Variations (3.0 cr)
• GEOG 5839 - Introduction to Dendrochronology (3.0 cr)
• GEOG 8260 - Seminar: Physical Geography (2.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
• HORT 5071 - Ecological Restoration (4.0 cr)
• OLPD 5061 - Ethnographic Research Methods (3.0 cr)
• OLPD 5528 - Focus Group Interviewing Research Methods (1.0 - 3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)
• PA 5920 - Skills Workshop (0.5 - 4.0 cr)
• PA 8201 - Environment and Infrastructure Planning (4.0 cr)
• PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
• PLPA 5480 - Principles of Plant Pathology (3.0 cr)
• POL 8126 - Qualitative Methods (3.0 cr)
• PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
• PUBH 7407 - Analysis of Categorical Data (3.0 cr)
• SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
• SOC 8881 - Sociological Research Methods (4.0 cr)
• SOIL 5611 - Soil Biology and Fertility (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analytic and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)

Paper Science and Engineering
Specializes in areas such as: the chemistry and biotechnology of lignocellulosic materials; material science of paper and fiber products; paper recycling; energy and manufacturing efficiency in the pulp and paper-making process; novel and environmentally friendly pulping and bleaching, transport processes through porous media, surface and colloid science of papermaking; chemical engineering
applications in pulp and paper processes; and statistical process control.

**Paper Science and Engineering - Suggested Course List**

NRSM students in the paper science and engineering track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee. Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- BBE 5001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
- BBE 5023 - Process Control and Instrumentation (3.0 cr)
- BBE 5301 - Applied Surface and Colloid Science (3.0 cr)
- BBE 5307 - Biodegradation of Bioproducts (3.0 cr)
- BBE 5303 - Introduction to Bio-based Materials Science (3.0 cr)
- BBE 5305 - Pulp and Paper Technology [WI] (3.0 cr)
- BBE 5401 - Bioproducts Separation and Purification Processes (3.0 cr)
- BBE 5402 - Bio-based Products Engineering Lab I (1.0 cr)
- BBE 5403 - Bio-based Products Engineering Lab II (1.0 cr)
- BBE 5404 - Biopolymers and Biocomposites Engineering (3.0 cr)
- BBE 5412 - Biocomposites and Biomass Energy (4.0 cr)
- BBE 5608 - Environmental and Industrial Microbiolog (3.0 cr)
- BBE 5713 - Biological Process Engineering (3.0 cr)
- BBE 5733 - Renewable Energy Technologies (3.0 cr)
- BBE 8001 - Seminar I (1.0 cr)
- BBE 8002 - Seminar II (1.0 cr)
- BBE 8013 - Parameter Estimation in Biosystems and Agricultural Engineering (3.0 cr)
- BBE 8300 - Research Problems (1.0 - 10.0 cr)
- CHEM 5210 - Materials Characterization (4.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5267 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
- FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
- FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
- FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
- FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
- FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
- FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
- FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
- FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
- FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
- FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
- FNRM 8206 - Research Problems: Forest Management (1.0 - 5.0 cr)
- FNRM 8207 - Economic Analysis of Natural Resource Projects (2.0 cr)
- FNRM 8208 - Research Problems: Environmental Learning and Leadership (1.0 - 5.0 cr)
- GIS 5555 - Basic Spatial Analysis (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
Recreation Resources, Tourism, and Environmental Education

Focuses on the use and management of natural resources for recreation and tourism. Graduate students in this track may specialize in areas such recreational land management, resource-based tourism, planning for recreation and tourism, and the human dimensions of natural resource uses. Additionally, students may focus on environmental education and leadership for effective communication with diverse publics about natural resources.

Recreation Resources, Tourism, and Environmental Education - Suggested Course List

NRSM students in the recreation resources, tourism, and environmental education track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 4311 - Tourism Development: Principles, Processes, Policies (3.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- CI 5537 - Principles of Environmental Education (3.0 cr)
- CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5245 - Sustainable Land Use Planning and Policy (3.0 cr)
- ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
For students interested in working with leaders in ecology, physiology, evolution, genetics, statistics, computer science, forestry, natural resource policy, and the social sciences as they relate to wildlife, ecology and management, and conservation biology.

**Wildlife Ecology and Management - Suggested Course List**

NRSM students in the wildlife ecology and management track should refer to this list when enrolling in courses that are appropriate for their area of study. Students must enroll in at least 34 credits in addition to their seminar and thesis credit (24 credits of NR 8888) requirements. Students may elect to take courses outside of this list if advised to do so by their advisor or committee.

Take 0 or more course(s) from the following:

- AGRO 5121 - Applied Experimental Design (4.0 cr)
- APEC 5031 - Methods of Economic Data Analysis (3.0 cr)
- APEC 5032 - Economic Data Analysis for Managerial and Policy Decisions (3.0 cr)
- APEC 5321 - Regional Economic Analysis (3.0 cr)
- APEC 5711 - U.S. Agricultural and Environmental Policy (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- BIOL 5407 - Ecology (3.0 cr)
- CONS 8001 - Conservation Biology Seminar (1.0 cr)
- CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
- CONS 8201 - How to Excel in Graduate School (2.0 cr)
- CI 8149 - Qualitative Research: Coding, Analysis, Interpretation, and Writing (3.0 cr)
- DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
- EEB 4129 - Mammalogy (4.0 cr)
- EEB 4134 - Introduction to Ornithology (4.0 cr)
- EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
- EEB 5322 - Evolution and Animal Cognition (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)
- EEB 8550 - Graduate Research Fellowship Proposal Writing Seminar (1.0 cr)
- ENT 5910 - Special Problems in Entomology (1.0 - 6.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 5251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8525 - Statistical Methods in Education II (3.0 cr)
- ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- ESPM 5211 - Survey, Measurement, and Modeling for Environmental Analysis (3.0 cr)
- ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
- ESPM 5242 - Methods for Environmental and Natural Resource Policy Analysis (3.0 cr)
- ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
- ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
- FNRM 5104 - Forest Ecology (4.0 cr)
- FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
- FNRM 5204 - Landscape Ecology and Management (3.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FNRM 5411 - Managing Forest Ecosystems: Silviculture (3.0 cr)
- FNRM 8101 - Research Problems: Physiological Ecology (1.0 - 5.0 cr)
- FNRM 8102 - Research Problems: Forest-Tree Genetics (1.0 - 5.0 cr)
- FNRM 8103 - Research Problems: Forest Hydrology (1.0 - 5.0 cr)
- FNRM 8104 - Research Problems: Forest Ecology (1.0 - 5.0 cr)
- FNRM 8105 - Research Problems: Silviculture (1.0 - 5.0 cr)
- FNRM 8106 - Research Problems: Urban Forestry--Biology and Management (1.0 - 5.0 cr)
- FNRM 8201 - Research Problems: Forest Economics (1.0 - 5.0 cr)
- FNRM 8202 - Research Problems: Forest Biometry and Measurements (1.0 - 5.0 cr)
- FNRM 8203 - Research Problems: Forest Recreation (1.0 - 5.0 cr)
- FNRM 8204 - Research Problems: Forest Policy (1.0 - 5.0 cr)
- FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
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<tr>
<th>Course Code</th>
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<tr>
<td>FNRM 8206</td>
<td>Research Problems: Forest Management</td>
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<tr>
<td>FNRM 8207</td>
<td>Economic Analysis of Natural Resource Projects</td>
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<td>FNRM 8208</td>
<td>Research Problems: Environmental Learning and Leadership</td>
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<td>FW 4001</td>
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<td>FW 4101</td>
<td>Herpetology</td>
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<td>FW 4103</td>
<td>Principles of Wildlife Management</td>
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<td>FW 5003</td>
<td>Human Dimensions of Biological Conservation</td>
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<td>Analysis of Populations</td>
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<td>FW 5603W</td>
<td>Habitats and Regulation of Wildlife [WI]</td>
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<td>FW 5625</td>
<td>Wildlife Handling and Immobilization for Research and Management</td>
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<td>FW 8051</td>
<td>Statistical Modeling of Ecological Data using R and WinBugs/JAGS</td>
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<td>Seminar</td>
<td>1.0 - 4.0 cr</td>
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<td>FW 8452</td>
<td>Conservation Biology</td>
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<td>FW 8494</td>
<td>Research in Wildlife</td>
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<td>GIS 5555</td>
<td>Basic Spatial Analysis</td>
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<td>GRAD 8101</td>
<td>Teaching in Higher Education</td>
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<tr>
<td>GRAD 8200</td>
<td>Teaching and Learning Topics in Higher Education</td>
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<td>OLPD 5061</td>
<td>Ethnographic Research Methods</td>
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<td>OLPD 5528</td>
<td>Focus Group Interviewing Research Methods</td>
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<td>Introduction to Policy Analysis</td>
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<td>PA 5031</td>
<td>Empirical Analysis I</td>
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<td>PA 5035</td>
<td>Survey Research and Data Collection</td>
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<td>PA 5041</td>
<td>Qualitative Methods for Policy Analysts</td>
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<td>PA 5920</td>
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<td>PBIO 4321</td>
<td>Minnesota Flora</td>
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<td>POL 5128</td>
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<td>PUBH 6420</td>
<td>Introduction to SAS Programming</td>
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<td>PUBH 7250</td>
<td>Designing and Conducting Focus Group Interviews</td>
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<td>SOC 5811</td>
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<td>SOC 8801</td>
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<td>SOC 8811</td>
<td>Advanced Social Statistics</td>
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<td>Statistical Analysis</td>
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<td>Theory of Statistics II</td>
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<td>STAT 5201</td>
<td>Sampling Methodology in Finite Populations</td>
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<td>Applied Regression Analysis</td>
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<td>STAT 5303</td>
<td>Designing Experiments</td>
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<td>STAT 5401</td>
<td>Applied Multivariate Methods</td>
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<td>STAT 5421</td>
<td>Analysis of Categorical Data</td>
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<td>STAT 5601</td>
<td>Nonparametric Methods</td>
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<td>STAT 8051</td>
<td>Advanced Regression Techniques: linear, nonlinear and nonparametric methods</td>
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<td>STAT 8052</td>
<td>Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling</td>
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<td>STAT 8053</td>
<td>Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression</td>
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<td>STAT 8054</td>
<td>Statistical Methods 4: Advanced Statistical Computing</td>
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<td>Theory of Statistics 1</td>
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<tr>
<td>STAT 8102</td>
<td>Theory of Statistics 2</td>
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<td>WRIT 5051</td>
<td>Graduate Research Writing Practice for Non-native Speakers of English</td>
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</table>
Twin Cities Campus
Nutrition M.S.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/graduate-programs/nutrition

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisors and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, MN); and V.A. Medical Center and Park Nicollet Institute (Minneapolis, MN).

Three subspecialty areas are offered in the program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work can be conducted locally or internationally in the laboratory, clinic, or field.

Students are allowed a maximum of 5 years in the program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent.

Other requirements to be completed before admission:
A strong foundation in the biological and physical sciences is required. This background includes college mathematics, the equivalent of one semester of general chemistry, organic chemistry, general biology, biochemistry, physiology, and statistics. For the doctoral program, additional prerequisite courses include calculus and physics. If there is evidence that the applicant has a good background in the sciences, some of the prerequisites can be met after admission. The M.S. program also requires the following nutrition courses, or equivalent, which may be completed after the student's admission to the program: Principles of Nutrition (FSCN 1112), Life Cycle Nutrition (FSCN 3612), and Human Nutrition (FSCN 4612).

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The graduate faculty, including the student's advisor and director of Graduate Studies, specify both the nature and extent of the course and project work necessary to satisfy this requirement.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All students are expected to obtain teaching experience, subject to the policies of the advisor's department or division.

Required Coursework

All students must take the following courses for at least 20 credits:

- **Orientation Course**
  - NUTR 8621 - Presentation Skills (1.0 cr)

- **Core Coursework**
  - NUTR 5625 - Nutritional Biochemistry (3.0 cr)
  - NUTR 5626 - Nutritional Physiology (3.0 cr)
  - NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)

- **Advanced Topics Course**
  - Take at least one course from the following list after completing two semesters in the program:
    - NUTR 8620 - Advances in Nutrition (2.0 cr)
    - or NUTR 8611 - The Role of Nutrition in Cancer Causation and Prevention (2.0 cr)
  - Take at least 2 credits from the following:
    - NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
    - or NUTR 5xxx
    - or NUTR 5xxx

- **Outside Coursework**
  - All students must complete at least 6 credits outside the major, including at least one statistics course and at least one methods course.

- **Statistics Course**
  - Take at least one statistics course from the following list. A different statistics course can be substituted with adviser approval.
    - PUBH 6450 - Biostatistics I (4.0 cr)
    - or PUBH 6451 - Biostatistics II (4.0 cr)
    - or PUBH 6414 - Biostatistical Literacy (3.0 cr)
    - or STAT 5021 - Statistical Analysis (4.0 cr)

- **Research Methods Course**
  - Take one or more courses for at least 2 credits of research methods coursework from this list, or graduate-level methods coursework from another field with advisor approval.
    - ANSC 5091 - Research Proposals: From Ideas to Strategic Plans [WI] (3.0 cr)
    - NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
    - PUBH 6341 - Epidemiologic Methods I (3.0 cr)
    - PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)
    - PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
FSCN 4622 - Nutritional Toxicology, the basic science of diet-related toxicants (3.0 cr)
PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
PUBH 6914 - Community Nutrition Intervention (3.0 cr)

Plan Options

Plan A: Master's Thesis Credits
Plan A students take at least 10 credits of the following:
NUTR 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B: Additional Coursework
Plan B students must take at least 10 credits from the following, or other graduate-level coursework with advisor approval:
NUTR 8695 - Independent Study: Nutrition (1.0 - 10.0 cr)
NUTR 8xxx
NUTR 5xxx

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.
Nutrition Minor

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/graduate-programs/nutrition

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, Minn.); V.A. Medical Center and Park Nicollet Institute (Minneapolis, Minn.).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Coursework
Take the following two courses for the master's minor in Nutrition.
NUTR 5625 - Nutritional Biochemistry (3.0 cr)
NUTR 5626 - Nutritional Physiology (3.0 cr)

Doctoral
Coursework
Take at least 13 credits from the following list of courses. NUTR 8620 and 8611 are available to students after completing two semesters in the minor. Consult with the Nutrition Director of Graduate Studies.
NUTR 5624 - Nutrition and Genetics (2.0 cr)
NUTR 5625 - Nutritional Biochemistry (3.0 cr)
NUTR 5626 - Nutritional Physiology (3.0 cr)
NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)
NUTR 8620 - Advances in Nutrition (2.0 cr)
NUTR 8611 - The Role of Nutrition in Cancer Causation and Prevention (2.0 cr)
Twin Cities Campus
Nutrition Ph.D.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/graduate-programs/nutrition/phd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 52
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, MN.); V.A. Medical Center and Park Nicollet Institute (Minneapolis, MN.).

Three subspecialty areas are offered in the doctoral degree program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work may be conducted locally or internationally in the laboratory, clinic, or field.

Students may spend a maximum of 8 years in the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent, along with demonstrated research ability such as a MS degree or publications.

Other requirements to be completed before admission:
A strong foundation in the biological and physical sciences is required. This background includes college mathematics, the equivalent of one semester of general chemistry, organic chemistry, general biology, biochemistry, physiology, and statistics. For the doctoral program, additional prerequisite courses include calculus and physics. If there is evidence that the applicant has a good background in the sciences, some of the prerequisites can be met after admission. The PhD program also requires the following nutrition courses, or equivalents, which may be completed after admission to the program: Principles of Nutrition (FSCN 1112), Life Cycle Nutrition (FSCN 3612), and Human Nutrition (FSCN 4612).

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

IELTS
- Total Score: 6.5
MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

PhD students are expected to obtain teaching experience through assisting with course instruction three times. Teaching experience is subject to the policies of the advisor's department or division.

Thesis work may be conducted in the laboratory, clinic, or field, either locally or internationally.

Required Coursework
Orientation Course
NUTR 8621 - Presentation Skills (1.0 cr)

Core Courses
NUTR 5625 - Nutritional Biochemistry (3.0 cr)
NUTR 5626 - Nutritional Physiology (3.0 cr)
NUTR 5622 - Vitamin and Mineral Biochemistry (3.0 cr)

Advanced Topics Courses
Take at least two courses from the following list after completing two semesters in the program:
NUTR 8620 - Advances in Nutrition (2.0 cr)
NUTR 8611 - The Role of Nutrition in Cancer Causation and Prevention (2.0 cr)

Remainning Nutrition Coursework
Take at least 2 credits from the following:
NUTR 5627 - Nutritional and Food Toxicology (3.0 cr)
or NUTR 8xxx

Outside Coursework
PhD students must complete at least 12 credits outside the major, including at least one statistics course and at least one methods course.

Statistics Course
Take at least one statistics course from the following list. A different statistics course can be substituted with advisor approval.
PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or PUBH 6414 - Biostatistical Literacy (3.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)

Research Methods Course
Take one or more courses totaling at least two credits of research methods coursework from this list, or graduate-level methods coursework from another field with advisor approval.
ANSC 5091 - Research Proposals: From Ideas to Strategic Plans [WI] (3.0 cr)
NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 6806 - Principles of Public Health Research (2.0 cr)
FSCN 4622 - Nutritional Toxicology, the basic science of diet-related toxicants (3.0 cr)
PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
PUBH 6914 - Community Nutrition Intervention (3.0 cr)

**Doctoral Thesis Credits**
Take at least 24 credits of the following:

**NUTR 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Plant Pathology M.S.
Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with many other fields including food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally, as well as nationally and internationally. The course of study varies with the requirements for the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Master's degree applicants must have a sound college background in the basic biological and physical sciences and mathematics.

Other requirements to be completed before admission:
Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, students must correct them during the first year of the graduate program. These courses cannot be counted as part of the degree program. All students accepted into the department with a BS degree are admitted into the MS program. After a minimum of two semesters, students who qualify may elect to change their degree status to the PhD program. Criteria for the change include scholastic standing, potential for success in completing a PhD, and writing competency.

Special Application Requirements:
GRE scores are required for all students and TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 10 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 148
  - General Test - Analytical Writing: 4.5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](catalog website). section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 20 major credits and 10 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B option requires one to three projects, determined and approved by the advisor and director of graduate studies, totaling approximately 120 hours of work.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**All students:**

- Students must enroll in a credit or non-credit teaching methods seminar or workshop, chosen in consultation with the advisor and director of graduate studies.
- Regular attendance at weekly plant pathology seminars is expected.
- Internships are encouraged as part of the graduate experience. Financial support for international or domestic internships is available on a competitive basis.

**Students pursuing the non-molecular plant pathology option:**

Take PLPA 5480 (3 credits), if an introductory plant pathology course has not previously been taken.

**Required Coursework**

All students take the following courses. Take PLPA 8090 (S-N grade basis) for 2 credits if completing a one-semester teaching experience, or 1 credit for a half-semester experience. Consult with the advisor and director of graduate studies regarding the additional teaching methods seminar/workshop requirement.

**PLPA 8123** - Research Ethics in Plant and Environmental Sciences (0.5 cr)
**PLPA 8200** - Seminar (1.0 cr)
**PLPA 8090** - Advanced Procedures and Research in Plant Pathology (1.0 - 8.0 cr)
**PLPA 5480** - Principles of Plant Pathology (3.0 cr)

**Outside Coursework**

Take at least 6 credits (Plan A) or 10 credits (Plan B) outside the major. Select courses in consultation with the advisor, director of graduate studies, and advisory committee. Suggested courses include the following:

**AGRO 8241** - Chromosomal and Molecular Genetics of Plant Improvement (3.0 cr)
**EEB 5221** - Molecular Evolution (3.0 cr)
**GCD 5036** - Molecular Cell Biology (3.0 cr)

**Thesis Credits**

All students completing the Molecular Plant Pathology option, and students completing the non-molecular plant pathology Plan A option, take at least 10 master's thesis credits.

**PLPA 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)

**Non-Molecular and Molecular Plant Pathology Options**
Non-Molecular Plant Pathology Option

**Required Coursework**
In addition to courses required of all MS students, students pursuing the non-molecular plant pathology option must complete the following courses:

- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (2.0 cr)

**Electives**
Take elective credits from the following list, chosen in consultation with the advisor, director of graduate studies, and advisory committee, to meet the 14-credit (Plan A) or 20-credit (Plan B) minimum requirement for the major.

- PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 - 2.0 cr)
- PLPA 5301 - Plant Genomics (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)

-OR-

Molecular Plant Pathology Option

**Required Coursework**
In addition to courses required of all MS students, students pursuing the molecular plant pathology option must complete the following courses:

- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 - 2.0 cr)

**Electives**
Take elective credits from the following list, chosen in consultation with the advisor, director of graduate studies, and advisory committee, to meet the 14-credit (Plan A) minimum requirement for the major.

- PLPA 5003 - Diseases of Forest and Shade Trees (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5660 - Plant Disease Resistance and Applications (3.0 cr)
- PLPA 5202 - Field Plant Pathology (2.0 cr)
- PLPA 5203 - Introduction to Fungal Biology (3.0 cr)
- PLPA 5301 - Plant Genomics (3.0 cr)
- PLPA 8105 - Plant Virology (2.0 cr)
- PLPA 8104 - Plant Bacteriology (2.0 cr)
Twin Cities Campus

Plant Pathology Minor

Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral

Doctoral
Take 12 or more credit(s) from the following:
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 - 2.0 cr)
- PLPA 5301 - Plant Genomics (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (2.0 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)

Masters

Master's Minor
Take 6 or more credit(s) from the following:

- PLPA 5103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 - 2.0 cr)
- PLPA 5301 - Plant Genomics (3.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (2.0 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
Twin Cities Campus
Plant Pathology Ph.D.
Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpath@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 53
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements of the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a sound college background in the basic biological and physical sciences and mathematics.

PhD applicants must satisfy all the prerequisites for the master's degree program in plant pathology or have a master's degree in plant pathology or in a field of natural science.

Other requirements to be completed before admission:
Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, they must be corrected during the first year of the graduate program. Applicants should note that these courses cannot be counted as part of the degree program. All students accepted into the department with only a BS degree are admitted into the MS degree program. After a minimum of two semesters, students who qualify may elect to change their degree status to the PhD program. Criteria for the change include scholastic standing, potential for success in completing a PhD, and writing competency.

Special Application Requirements:
GRE scores are required for all students and TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 10 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153

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Information current as of December 20, 2016
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

The preferred English language test is **Test of English as Foreign Language**

Key to the abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

17 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must enroll in a supervised teaching or extension teaching experience, chosen in consultation with the advisor and director of graduate studies.

Degree plans are determined by the advisory committee, with approval of the director of graduate studies.

Regular attendance at weekly plant pathology seminars is expected.

Internships are encouraged as part of the graduate experience. Financial support for international or domestic internships is available on a competitive basis.

**Required Coursework**

All students take the following courses, if not completed previously. Take PLPA 8200 twice for a total of 2 credits; PLPA 8090 for 2 credits to fulfill the one-semester teaching experience requirement; and take GRAD 8101 or Grad 8102 concurrently with or after completing PLPA 8090.

- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- PLPA 8200 - Seminar (1.0 cr)
- PLPA 8090 - Advanced Procedures and Research in Plant Pathology (1.0 - 8.0 cr)
- GRAD 8102 - Practicum for Future Faculty (3.0 cr)
  or GRAD 8101 - Teaching in Higher Education (3.0 cr)

**Electives**

Take at least 12 credits, in consultation with the advisor, to complete the outside credit requirement.

**Thesis Credits**

Take at least 24 doctoral thesis credits.

- PLPA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Non-Molecular and Molecular Plant Pathology Options**

**Molecular Plant Pathology Option**

In addition to courses required of all doctoral students, students pursuing the molecular plant pathology option must complete the
following courses to meet the 17.5-credit minimum for the major. Take PLPA 5300 twice for a total of 2 credits.
PLPA 5301 - Plant Genomics (3.0 cr)
PLPA 5300 - Current Topics in Molecular Plant Pathology (1.0 - 2.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
  or PLPA 8105 - Plant Bacteriology (2.0 cr)

-OR-

Non-Molecular Plant Pathology Option
In addition to courses required of all doctoral students, students pursuing the non-molecular plant pathology option must complete the following courses to meet the 17.5-credit minimum for the major:
PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
PLPA 8104 - Plant Virology (2.0 cr)
PLPA 8105 - Plant Bacteriology (2.0 cr)
Twin Cities Campus

Risk Analysis for Introduced Species and Genotypes Minor

Fisheries, Wildlife, and Conservation Biology

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, Room 219 Hodson Hall, 6125B, 1980 Folwell Ave., St. Paul, MN 55108
Email: isgigert@umn.edu
Website: http://isg-igert.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in risk analysis for introduced species and genotypes is available to master's (M.A. and M.S.) and doctoral students. The minor provides an interdisciplinary curriculum that addresses all phases of risk analysis pertaining to the introduction of exotic species and novel genotypes. The curriculum is based on collaborative learning and includes a survey course, discussions, a problem solving practicum, and a cooperative learning practicum. The minor complements major programs in applied economics; applied plant sciences; conservation biology; ecology, evolution, and behavior; entomology; natural resources science and management; plant biological sciences; and water resources science.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
ISG Core Courses
The master's minor requires 6 graduate credits from the core curriculum; ISG 8001 must be taken two times for 1 credit each time.
ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
ISG 5020 - Risk Analysis Modeling for Introduced Species and Genotypes (1.0 cr)
ISG 8001 - Discussions in Introduced Species and Genotypes (1.0 cr)

Doctoral
ISG Doctoral Minor
In addition to the 10-credit core listed, a 3-credit decision analysis or quantitative modeling course from another program is required. ISG 8001 must be taken twice for one credit.
ISG 5010 - Risk Analysis for Introduced Species and Genotypes (3.0 cr)
ISG 5020 - Risk Analysis Modeling for Introduced Species and Genotypes (1.0 cr)
ISG 8001 - Discussions in Introduced Species and Genotypes (1.0 cr)
ISG 8021 - Problem Solving Practicum in Risk Analysis (3.0 cr)
ISG 8031 - Cooperative Learning Practicum (1.0 cr)
Twin Cities Campus
Sustainable Agriculture Systems Minor
Agronomy & Plant Genetics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Sustainable Agriculture Systems Minor, 411 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108 (612-625-3754; fax:612-625-1268)
Email: sheaf001@umn.edu
Website: http://www.misa.umn.edu/StudentPrograms/GraduateMinor/index.htm

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in sustainable agriculture systems offers master's (M.A. and M.S.) and doctoral students an interdisciplinary curriculum that considers the biological, sociological, and economic aspects of agriculture. The minor emphasizes a holistic perspective to designing farming and food systems and solving problems in agriculture. The importance of yield and profitability are balanced by considerations of the environment and the health and social well-being of producers, consumers, and communities. The minor complements major programs in ecology, conservation biology, forestry, sociology, geography, political science, and public affairs, as well as majors in the College of Food, Agricultural and Natural Resource Sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission is contingent upon prior admission to a master's or doctoral degree-granting program.

Special Application Requirements:
Contact the director of graduate studies in sustainable agriculture systems for an Intent to Enroll Form. Students are admitted each semester.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 graduate credits from the core curriculum; the doctoral minor requires 12 graduate credits. All students must take SAGR 8010 and 8020. The other core course is AGRO 5321 - Ecology of Agricultural Systems (cross listed with ENT 5321). A unique component of the minor is an on-site internship with growers, grassroots organizations, or public agencies working in sustainable agriculture.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.
Masters
The minor in sustainable agriculture systems offers master's (M.A. and M.S.) and doctoral students an interdisciplinary curriculum that considers the biological, sociological, and economic aspects of agriculture. The minor emphasizes a holistic perspective to designing farming and food systems and solving problems in agriculture. The importance of yield and profitability are balanced by considerations of the environment and the health and social well-being of producers, consumers, and communities. The minor complements major programs in ecology, conservation biology, forestry, sociology, geography, political science, and public affairs, as well as majors in the College of Food, Agricultural and Natural Resource Sciences.

The master's minor requires 6 graduate credits from the core curriculum; students must take SAGR 8010 and 8020, and AGRO 5321 (cross listed with ENT 5321). A unique component of the minor is an on-site internship with growers, grassroots organizations, or public agencies working in sustainable agriculture.

SAGR Master's Minor
6 graduate-level credits required. AGRO 5321 is cross listed with ENT 5321.

SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
SAGR 8020 - Field Experience in Sustainable Agriculture (1.0 - 4.0 cr)
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)

Doctoral
The minor in sustainable agriculture systems offers master's (M.A. and M.S.) and doctoral students an interdisciplinary curriculum that considers the biological, sociological, and economic aspects of agriculture. The minor emphasizes a holistic perspective to designing farming and food systems and solving problems in agriculture. The importance of yield and profitability are balanced by considerations of the environment and the health and social well-being of producers, consumers, and communities. The minor complements major programs in ecology, conservation biology, forestry, sociology, geography, political science, and public affairs, as well as majors in the College of Food, Agricultural and Natural Resource Sciences.

The doctoral minor requires 12 graduate level course credits. All students must take SAGR 8010 and 8020, and AGRO 5321 (cross listed with ENT 5321). An additional 6 graduate level course credits will be decided in consultation with the DGS. A unique component of the minor is an on-site internship with growers, grassroots organizations, or public agencies working in sustainable agriculture.

SAGR Doctoral Minor
12 graduate-level credits required. AGRO 5321 is cross listed with ENT 5321. Six additional graduate-level course credits will be decided in consultation with the DGS.

SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
SAGR 8020 - Field Experience in Sustainable Agriculture (1.0 - 4.0 cr)
AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
Twin Cities Campus
American Studies M.A.
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street SE, Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The master's degree in American studies is not designed as a terminal degree; therefore, students are not admitted directly to the MA program. Students may apply for graduate study at the PhD level only. A PhD student may elect to pursue the MA. All PhD coursework is applicable. Current graduate students seeking to obtain the MA should review the information in the current graduate handbook on the website at http://americanstudies.umn.edu/grad/handbook.html.

American studies is an interdisciplinary, interdepartmental program. The American studies graduate faculty consists of American studies core faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate major in a field related to American studies or other preparation acceptable to the Admissions Committee for American studies is required.

Special Application Requirements:
American studies admits for graduate study at the PhD level only. PhD students may obtain a MA during the course of their studies; however no students are admitted for a terminal MA. Students entering the PhD program must hold at least a bachelor's level degree from a recognized institution of higher education. The deadline for application to the Department of American Studies is December 1 of the year prior to intended entry. Refer to the department website for application procedures and additional information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 21 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 30 major credits and 0 credits outside the major. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language

A minimum GPA of 3.50 is required for students to remain in good standing.

The master's degree is not designed as a terminal degree; therefore, students are not admitted directly to the MA program. A PhD student may elect to pursue the MA. All PhD coursework is applicable. Current graduate students seeking to obtain the MA should review the information in the current Graduate Handbook on the program website at http://americanstudies.umn.edu/grad/handbook.html.

All courses are selected in consultation with the student's advisor and the director of Graduate Studies.

"Major" courses are defined as any courses that American Studies deems appropriate to the student's area of study, due to the interdisciplinary nature of the program.

**Requirements**

The following courses are required for all students:

- AMST 8201 - Historical Foundations of American Studies (3.0 cr)
- AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)

**Core Areas**

**Research Seminars**

6 credits (2 courses) worth of research seminars offered by the Department of American Studies or another department related to research area. Requires director of Graduate Studies approval.

**Comparative Culture**

3 credits (1 course) in a course on comparative cultures, covering international or non-U.S. subjects offered by the Department of American Studies or another department related to research area.

**Plans A & B**

Students are required to specify a field of concentration. The courses required to fulfill these concentrations are to be selected between the student and the advisor, and approved by the director of Graduate Studies.

**Plan A**

**Field of Concentration**

**Concentration Area Courses**

3 credits (one course) in students field of concentration offered by the Department of American Studies or another department related to research area.

**Cultural Pluralism Course**

3 credits (one course) in student's field of concentration, focused on cultural pluralism within the United States offered by the Department of American Studies or another department related to research area.

**Thesis Credits**

Take exactly 10 credit(s) from the following:

- AMST 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

- OR -

**Plan B**

This plan requires 3 papers in lieu of an MA thesis.

**Concentration Area Courses**

12 credits (4 courses) in student's field of concentration offered by the Department of American Studies or another department related to research area.

**Cultural Pluralism Course**

3 credits (one course) in students field of concentration, focused on cultural pluralism within the United States offered by the Department of American Studies or another department related to research area.


**Twin Cities Campus**

**American Studies Minor**

*American Studies*

*College of Liberal Arts*

Link to a list of faculty for this program.

**Contact Information:**
Department of American Studies, 104 Scott Hall, 72 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: [http://americanstudies.umn.edu](http://americanstudies.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

American studies is an interdisciplinary, interdepartmental program. The American studies graduate faculty consists of American studies core faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For the master's and doctoral minors, students are expected to choose courses consistent with or complementary to their major.

**Program Sub-plans**
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters Requirements**
AMST 8201 - Historical Foundations of American Studies (3.0 cr)
or AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)

**American Studies Electives**
Take 6 or more credit(s) from the following:
- AMST 5xxx
- AMST 8xxx

**Doctoral Requirements**
AMST 8201 - Historical Foundations of American Studies (3.0 cr)
or AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
American Studies Electives
Take 9 or more credit(s) from the following:
• AMST 5xxx
• AMST 8xxx
Twin Cities Campus
American Studies Ph.D.
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street SE, Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858).
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 63 to 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

American studies is an interdisciplinary, interdepartmental program. The American studies graduate faculty consists of American studies core faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate major in a field related to American studies or other preparation acceptable to the Admissions Committee for American studies is required.

Special Application Requirements:
American studies admits students for graduate study at the PhD level only. (PhD students may obtain a MA during the course of their studies, but students are not admitted for a terminal MA.) Students entering the PhD program must hold at least a bachelor's level degree from a recognized institution of higher education. The deadline for application to the Department of American Studies is December 1 of the year prior to intended entry. Refer to the program website for application procedures and additional information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
39 to 45 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

Requirements
The following courses are required for all students:
- AMST 8201 - Historical Foundations of American Studies (3.0 cr)
- AMST 8202 - Theoretical Foundations and Current Practice in American Studies (3.0 cr)
- AMST 8401 - Practicum in American Studies (3.0 cr)
- AMST 8801 - Dissertation Seminar (3.0 cr)

Core Areas
Of the 3 core areas below, at least 3 credits must focus on American cultural diversity. Coursework is chosen in consultation with the advisor and director of Graduate Studies.

1. Research Seminars
   A minimum of 3 and maximum of 9 credits (3 courses) worth of research seminars offered by the department of American Studies or another department related to research area. Requires DGS approval.

   One of these seminars requires original research.

2. Comparative Culture
   3 credits (1 course) in a course on comparative cultures, covering international or non-U.S. subjects.

3. Electives
   21 credits (7 courses) of American studies courses or courses related to an area of study chosen in consultation with your advisor.

Outside Coursework
Take 12 credits in a declared minor field or supporting program in integration with the research focus.
Twin Cities Campus
Anthropology M.A.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Ave S, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095).
Email: anthgrad@umn.edu
Website: http://anthropology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The anthropology MA degree is offered with a focus on cultural heritage management (CHM). It is a two-year program, which can be completed with or without a thesis, designed for students who wish to pursue a career in heritage management archaeology in non-academic settings. Our aim is to train students in anthropological perspectives on the issues of heritage management, broadly defining heritage as materials and practices remaining from the past. This perspective ranges from the abstract understanding of how heritage is construed, valued and used, to the more concrete methods for archaeological analysis, site protection (especially in the legal framework), outreach and education in concert with stakeholder communities and the wider public.

This program draws additional strength from a wide variety of heritage-related departments and programs that students may work with, including Architecture, Public History, Museum Studies, Landscape Architecture, Geography, the Tourism Center, the River Life program, and many more. Both on-campus and in the greater Twin Cities area, there are a tremendous number of museums, archives, history centers and sites, heritage preservation non-profits and agencies where students may gain practical experiences and contacts in the professional worlds.

Note: The Department of Anthropology admits students for the master's degree only in cultural heritage management, although in some cases students admitted to the PhD program complete a master's degree as they work toward the PhD.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
For the cultural heritage management focus of the anthropology MA program, students with a background in anthropology or archaeology are preferred because of the two-year nature of the program and the demanding final oral examination. Likewise, students with field and/or laboratory experience are preferred because of the nature of the competencies that structure the program. Nonetheless, all applicants who wish to pursue the cultural heritage management focus are considered, and students with little or no background in anthropology or archaeology are accepted depending on interest and training. These students may be required to make up specified deficiencies during their program.

Special Application Requirements:
Three letters of recommendation and scores from the General test of the GRE should be sent to the director of graduate studies. Students are admitted for fall semester only; the deadline for all materials is February 15.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 84

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is a demonstration of familiarity with the tools of research or scholarship in the graduate student's area of study, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project, though advisors may require as many as three such projects. The norm in anthropology is two to three projects. Master's-level projects are often the result of work carried out in a seminar or course (e.g., a paper), and are generally polished in a directed reading or research course. Plan B project(s) should involve a combined total of approximately 120 hours of work. With the approval of their advisors, graduate students have considerable flexibility in defining the nature of their Plan B project(s).

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Concentrations

Sociocultural Anthropology
Required Core Courses
  ANTH 8001 - Ethnography, Theory, History (3.0 cr)
  ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
  ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)

Major Electives
Take 5 or more credit(s) from the following:
• ANTH 5xxx
• ANTH 8xxx
  • or other 5xxx or 8xxx level that is approved by advisor and director of Graduate Studies.

-OR-

Biological Anthropology
Required Core Courses
  ANTH 8111 - Evolutionary Morphology (3.0 cr)
  ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)
  ANTH 8213 - Ecological Anthropology (3.0 cr)

Major Electives
Take 5 or more credit(s) from the following:
• ANTH 5xxx
• ANTH 8xxx
  • or other 5xxx or 8xxx level that is approved by advisor and director of Graduate Studies.

-OR-

Archaeology
Required Core Courses
  ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)
ANTH 8230 - Anthropological Research Design (3.0 cr)

Methods Course
Take 3 or more credit(s) from the following:
• ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
• ANTH 5444 - Archaeological Ceramics (4.0 cr)
• ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)
• ANTH 4101 - Archival Analysis for Anthropologists (3.0 cr)
• ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)

Major Electives
Take 2 or more credit(s) from the following:
• ANTH 5xxx
• ANTH 8xxx
• or other 5xxx or 8xxx level that is approved by advisor and director of Graduate Studies.

-OR-

Cultural Heritage Management

Required Core Courses
• ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)

Additional Required Course
Take 3 or more credit(s) from the following:
• ANTH 5448 - Applied Heritage Management (3.0 cr)
• MST 5011 - Museum History and Philosophy (3.0 cr)
• ANTH 5601 - Archaeology and Native Americans [DSJ] (3.0 cr)

Major Electives
Take 8 or more credit(s) from the following:
• ANTH 5xxx
• ANTH 8xxx
• or other 5xxx or 8xxx level that is approved by advisor and director of Graduate Studies.
Twin Cities Campus
Anthropology Minor
Anthropology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: anthgrad@umn.edu
Website: http://anthropology.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor program in anthropology is individually designed by each student in consultation with a faculty advisor at both the master's and Ph.D. level. Consult the director of graduate studies about selecting an advisor.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's and doctoral minors are individually designed by the student and a faculty advisor. Consult with the anthropology director of graduate studies about selecting an advisor, and obtaining approval for course choices.
Students pursuing the doctoral minor must complete at least one 8xxx-level course.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required
Take 6 or more credit(s) from the following:
• ANTH 5xxx
• ANTH 8xxx

Doctoral
Required
At least one course must be at the 8xxx-level.
Take 12 or more credit(s) from the following:
• ANTH 5xxx
• ANTH 8xxx
Twin Cities Campus
Anthropology Ph.D.
Anthropology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Ave S, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: anthgrad@umn.edu
Website: http://anthropology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60 to 61
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Anthropology offers graduate education in sociocultural and linguistic anthropology, archaeology, and biological anthropology. With the exception of the master’s degree with an emphasis on cultural heritage management, the program admits students only for the PhD, although some students do earn a master’s degree as part of their PhD program.

Major areas of faculty research and graduate student training in sociocultural and linguistic anthropology include colonial and post-colonial studies, cultures of capitalism, cultural studies of science, the anthropology of death and dying, analysis of discourse and social interaction, economic anthropology, ethnographies of the state, gender and sexuality, globalization, human and nonhuman relations, language politics, medical anthropology, philosophical anthropology, semiotic anthropology, temporality and futurity, and urban anthropology, among other specialties. Regional specializations include Europe, the Pacific, the Middle East, North America, Russia, Southern Africa, East Asia, and South Asia.

The program in biological anthropology offers training and research opportunities in two main areas: paleoanthropology and behavioral biology. The paleoanthropology specialty combines biological anthropology and Paleolithic archaeology in the reconstruction of the evolution and behavior of primates, including hominins, through the application of evolutionary theory to the analysis of skeletal morphology, faunal remains, site taphonomy, and lithic technology. The behavioral ecology specialty involves the study of the behavior and ecology of living primate species, including humans, through field studies and the analysis of long-term data. Regional specializations include Africa, Southwest Asia, Central Asia, and Europe.

The program in archaeology offers training and research opportunities in the use of anthropological theories and interpretive strategies in the reconstruction of historic and prehistoric pasts based on material culture, the application of faunal and lithic analysis to questions in paleoecology and evolutionary theory, and the application of archaeological science to the reconstruction of site formation. Regional specializations include Europe, Southwest Asia, Central Asia, and North America.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor of arts degree or equivalent is required for admission.

Other requirements to be completed before admission:
Graduate students who enter the PhD program with an MA degree in Anthropology, or a closely related field from another institution, will generally enter the program at the second-year level. Should second-year requirements (e.g., the research paper, preparation for the bibliography) prove overly challenging for the graduate student, the student will, in most cases, be required to continue their second year activities into their third year. In addition, they may be asked to take courses in areas of perceived weakness.

Special Application Requirements:
Three letters of recommendation and scores from the General test of the GRE should be sent to the director of graduate studies. Admission is for fall semester only; the deadline for all materials is December 1.
Applicants must submit their test score(s) from the following:

- **GRE**

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 84

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

24 to 25 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

During the first year, students are required to take at least one graduate-level (8xxx) seminar in the PhD program each semester. Students should consult the Graduate Student Handbook for special requirements for sociocultural anthropology, linguistic anthropology, archaeology, and biological anthropology. Language requirements depend upon student's special area of research.

**Concentration Areas**

**Sociocultural Anthropology**

**Required Major Core Courses**

Take 9 or more credit(s) from the following:

- **ANTH 8001** - Ethnography, Theory, History (3.0 cr)
- **ANTH 8002** - Ethnography: Contemporary Theory and Practice (3.0 cr)
- **ANTH 8203** - Research Methods in Social and Cultural Anthropology (3.0 cr)

**Major Elective Courses**

Take 15 or more credit(s) from the following:

- **ANTH 5xxx**
- **ANTH 8xxx**
- or other 5xxx or 8xxx level that is approved by advisor and director of Graduate Studies

**Outside the Major in a Supporting Program**

Take 12 credits outside the major in a graduate minor or supporting program.

**Thesis Credits**

Take 24 or more credit(s) from the following:

- **ANTH 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)

-OR-

**Biological Anthropology**

**Required Major Core Courses**

Take 9 or more credit(s) from the following:

- **ANTH 8111** - Evolutionary Morphology (3.0 cr)
- **ANTH 8112** - Reconstructing Hominin Behavior (3.0 cr)
• **ANTH 8213 - Ecological Anthropology (3.0 cr)**

**Major Elective Courses**
- Take 15 or more credit(s) from the following:
  - ANTH 5xxx
  - ANTH 8xxx
  - or other 5xxx or 8xxx level that is approved by advisor and director of Graduate Studies

**Outside the Major in a Supporting Program**
- Take 12 credits outside the major in a graduate minor or supporting program.

**Thesis Credits**
- Take 24 or more credit(s) from the following:
  - **ANTH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**

  - OR-

**Archaeology**

**Required Major Core Courses**
- Take 9 or more credit(s) from the following:
  - **ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)**
  - **ANTH 8230 - Anthropological Research Design (3.0 cr)**
  - **ANTH 8009 - Prehistoric Pathways to World Civilizations (3.0 cr)**

**Required Methods Course**
- **ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)**
- or **ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)**
- or **ANTH 5444 - Archaeological Ceramics (4.0 cr)**
- or **ANTH 4101 - Archival Analysis for Anthropologists (3.0 cr)**
- or **ANTH 5403 - Quantitative Methods in Biological Anthropology (4.0 cr)**

**Major Electives Courses**
- Take 12 or more credit(s) from the following:
  - **ANTH 5xxx
  - **ANTH 8xxx
  - or other 5xxx/8xxx level courses approved by advisor**

**Outside the Major in a Supporting Program**
- Take 12 credits outside the major in a graduate minor or supporting program.

**Thesis Credits**
- Take 24 or more credit(s) from the following:
  - **ANTH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**
Twin Cities Campus
Art History M.A.
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, University of Minnesota, 338 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: http://www.arthist.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of specialization in the art history master's degree program include: North American, ancient Mediterranean, ancient Western Asia, early modern, East Asian, Islamic, medieval, modern, contemporary, film/photography, and South Asian. The master's is the first stage of the linked MA/PhD graduate program in Art History. The department does not offer a terminal master's degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For the MA program, a bachelor's degree is required, preferably in art history or a closely related field. Ability and scholarly promise must be demonstrated by a past record of academic excellence.

Special Application Requirements:
For the M.A. program, results from the GRE General Test, at least one substantial research paper preferably in art history, and three letters of recommendation from persons well acquainted with the applicant's research and writing skills are required. In addition, M.A. applicants must provide a detailed statement describing previous experience and academic training as related to the projected course of study and academic goals.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 30 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: The Plan B capstone project requires two Plan B papers demonstrating the student's mastery of the essential skills of scholarship. One paper is written on a subject in the area of the student's primary concentration. This paper is supervised by the student's academic adviser. The second paper is written on a subject in the area of the student's secondary concentration and is supervised by someone other than the academic adviser. Term papers or seminar reports may serve as the basis for the Plan B papers, or the topic may be the result of independent study. The student and the project supervisor should decide upon the length for the chosen topic. The projects are evaluated and approved by two art history graduate faculty, one of whom is the project supervisor. Both are required to sign the title page of the paper. Upon completion of the Plan B papers, they should be submitted to the Graduate Studies secretary.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Reading proficiency in a second language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Art History Department Courses

Within this the following concentrations and electives, students must fulfill the following distribution requirements in courses taken in the Art History department:

1) Global Perspectives Requirement (1 course)
2) Art history seminars at the 8xxx level (2 courses)
   - This requirement is in addition to ARTH 8001, and excluding ARTH 8975.

Primary Concentration
Take 9 or more credit(s) from the following:
• ARTH 5xxx
• ARTH 8xxx

Secondary Concentration
Take 6 or more credit(s) from the following:
• ARTH 5xxx
• ARTH 8xxx

Required Art History Courses
ARTH 8001 - Art Historiography: Theory and Methods (3.0 cr)
Take 3 additional credits from either...
ARTH 5xxx
or ARTH 8xxx

Electives
Take 9 or more credits. At least 3 of these credits must be from the following:
ARTH 5xxx
or ARTH 8xxx

Outside Coursework
Take remaining 6 credits in courses that do not focus on art history in content outside of the department.

Concentration Areas

Examples of potential concentrations include:
North American
Ancient Mediterranean
Ancient Western Asia
Early Modern
East Asian
Islamic
Medieval
Modern
Contemporary
Twin Cities Campus

Art History Minor

Art History

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, 338 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: http://www.arthist.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 11
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of specialization in the art history program include: American art and material culture; early modern and Baroque art; East Asian art and archaeology; art and archaeology of ancient Iran, Hellenistic Asia, and the late Roman empire; modern and contemporary art and theory, including film and photography studies as well as 19th- through 21st-century art; pre-Columbian and colonial art of the Americas, and South Asian art and architecture.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Electives
Take 11 or more credit(s) from the following:
• ARTH 5xxx
• ARTH 8xxx

Doctoral
Required Electives
Take 12 or more credit(s) from the following:
• ARTH 5xxx
• ARTH 8xxx
Twin Cities Campus
Art History Ph.D.
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, 338 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: http://www.arthist.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 78
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The art history program does not admit students directly to the PhD. All art history graduate students begin in the MA program and are expected to continue on toward the PhD. Areas of specialization include: North American, Ancient Mediterranean, Ancient Western Asia, Early Modern, East Asian, Islamic, Medieval, Modern, Contemporary, Film/Photography, and South Asian. The master's is the first stage of the linked MA/PhD graduate program in Art History. The department does not offer a terminal master's degree. The PhD is the second stage of the linked MA/PhD graduate program in Art History. All students, whether they have an master's from a previous institution or not, apply to and gain admission through the master's program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Note: The program does not admit students directly to the PhD. All graduate students in art history begin in the MA program and are expected to continue on toward the PhD. Graduate students who join the program already having completed a master's degree or graduate-level coursework at another institution may be allowed to transfer credits. See the department website for more information or contact the director of graduate studies.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
42 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in two foreign languages.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students complete a Master's degree en route to the PhD. Therefore, all courses in the MA at the University of Minnesota are applied to this PhD.

Students may take up to 2 Directed Study courses to satisfy requirements.

Art History Department Courses
Within this the following concentrations and electives, students must fulfill the following distribution requirements in courses taken in the Art History department:

1) Global Perspectives Requirement (1 course)
2) Art History Seminars at the 8xxx level (2 courses)
   - This requirement is in addition to ARTH 8001, and excluding ARTH 8975.

Primary Concentration
Take 18 or more credit(s) from the following:
• ARTH 5xxx
• ARTH 8xxx

Secondary Concentration
Take 9 or more credit(s) from the following:
• ARTH 5xxx
• ARTH 8xxx

Required Art History Courses
ARTH 8001 - Art Historiography: Theory and Methods (3.0 cr)
Take 3 additional credits from either:
ARTH 5xxx
or ARTH 8xxx

Electives
Take 9 or more elective credits. At least 3 of these credits must be from the following:
ARTH 5xxx
or ARTH 8xxx

Outside Coursework
Doctoral Minor
A doctoral-level minor is comprised of a minimum of 12 credits, with the terms specified by the department housing the minor program.
At least 6 credits of the minor must be taken in a single field outside the Department of Art History. The field must be related to Art History, but cannot be art historical in content.

or Supporting Program
A supporting program consists of 12 credits, which may be from more than one discipline outside the department and which represent a coherent area of work.
6 credits may be art historical in content; however, they must be outside the student's primary area of concentration.
6 additional credits of the supporting program must NOT be art historical in content.

Thesis Credits
Take 24 or more credit(s) from the following:
• ARTH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Areas of Concentration
Examples of potential concentrations include:
North American
Ancient Mediterranean
Ancient Western Asia
Early Modern
East Asian
Islamic
Medieval
Modern
Contemporary
Film/Photography
South Asian
Twin Cities Campus
Art M.F.A.
Art Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art, E201 Regis Center for Art, 405 21st Avenue S, Minneapolis, MN 55455 (612-625-8096; fax: 612-625-7881).
Email: artdept@umn.edu
Website: http://www.art.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of fine arts program places major emphasis on creative artistic work of high quality. It promotes not only the conceptual and technical education of the professional artist in their artistic practice, encouraging critical inquiry, excellence, and an understanding of the history of art, but also an experimental approach toward each media. The following areas of concentration are available: ceramics, drawing and painting, photography, printmaking, sculpture, and experimental and media arts. The MFA is considered the terminal degree in the field of fine arts and is typically the degree required to teach at the college or university level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission to the M.F.A. program is highly competitive. In addition to meeting the University's application requirements, students applying to the program must demonstrate a high degree of capability and commitment in their artistic portfolio and in their statements of artistic and academic intent. Applicants must submit a portfolio electronically with documentation of artwork completed in the three years prior to admission. Instructions for submitting the portfolio and supplemental materials including three letters of recommendation may be found at the department's website: www.art.umn.edu

Students are admitted for fall semester only.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan B:** Plan B requires 58 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Candidates demonstrate their visual research accomplishments through participation in the MFA thesis exhibition in the Katherine E. Nash Gallery, a supporting paper, and a final oral examination.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MFA program requires a total of 64 credits. It is typically a three-year program and studio space is provided for a maximum of three consecutive years for the pursuit of appropriate artistic research. MFA candidates plan programs with their advisors with approval of the director of graduate studies. The program requires all coursework be completed by the end of the second year of the program.

Students who will teach during their time in the MFA program will be required to register for the 1-credit MFA teaching colloquium prior to a graduate teaching appointment.

In the third year of the MFA program, candidates are required to register for 9 ARTS 8990 credits per semester and a 1-credit writing workshop in the fall.

Candidates must be reviewed annually for progress through the program. At the end of the final year, candidates demonstrate their artistic research accomplishments through participation in the MFA thesis exhibition held in the Katherine E. Nash Gallery, a supporting paper, and a final oral examination.

**Seminar Courses**
Take the following courses for a total of 9 credits:
- ARTS 8440 - MFA Thesis Research + Writing (3.0 cr)
- ARTS 8430 - MFA Professional Practices and Teaching Pedagogy (3.0 cr)
- ARTS 8400 - Theoretical Constructions in Contemporary Art (3.0 cr)

**MFA Critique Seminar**
Take ARTS 8410 in the fall of 1st year, the fall of 2nd year, and the spring of 2nd year, for a total of 9 credits.
Take 9 or more credit(s) from the following:
- ARTS 8410 - MFA Critique Seminar (3.0 cr)

**Studio Credits**
ARTS 8420 and 8450 can be repeated multiple times for credit.
Take 24 or more credit(s) from the following:
- ARTS 8420 - MFA Studio (1.0 - 6.0 cr)
Take 16 or more credit(s) from the following:
- ARTS 8990 - MFA Creative Thesis (1.0 - 9.0 cr)

**Art Theory or Art History Courses**
Take at least 6 credits from outside art to fulfill the art theory or art history course requirements. Courses can be selected from the following departments, or in consultation with the advisor and director of graduate studies.
Take 6 or more credit(s) from the following:
- ARTH 5xxx
- ARTH 8xxx
- THE 5xxx
- THE 8xxx
- ADES 5xxx
- ADES 8xxx
- APST 5xxx
- APST 8xxx
- ARCH 5xxx
- ARCH 8xxx
- DES 5xxx
- DES 8xxx
- GDES 5xxx
- GDES 8xxx
- HSG 5xxx

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Information current as of December 20, 2016
• HSG 8xxx
• IDES 5xxx
• IDES 8xxx
• LA 5xxx
• LA 8xxx
• MST 5xxx
• MST 8xxx
• RM 5xxx
• RM 8xxx
• CSCL 5xxx
• CSCL 8xxx
Twin Cities Campus

Art Minor
Art Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art, E201 Regis Center for Art, 405 21st Ave S, Minneapolis, MN 55455 (612-625-8096; fax: 612-625-7881)
Email: artdept@umn.edu
Website: http://www.art.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor program in art places major emphasis on creative artistic work of high quality. It promotes not only the conceptual and technical education of the professional artist in their artistic practice, encouraging critical inquiry, excellence, and an understanding of the history of art, but also an experimental approach toward each media. The following media areas are available: ceramics, drawing and painting, photography, printmaking, sculpture, and experimental and media arts.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Course
ARTS 8400 - Theoretical Constructions in Contemporary Art (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Coursework is chosen in consultation with the Art director of graduate studies.

Electives
Take 6 - 9 credit(s) from the following:
• ART 5xxx
• ART 8xxx

Doctoral
Coursework is chosen in consultation with the Art director of Graduate Studies.

Electives
Take at least 9 credits from the following:
Twin Cities Campus
Asian Literatures, Cultures, and Media M.A.
Asian Languages and Literatures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Asian Languages and Literatures, 220 Folwell Hall, 9 Pleasant St SE, Minneapolis, MN 55455 (612-625-6534; fax: 612-624-5513)
Email: all@umn.edu
Website: http://all.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Asian Languages and Literatures Department considers applications only from students seeking the PhD degree; it does not admit students directly to the MA. The MA is offered only as an exit degree or interim credential.

The Asian literatures, cultures, and media (ALCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their ALCM program application form. Currently, students may select Arabic, Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate studies. For details, see the graduate program website at www.all.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Only applications from students seeking the PhD degree are considered, although applicants are not required to have taken graduate coursework before entering the program. The MA is offered as an exit degree or interim credential. A bachelor's degree from an accredited U.S. institution (or its foreign equivalent) is required for admission. Students entering with an MA in a related field will have the appropriate number of credits and courses applied to their program of study (as determined by the director of graduate studies). Applicants are expected to have a strong academic record from a relevant humanities or social science discipline and at least three years of college-level study in the proposed language of concentration, or a demonstration of comparable linguistic proficiency.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
Program Requirements

Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Advanced knowledge in the chosen language.

A minimum GPA of 3.5 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The MA examination comprises the PhD qualifying examination, which is normally taken at the end of the student's second year in the program. Students entering the program with an MA in a related field can take the qualifying examination after one year of study, with approval of the director of graduate studies.

The final examination consists of the following:
1) written language examination(s), typically an in-room reading/translation examination on materials directly related to study and research interests;
2) an oral presentation and interview discussing the materials that were part of the written examination;
3) submission of two Plan B research papers for evaluation (normally papers from two different classes, revised for submission); and
4) an oral examination (in English) by a faculty committee, based on the submitted papers.

Required Courses
ALL 8001 - Critical Approaches to Asian Literary and Cultural Studies (3.0 cr)
ALL 8002 - Critical Approaches to Asian Studies (3.0 cr)

Electives
Take 24 or more credit(s) from the following:
A maximum of 8 language credits can be applied as electives.
Take 0 - 8 credit(s) from the following:
• ARAB 4101 - Beginning Arabic I for Graduate Student Research (5.0 cr)
• ARAB 4102 - Beginning Arabic II for Graduate Student Research (5.0 cr)
• ARAB 4121 - Intermediate Arabic I for Graduate Student Research (5.0 cr)
• ARAB 4122 - Intermediate Arabic II for Graduate Student Research (5.0 cr)
• CHN 4041 - Advanced Readings in Modern Chinese I (4.0 cr)
• CHN 4042 - Advanced Readings in Modern Chinese II (4.0 cr)
• CHN 5040 - Readings in Chinese Texts (3.0 cr)

Seminars and Courses
Many 8xxx-level CLA seminars can be taken to fulfill the requirements of this degree. Students choose courses in consultation with their advisor. The following list includes frequently taken electives:
Take 16 - 24 credit(s) from the following:
• ALL 5xxx
• ALL 8xxx
• CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
• CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
• CL 5910 - Topics in Comparative Literature (3.0 - 4.0 cr)
• MIMS 8001 - Theories of the Moving Image (3.0 cr)
• MIMS 8003 - Historiography of the Moving Image (3.0 cr)
• HIST 5940 - Topics in Asian History (1.0 - 4.0 cr)
• HIST 5960 - Topics in History (1.0 - 4.0 cr)
• HIST 8960 - Topics in History (1.0 - 4.0 cr)
• ARTH 5765 - Early Chinese Art (3.0 cr)
• ARTH 8710 - Seminar: Islamic Art (3.0 cr)
• ARTH 8720 - Seminar: East Asian Art (3.0 cr)
• ARTH 8950 - Seminar: Issues in the History of Art (3.0 cr)
• GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
• ANTH 5980 - Topics in Anthropology (3.0 cr)
• ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
Twin Cities Campus
Asian Literatures, Cultures, and Media Minor
Asian Languages and Literatures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Asian Languages and Literatures, 220 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-6534; fax: 612-624-5513).
Email: all@umn.edu
Website: http://all.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Asian literatures, cultures, and media (ALCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their ALCM program application form. Currently, students may select Arabic, Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate Studies. For details, see the graduate program website at www.all.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students seeking the ALCM minor must consult with the ALCM director of Graduate Studies to select a minor field advisor. Coursework for the minor is approved by the minor field advisor.

In addition to credit requirements, students must take and pass at the terminal MA level the language translation examination section of the ALCM MA qualifying examination.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Required Coursework
ALL 8001 - Critical Approaches to Asian Literary and Cultural Studies (3.0 cr)

Electives
Take 9 or more credits from the following:
ALL 5xxx
ALL 8xxx
Asian Literatures, Cultures, and Media Ph.D.

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Asian Languages and Literatures, 220 Folwell Hall, 9 Pleasant St SE, Minneapolis, MN 55455 (612-625-6534; fax: 612-624-5513)
Email: all@umn.edu
Website: http://all.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Asian literatures, cultures, and media (ALCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their ALCM program application form. Currently, students may select Arabic, Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate studies. For details, see the graduate program website at www.all.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Note: Only applications from students seeking the Ph.D. degree are considered, although applicants are not required to have taken graduate coursework before entering the program. (The M.A. is offered as an exit degree or interim credential.) A bachelor's degree from an accredited U.S. institution (or its foreign equivalent) is required for admission. Students entering with an M.A. in a related field will have the appropriate number of credits and courses applied to their program of study (as determined by the director of graduate studies). Applicants are expected to have a strong academic record from a relevant humanities or social science discipline and at least three years of college-level study in the proposed language of concentration, or a demonstration of comparable linguistic proficiency.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
48 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading and speaking competence in the language.

A minimum GPA of 3.05 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must also pass the translation examination component of the ALCM PhD qualifying examination.

Required Courses
ALL 8001 - Critical Approaches to Asian Literary and Cultural Studies (3.0 cr)
ALL 8002 - Critical Approaches to Asian Studies (3.0 cr)

Electives
Take 42 or more credit(s) from the following:

Language Courses
A maximum of 8 language credits can be applied as electives.
Take at most 8 credit(s) from the following:
• ARAB 4101 - Beginning Arabic I for Graduate Student Research (5.0 cr)
• ARAB 4102 - Beginning Arabic II for Graduate Student Research (5.0 cr)
• ARAB 4121 - Intermediate Arabic I for Graduate Student Research (5.0 cr)
• ARAB 4122 - Intermediate Arabic II for Graduate Student Research (5.0 cr)
• CHN 4041 - Advanced Readings in Modern Chinese I (4.0 cr)
• CHN 4042 - Advanced Readings in Modern Chinese II (4.0 cr)
• CHN 5040 - Readings in Chinese Texts (3.0 cr)

Seminars and Courses
Many 8xxx-level CLA seminars can be taken to fulfill the requirements of this degree. Students choose courses in consultation with their advisor. The following list includes frequently taken electives:
Take 34-42 credit(s) from the following:
• ALL 5xxx
• ALL 8xxx
• CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
• CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
• CL 5910 - Topics in Comparative Literature (3.0 - 4.0 cr)
• MIMS 8001 - Theories of the Moving Image (3.0 cr)
• MIMS 8003 - Historiography of the Moving Image (3.0 cr)
• HIST 5940 - Topics in Asian History (1.0 - 4.0 cr)
• HIST 5960 - Topics in History (1.0 - 4.0 cr)
• HIST 8960 - Topics in History (1.0 - 4.0 cr)
• ARTH 5765 - Early Chinese Art (3.0 cr)
• ARTH 8710 - Seminar: Islamic Art (3.0 cr)
• ARTH 8720 - Seminar: East Asian Art (3.0 cr)
• ARTH 8920 - Seminar: Film History and Criticism (3.0 cr)
• ARTH 8950 - Seminar: Issues in the History of Art (3.0 cr)
• GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
• ANTH 5980 - Topics in Anthropology (3.0 cr)
• ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
Twin Cities Campus
Audiology Au.D.
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhs@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 102
- This program requires summer semesters for timely completion.
- Degree: Doctor of Audiology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The emphases in the AuD program focus on meeting the standards for licensure as an audiologist. The program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development. Note that all offers of admission for the AuD program are contingent upon the results of a criminal background check administered by the Minnesota Department of Human Services which will be conducted during the upcoming fall semester.

The doctoral (AuD) education program in audiology at the University of Minnesota - Twin Cities is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association, 2200 Research Boulevard #310, Rockville, Maryland 20850, 800-498-2071 or 301-296-5700.

Accreditation
This program is accredited by the American Speech-Language-Hearing Association (ASHA).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Prerequisite coursework for the Au.D. program includes transcript credit in statistics, social science, and scientific method/inquiry.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

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Information current as of December 20, 2016
For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

94 credits are required in the major.
8 credits are required outside the major.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The AuD is a four-year plan of study for students entering with a background in speech-language-hearing sciences. Students without such a background should expect an additional year of study. In addition to study in the major field, the degree requires 8 related-fields credits. With advisor approval, up to 6 of these outside-major credits may be completed within the department. During the final year, students complete a clinical externship. Summative evaluations will include a written comprehensive examination followed by an oral exam, and a written capstone project that includes an oral presentation and an oral defense of the project.

**Audiology Track: Required Courses**

- SLHS 5401 - Counseling and Professional Issues (3.0 cr)
- SLHS 5801 - Advanced Audiologic Assessment (3.0 cr)
- SLHS 5802 - Hearing Aids I (3.0 cr)
- SLHS 5803 - Pediatric Audiology (3.0 cr)
- SLHS 5804 - Cochlear Implants (3.0 cr)
- SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
- SLHS 5806 - Auditory Processing Disorders (3.0 cr)
- SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
- SLHS 5808 - Pathophysiology of Hearing Disorders (3.0 cr)
- SLHS 8801 - Electrophysiologic Assessment of Auditory Function (3.0 cr)
- SLHS 8802 - Hearing Aids II (3.0 cr)
- SLHS 8803 - Signals and Systems in Audiology (3.0 cr)
- SLHS 8805 - Hearing Science Foundations of Audiology (3.0 cr)
- SLHS 8807 - Balance Assessment (3.0 cr)

**Audiology Capstone**

Take exactly 6 credit(s) from the following:

- SLHS 8806 - Audiology Capstone (1.0 - 6.0 cr)

**Clinical Education in Audiology**

Take exactly 17 credit(s) from the following:

- SLHS 8820 - Clinical Education in Audiology (1.0 - 8.0 cr)

**Audiology Externship**

Take exactly 17 credit(s) from the following:

- SLHS 8840 - Audiology Externship (1.0 - 7.0 cr)

**Laboratory Module in Audiology**

Take exactly 2 credit(s) from the following:

- SLHS 5810 - Laboratory Module in Audiology (1.0 - 2.0 cr)

**Clinical Research and Practice: Grand Rounds**

Take exactly 4 credit(s) from the following:

- SLHS 5820 - Clinical Research and Practice: Grand Rounds (1.0 - 6.0 cr)

**Clinical Foundations in Audiology**

Take exactly 2 credit(s) from the following:

- SLHS 5830 - Clinical Foundations in Audiology (1.0 - 8.0 cr)

**Directed Research**

Take exactly 4 credit(s) from the following:

- SLHS 8994 - Directed Research (1.0 - 12.0 cr)

**Related Fields**

A minimum of 2 credits must be taken outside of SLHS.

Take 8 or more credit(s) from the following:

- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPSY 4302</td>
<td>Infant Development (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>CPSY 4329</td>
<td>Biological Foundations of Development (3.0 cr)</td>
<td></td>
</tr>
<tr>
<td>CPSY 4341</td>
<td>Perceptual Development (3.0 cr)</td>
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<tr>
<td>CPSY 4343</td>
<td>Cognitive Development (3.0 cr)</td>
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<tr>
<td>CSPH 5806</td>
<td>Wellbeing and Resiliency for Health Professionals (1.0 cr)</td>
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<tr>
<td>CSPH 5101</td>
<td>Introduction to Integrative Healing Practices (3.0 cr)</td>
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<tr>
<td>CSPH 5111</td>
<td>Ways of Thinking about Health (2.0 cr)</td>
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<tr>
<td>EPSY 5101</td>
<td>Intelligence and Creativity (3.0 cr)</td>
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<tr>
<td>EPSY 5112</td>
<td>Knowing, Learning, and Thinking (4.0 cr)</td>
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<tr>
<td>EPSY 5135</td>
<td>Human Relations Workshop (4.0 cr)</td>
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<tr>
<td>EPSY 5400</td>
<td>Special Topics in Counseling Psychology (1.0 - 4.0 cr)</td>
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<tr>
<td>EPSY 5415</td>
<td>Child and Adolescent Development and Counseling (4.0 cr)</td>
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<tr>
<td>EPSY 5451</td>
<td>College Students Today (3.0 cr)</td>
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<td>EPSY 5461</td>
<td>Cross-Cultural Counseling (3.0 cr)</td>
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<td>EPSY 5609</td>
<td>Family-centered Services (2.0 cr)</td>
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<tr>
<td>EPSY 5626</td>
<td>Classroom Management and Behavior Analytic Problem Solving (3.0 cr)</td>
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<tr>
<td>EPSY 5625</td>
<td>Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)</td>
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<tr>
<td>EPSY 5641</td>
<td>Foundations of Education for Individuals Who Are Deaf/Hard of Hearing (2.0 cr)</td>
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<tr>
<td>EPSY 5642</td>
<td>Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing (3.0 cr)</td>
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<tr>
<td>EPSY 5644</td>
<td>Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing (3.0 cr)</td>
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<tr>
<td>EPSY 5661</td>
<td>Introduction to Autism Spectrum Disorder (3.0 cr)</td>
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<tr>
<td>EPSY 5663</td>
<td>Assessment and Intervention for Individuals with Autism Spectrum Disorders (3.0 cr)</td>
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<tr>
<td>EPSY 5681</td>
<td>Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)</td>
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<tr>
<td>GER 5105</td>
<td>Multidisciplinary Perspectives on Aging (3.0 cr)</td>
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<td>GER 5110</td>
<td>Biology of Aging (3.0 cr)</td>
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<td>GER 5115</td>
<td>Introduction to Geriatrics (2.0 cr)</td>
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<td>GER 5125</td>
<td>Gerontology Service Learning (3.0 cr)</td>
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<td>HINF 5501</td>
<td>US Health Care System: Information Challenges in Clinical Care (1.0 cr)</td>
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<td>KIN 8211</td>
<td>Seminar: Perception and Action (3.0 cr)</td>
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<td>LING 8920</td>
<td>Topics in Language and Cognition (3.0 cr)</td>
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<td>NSCI 5101</td>
<td>Introduction to Neuroscience for Graduate Students (3.0 cr)</td>
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<td>NSCI 5111</td>
<td>Medical Neuroscience for Graduate Students (5.0 cr)</td>
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<td>OTOL 8234</td>
<td>Anatomy of the Head and Neck and Temporal Bone Dissection (2.0 cr)</td>
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<td>OTOL 8247</td>
<td>Anatomy and Physiology of Hearing and Balance (3.0 cr)</td>
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<td>PHAR 5201</td>
<td>Applied Health Sciences Terminology (2.0 cr)</td>
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<td>PHAR 5207</td>
<td>Applied Leadership in Health Care (3.0 cr)</td>
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<td>PS 4036</td>
<td>Perceptual Issues in Visual Impairment (3.0 cr)</td>
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<td>PS 4960</td>
<td>Seminar in Psychology (1.0 - 4.0 cr)</td>
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<tr>
<td>PS 5014</td>
<td>Psychology of Human Learning and Memory (3.0 cr)</td>
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<tr>
<td>PS 5037</td>
<td>Psychology of Hearing (3.0 cr)</td>
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<td>PS 5054</td>
<td>Psychology of Language (3.0 cr)</td>
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<td>PS 5137</td>
<td>Introduction to Behavioral Genetics (3.0 cr)</td>
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<tr>
<td>PS 5205</td>
<td>Applied Social Psychology (3.0 cr)</td>
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<tr>
<td>PS 5960</td>
<td>Topics in Psychology (1.0 - 4.0 cr)</td>
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<tr>
<td>PS 8037</td>
<td>Psychophysics and Audition (3.0 cr)</td>
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<tr>
<td>PUBH 6370</td>
<td>Social Epidemiology (2.0 cr)</td>
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<td>PUBH 6904</td>
<td>Nutrition and Aging (2.0 cr)</td>
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<tr>
<td>PUBH 8895</td>
<td>Sociological Theory in Health Services Research (3.0 cr)</td>
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<tr>
<td>SPAN 5985</td>
<td>Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)</td>
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<tr>
<td>SLHS 5900</td>
<td>Topic in Speech-Language-Hearing Sciences (3.0 cr)</td>
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<tr>
<td>SLHS 8530</td>
<td>Seminar: Speech (3.0 cr)</td>
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</table>

**Joint- or Dual-degree Coursework:** AuD and PhD in Speech-Language-Hearing Sciences

Student may take a total of 9 credits in common among the academic programs.
Twin Cities Campus
Classical and Near Eastern Studies M.A.

Classical & Near Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnes@umn.edu
Website: http://cnes.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34 to 47
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and Near Eastern Studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various master's and Ph.D. tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching. Related special facilities include the Center for Medieval Studies, the Center for Jewish Studies, and the Center for Modern Greek Studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

For the major track in classics, students should have sufficient knowledge to begin graduate reading courses in either Greek or Latin and at least intermediate ability in the other language.

Other requirements to be completed before admission:
In addition to the online University application, applicants must complete the Department of Classical and Near Eastern Studies application on the ApplyYourself site (also available for download on the department website); other supporting materials, including recommendations and a writing sample, can be uploaded directly into the University's online application. For non-native speakers of English, a copy of TOEFL results is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 28 to 31 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 28 to 31 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: A capstone project is required. Two research papers from departmental seminars (numbered 8190 or 8910), as long as the paper receives a grade of B+ or higher and makes substantive use of at least one modern scholarly language other than English.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Translation proficiency exams offered 1x semester.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Program Sub-plans

Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

Ancient and Medieval Art and Archaeology

Note: This sub-plan is inactive. CNES is currently not accepting applications for this program.

This sub-plan allows concentrations ranging broadly over the ancient and medieval periods, with an emphasis on art historical and archaeological approaches. Work in an appropriate ancient language is encouraged.

Language Requirements: Reading knowledge of one modern foreign language appropriate to the student's program is required (normally German, French, or Italian).

Final Exam: The final exams are written and oral.

Classics

This sub-plan provides broad training in the literature of ancient Greece and Rome in its cultural context. Work in Greek and Latin is supplemented by courses in a related field or area of interest. The program requires nearly equal emphasis on courses and seminars in Greek and in Latin, as well as supporting work in a related field or area of interest. The minimum requirement for Plan A is 44 credits (including 10 thesis credits), and for Plan B, 34 credits. Language Requirements: One modern research language as appropriate (normally French, German, or Italian) and reading proficiency in both Greek and Latin as certified by a department exam based on a set reading list is required. Final Exam: The final exams are written (Greek and Latin reading proficiency) and oral (general).

Greek

A core of advanced work in Greek is supplemented by a minor or supporting program in a related field or area of interest. The minimum requirement for Plan A is 47 credits (including 10 thesis credits), and for Plan B, 37 credits.

Language Requirements: One modern research language as appropriate, preferably French, German, or Italian, and reading proficiency in Greek as demonstrated by a department exam based on a set reading list is required.

Final Exam: The final exams are written (Greek reading proficiency) and oral (general).

Latin

A core of advanced work in Latin is supplemented by a minor or supporting program in a related field or area of interest. The minimum requirement for Plan A is 47 credits (including 10 thesis credits), and for Plan B, 37 credits.
Language Requirements: One modern research language as appropriate, preferably German, French, or Italian, and reading proficiency in Latin as demonstrated by a department exam based on a set reading list is required.

Final Exam: The final exams are written (Latin reading proficiency) and oral (general).

Religions in Antiquity
The religions in antiquity track is comparative in both method and content. Although students may focus on a particular religious tradition, they will nonetheless study several ancient religions. Plan A requires 47 credits, including 31 graduate course credits, plus 6 credits in a related field, plus 10 thesis credits. Plan B requires 37 credits, including 31 graduate course credits, plus 6 credits in a related field.

Language Requirements: Proficiency in one modern language (normally German) and master's-level proficiency in classical Hebrew, Greek, or Latin as demonstrated by a department exam based on a set reading list is required.

Final Exam: The final exams are written (ancient language reading proficiency) and oral (general).
Twin Cities Campus

Classical and Near Eastern Studies Minor

Classical & Near Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnes@umn.edu
Website: http://cnes.cla.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 10 to 13
- Length of program in credits (Doctorate): 16 to 19
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and Near Eastern Studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training, and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various MA and PhD tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.
For the minor track in classics, students should have sufficient knowledge to begin graduate reading courses in either Greek or Latin and at least intermediate ability in the other language.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in either Greek or Latin.

Required Core
CNES 5794 - Introduction to Classical and Near Eastern Studies (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Language Options
Classics
Take 12 or more credit(s) from the following:

Greek
Take 6 or more credit(s) from the following:
- GRK 5xxx
- GRK 8xxx
- (Does not include GRK 5003 and GRK 5004)

Latin
Take 6 or more credit(s) from the following:
- LAT 5xxx
- LAT 8xxx
- (excluding LAT 5003 and LAT 5004)

- OR -

Greek
Take 9 or more credit(s) from the following:
- GRK 5xxx
- GRK 8xxx
- (Excluding GRK 5003 and GRK 5004)

- OR -

Latin
Take 9 or more credit(s) from the following:
- LAT 5xxx
- LAT 8xxx
- (Excluding LAT 5003 and LAT 5004)

Doctoral

Language Options

Classics
Take 18 or more credit(s) from the following:

Greek
Take 9 or more credit(s) from the following:
- GRK 5xxx
- GRK 8xxx
- (Does not include GRK 5003 and GRK 5004)

Latin
Take 9 or more credit(s) from the following:
- LAT 5xxx
- LAT 8xxx
- (excluding LAT 5003 and LAT 5004)

- OR -

Greek
Take 15 or more credit(s) from the following:
- GRK 5xxx
- GRK 8xxx
- (Excluding GRK 5003 and GRK 5004)

- OR -

Latin
Take 15 or more credit(s) from the following:
- LAT 5xxx
- LAT 8xxx
- (Excluding LAT 5003 and LAT 5004)
Twin Cities Campus
Classical and Near Eastern Studies Ph.D.
Classical & Near Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. SE, Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnes@umn.edu
Website: http://cnes.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 70 to 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and Near Eastern Studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various Master's and Ph.D. tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching. Students entering the PhD program with an Master's can usually receive credit for some earlier coursework, subject to the approval of the graduate faculty and University requirements. Related special facilities include the Center for Medieval Studies, the Center for Jewish Studies, and the Consortium for the Study of the Pre-Modern World.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
In addition to the online University application, applicants must complete the Department of Classical and Near Eastern Studies application on the ApplyYourself site (also available for download on the department website); other supporting materials, including recommendations and a writing sample, can be uploaded directly into the University's online application. For nonnative speakers of English, a copy of TOEFL results is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of December 20, 2016
Program Requirements
34 to 35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: German and a second modern research language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Coursework
All students must taken the following 1-credit course:
CNES 5794 - Introduction to Classical and Near Eastern Studies (1.0 cr)

Doctoral Thesis Credits
All students must take at least 24 doctoral thesis credits.
CNES 8888 - Thesis Credits: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Classics
The Classics track requires extensive advanced work in both Latin and Greek, together with some study in a related field or area of interest. The program requires nearly equal emphasis on courses and seminars in Greek and in Latin.

Language Requirements: German, plus another modern language, preferably French or Italian, as well as reading proficiency in both Greek and Latin, as demonstrated by a departmental examination based on a set reading list.

Required Language Coursework (24 credits)
Language Courses (21 credits)
Take at least 9 credits of Greek and 9 credits of Latin for a total of 18 credits. Of the 18 credits, at least half must be from Greek or Latin seminar courses (6 seminar credits from one language and 3 seminar credits from the other). In addition, select at least 3 elective credits to complete the 21-credit language course requirement. 51xx and 52xx courses cannot be applied to this requirement.
GRK 5xxx
GRK 8xxx
GRK 8910 - Seminar (3.0 cr)
LAT 8910 - Seminar (3.0 cr)

Prose Composition Course (3 credits)
Take one of the following composition courses for 3 credits:
GRK 5701 - Prose Composition (3.0 cr)
LAT 5701 - Latin Prose Composition (3.0 cr)

Required Art or Archaeology Coursework (3 credits)
Take at least 3 credits from the following course list, or in consultation with the director of graduate studies:
ANTH 8004 - Foundations of Anthropological Archaeology (3.0 cr)
ANTH 8112 - Reconstructing Hominin Behavior (3.0 cr)
ANTH 8230 - Anthropological Research Design (3.0 cr)
ANTH 8244 - Interpreting Ancient Bone (4.0 cr)
ANTH 8510 - Topics in Archaeology (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
ANTH 5221 - Anthropology of Material Culture (3.0 cr)
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
ANTH 5401 - The Human Fossil Record (3.0 cr)
ANTH 5402 - Zooarchaeology Laboratory (3.0 cr)
ANTH 5980 - Topics in Anthropology (3.0 cr)
ANTH 5448 - Applied Heritage Management (3.0 cr)
ARTH 5xxx
ARTH 8xxx

Required Ancient History Coursework (6 credits)
Take at least 6 credits in Ancient History, in consultation with the director of graduate studies.
CNES 5xxx
CNES 8xxx

Electives
Select at least 3 elective credits as needed, in consultation with the adviser, to complete the 34-credit minimum for the major.

Outside Coursework (12 credits)
Take at least 12 credits, selected in consultation with the adviser, to meet the outside credit requirement.

Religions of Antiquity

Required Coursework (9 credits)
Take the following courses for a total of 9 credits:
RELS 8190 - Comparative Seminar in Religions in Antiquity (3.0 cr)
CNES 8513 - Scripture and Interpretation (3.0 cr)
RELS 5001 - Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion (3.0 cr)

Outside Coursework (12 credits)
All students take at least 12 credits outside the major, in consultation with the adviser. Outside coursework should comprise courses in languages or topics outside the primary concentration area, and can include relevant coursework from Anthropology; Art History; English; Gender, Women, & Sexuality Studies; History; Medieval Studies; or Philosophy.
ANTH 5xxx
ANTH 8xxx
ARTH 5xxx
ARTH 8xxx
ENGL 5xxx
ENGL 8xxx
HIST 5xxx
HIST 8xxx
GWSS 5xxx
GWSS 8xxx
PHIL 5xxx
PHIL 8xxx

Concentration Areas
Select one of the two following concentration areas. In addition, select a primary language of competence, and at least one secondary language of competence.

Ancient Near East and Hebrew Bible
This concentration area focuses on the religions, literatures, and cultures of Mesopotamia, Canaan, and Israel from the 2nd millennium BCE to the arrival of Roman rule in the first century BCE. The required primary language is Hebrew. Secondary language options are Aramaic, Akkadian, Ugaritic, or Greek.

Concentration Area Coursework (24 credits)
Courses are chosen from the following list, or in consultation with the adviser, based on concentration area and comparative themes for doctoral examinations.
CNES 5070 - Topics in Ancient Religion (3.0 cr)
CNES 5080 - New Testament Proseminar (3.0 cr)
CNES 8530 - Religions of the Ancient Mediterranean World (3.0 cr)
CNES 8550 - Gender and Body in Ancient Religion (3.0 cr)
CNES 8570 - Readings in Religious Texts (3.0 cr)
HEBR 5200 - Advanced Classical Hebrew (3.0 cr)
RELS 5013 - Biblical Law and Jewish Ethics (3.0 cr)
ANTH 4049 - Religion and Culture (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
ANTH 5446 - Archaeology of Representation as Communication (3.0 cr)
CNES 5051 - Before Herodotus: History and Historiography of Mesopotamia and the Ancient Near East (3.0 cr)
CNES 5188 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
CNES 5204 - The Dead Sea Scrolls (3.0 cr)
CNES 5502 - Ancient Israel: From Conquest to Exile (3.0 cr)
GRK 5200 - Biblical Greek (3.0 cr)
GRK 8400 - Readings in Patristic Greek (3.0 cr)
HEBR 5300 - Post-Biblical Hebrew: Second Temple Period (3.0 cr)
HIST 5053 - Doing Roman History: Sources, Methods, and Trends (3.0 cr)
HIST 5614 - The Medieval Church (3.0 cr)
HIST 8110 - Medieval History: Research Seminar (3.0 cr)
HIST 8930 - Topics in Ancient History (1.0 - 4.0 cr)
LAT 5200 - Advanced Reading in Later Latin (3.0 cr)

-OR-

Greek and Roman Religions, Formative Judaism, and Early Christianity
This concentration area focuses on the religions, literatures, and cultures of Greece, Rome and the Mediterranean world, with potential focal points in Egypt, Asia Minor, or Syria-Palestine. It centers on the period from Alexander the Great to Marcus Aurelius, and encompasses Second Temple Judaism and early Christianity, including New Testament literature. The required primary language is Greek or Latin. Secondary language options are Hebrew, Aramaic, Copic, Greek, or Latin.

Concentration Area Coursework (24 credits)
Courses are chosen from the following list, or in consultation with the adviser, based on concentration area and comparative themes for doctoral examinations.

CNES 5070 - Topics in Ancient Religion (3.0 cr)
CNES 5080 - New Testament Proseminar (3.0 cr)
CNES 8530 - Religions of the Ancient Mediterranean World (3.0 cr)
CNES 8550 - Gender and Body in Ancient Religion (3.0 cr)
CNES 8570 - Readings in Religious Texts (3.0 cr)
HEBR 5200 - Advanced Classical Hebrew (3.0 cr)
RELS 5013 - Biblical Law and Jewish Ethics (3.0 cr)
ANTH 4049 - Religion and Culture (3.0 cr)
ANTH 5027W - Archaeology of Prehistoric Europe [HIS, WI] (3.0 cr)
ANTH 5446 - Archaeology of Representation as Communication (3.0 cr)
CNES 5051 - Before Herodotus: History and Historiography of Mesopotamia and the Ancient Near East (3.0 cr)
CNES 5188 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
CNES 5204 - The Dead Sea Scrolls (3.0 cr)
CNES 5502 - Ancient Israel: From Conquest to Exile (3.0 cr)
GRK 5200 - Biblical Greek (3.0 cr)
GRK 8400 - Readings in Patristic Greek (3.0 cr)
HEBR 5300 - Post-Biblical Hebrew: Second Temple Period (3.0 cr)
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HIST 8110 - Medieval History: Research Seminar (3.0 cr)
HIST 8930 - Topics in Ancient History (1.0 - 4.0 cr)
LAT 5200 - Advanced Reading in Later Latin (3.0 cr)
Twin Cities Campus
Cognitive Science Minor
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3570; fax: 612-626-7253)
Email: cogsci@umn.edu
Website: http://www.cogsci.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8 to 9
- Length of program in credits (Doctorate): 14 to 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Cognitive science is broadly concerned with integrating contemporary approaches to the study of mind/brain, and with the systems and processes underlying the acquisition and use of knowledge. The coherence of the program lies in its intellectual focus on cognition. This program spans cellular, behavioral, and psychological levels of scientific analysis in the study of cognition in a single unified graduate program. It integrates the diverse content, methods, and perspectives of a number of different disciplines (e.g., anthropology, biology, artificial intelligence, linguistics, neuroscience, philosophy, and psychology), which are concerned with or in some sense inform our understanding of cognition.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Substitutions for required courses are permitted only with prior permission from the director of graduate studies for cognitive science. Elected courses must be taught by faculty in the minor program or be approved in advance by the director of graduate studies for cognitive science. Courses in the student's major department do not count toward the minor.

Introduction to Cognitive Science
CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
or CGSC 8041 - Cognitive Neuroscience (4.0 cr)
or An appropriate substitute approved by the DGS.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Major Electives
- Take 5 or more credit(s) from the following:
  - CGSC 8xxx
• **Cognitive Psychology**
  - [PSY 5014](#) - Psychology of Human Learning and Memory (3.0 cr)
  - or [PSY 5015](#) - Cognition, Computation, and Brain (3.0 cr)
  - or [PSY 5062](#) - Cognitive Neuropsychology (3.0 cr)
  - or [PSY 5064](#) - Brain and Emotion (3.0 cr)
  - or [PSY 5137](#) - Introduction to Behavioral Genetics (3.0 cr)
  - or [PSY 8010](#) - Advanced Topics in Learning (3.0 cr)
  - or [PSY 8031](#) - Seminar: Visual Perception (2.0 cr)
  - or [PSY 8036](#) - Topics in Computational Vision (3.0 cr)
  - or [PSY 8055](#) - Seminar: Cognitive Neuroscience (3.0 cr)
  - or [PSY 8056](#) - Seminar: Psychology of Language (3.0 cr)
  - or [PSY 8201](#) - Social Cognition (3.0 cr)
  - or [EPSY 8116](#) - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
  - or [EPSY 8117](#) - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
  - or [PSY 8301](#) - Developmental Psychology: Cognitive Processes (4.0 cr)
  - or [EEB 5322](#) - Evolution and Animal Cognition (3.0 cr)

• **Computer Science**
  - [CSCI 5421](#) - Advanced Algorithms and Data Structures (3.0 cr)
  - or [CSCI 5511](#) - Artificial Intelligence I (3.0 cr)
  - or [CSCI 5115](#) - User Interface Design, Implementation and Evaluation (3.0 cr)
  - or [CSCI 5521](#) - Introduction to Machine Learning (3.0 cr)
  - or [CSCI 5525](#) - Machine Learning (3.0 cr)
  - or [CSCI 5561](#) - Computer Vision (3.0 cr)
  - or [CSCI 8115](#) - Human-Computer Interaction and User Interface Technology (3.0 cr)
  - or [CSCI 8211](#) - Advanced Computer Networks and Their Applications (3.0 cr)
  - or [CSCI 8442](#) - Computational Geometry and Applications (3.0 cr)
  - or [CSCI 8551](#) - Intelligent Agents (3.0 cr)
  - or [CSCI 8725](#) - Databases for Bioinformatics (3.0 cr)

• **Linguistics**
  - [LING 5001](#) - Introduction to Linguistics [SOCS] (4.0 cr)
  - or [LING 5201](#) - Syntactic Theory I (3.0 cr)
  - or [LING 5202](#) - Syntactic Theory II (3.0 cr)
  - or [LING 5205](#) - Semantics (3.0 cr)
  - or [LING 5206](#) - Linguistic Pragmatics (3.0 cr)
  - or [LING 5801](#) - Introduction to Computational Linguistics (3.0 cr)
  - or [LING 8200](#) - Topics in Syntax and Semantics (3.0 cr)
  - or [LING 8210](#) - Seminar in Syntax (3.0 cr)
  - or [LING 8900](#) - Seminar: Topics in Linguistics (3.0 cr)
  - or [LING 8920](#) - Topics in Language and Cognition (3.0 cr)

• **Neuroscience**
  - [NSC 5202](#) - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
  - or [NSC 5461](#) - Cellular and Molecular Neuroscience (4.0 cr)
  - or [NSC 5561](#) - Systems Neuroscience (4.0 cr)
  - or [NSC 8217](#) - Systems and Computational Neuroscience (2.0 cr)

• **Philosophy**
  - [PHIL 4615](#) - Minds, Bodies, and Machines (3.0 cr)
  - or [PHIL 8131](#) - Epistemology Survey (3.0 cr)
  - or [PHIL 8180](#) - Seminar: Philosophy of Language (3.0 cr)
  - or [PHIL 8182](#) - Formal Semantics of Natural Language (3.0 cr)
  - or [PHIL 8620](#) - Seminar: Philosophy of the Biological Sciences (3.0 cr)
  - or [PHIL 8670](#) - Seminar: Philosophy of Science (3.0 cr)

**Doctoral Major Electives**
Take 11 or more credit(s) from the following:
- [CGSC 8xxx](#)

• **Cognitive Psychology**
  - [PSY 5014](#) - Psychology of Human Learning and Memory (3.0 cr)
  - or [PSY 5015](#) - Cognition, Computation, and Brain (3.0 cr)
  - or [PSY 5062](#) - Cognitive Neuropsychology (3.0 cr)
  - or [PSY 5064](#) - Brain and Emotion (3.0 cr)
  - or [PSY 5137](#) - Introduction to Behavioral Genetics (3.0 cr)
  - or [PSY 8010](#) - Advanced Topics in Learning (3.0 cr)
  - or [PSY 8031](#) - Seminar: Visual Perception (2.0 cr)
  - or [PSY 8036](#) - Topics in Computational Vision (3.0 cr)
or PSY 8055 - Seminar: Cognitive Neuroscience (3.0 cr)
or PSY 8056 - Seminar: Psychology of Language (3.0 cr)
or PSY 8201 - Social Cognition (3.0 cr)
or EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
or EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
or CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
or EEB 5322 - Evolution and Animal Cognition (3.0 cr)

• Computer Science
  • CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
or CSCI 5511 - Artificial Intelligence I (3.0 cr)
or CSCI 5515 - User Interface Design, Implementation and Evaluation (3.0 cr)
or CSCI 5521 - Introduction to Machine Learning (3.0 cr)
or CSCI 5525 - Machine Learning (3.0 cr)
or CSCI 5561 - Computer Vision (3.0 cr)
or CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
or CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
or CSCI 8442 - Computational Geometry and Applications (3.0 cr)
or CSCI 8551 - Intelligent Agents (3.0 cr)
or CSCI 8725 - Databases for Bioinformatics (3.0 cr)

• Linguistics
  • LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
or LING 5201 - Syntactic Theory I (3.0 cr)
or LING 5202 - Syntactic Theory II (3.0 cr)
or LING 5205 - Semantics (3.0 cr)
or LING 5206 - Linguistic Pragmatics (3.0 cr)
or LING 5801 - Introduction to Computational Linguistics (3.0 cr)
or LING 8200 - Topics in Syntax and Semantics (3.0 cr)
or LING 8210 - Seminar in Syntax (3.0 cr)
or LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
or LING 8920 - Topics in Language and Cognition (3.0 cr)

• Neuroscience
  • NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
or NSC 5461 - Cellular and Molecular Neuroscience (4.0 cr)
or NSC 5561 - Systems Neuroscience (4.0 cr)
or NSC 8217 - Systems and Computational Neuroscience (2.0 cr)

• Philosophy
  • PHIL 4615 - Minds, Bodies, and Machines (3.0 cr)
or PHIL 8131 - Epistemology Survey (3.0 cr)
or PHIL 8180 - Seminar: Philosophy of Language (3.0 cr)
or PHIL 8182 - Formal Semantics of Natural Language (3.0 cr)
or PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
or PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)
Twin Cities Campus
Cognitive Science Ph.D.
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3570; fax: 612-626-7253)
Email: cogsci@umn.edu
Website: http://www.cogsci.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Cognitive science is broadly concerned with integrating contemporary approaches to the study of mind/brain, and with the systems and processes underlying the acquisition and use of knowledge. The coherence of the program lies in its intellectual focus on cognition. This program spans cellular, behavioral, and psychological levels of scientific analysis in the study of cognition in a single unified graduate program. It integrates the diverse content, methods, and perspectives of a number of different disciplines (e.g., anthropology, biology, artificial intelligence, linguistics, neuroscience, philosophy, and psychology), which are concerned with or in some sense inform our understanding of cognition. The Ph.D. program trains cognitive scientists to conduct research integrating methodologies and content knowledge from a variety of approaches. In order to ensure an interdisciplinary approach, each student has two co-advisors from the cognitive science graduate faculty, each representing a different discipline from within the cognitive sciences.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applicants must apply through the University's online application system. They must submit a completed application, scores from the GRE, and three letters of recommendation. Applicants wishing to be considered for financial support should apply no later than December 1 of the preceding academic year. Entry is usually in fall semester but may be permitted in other semesters in exceptional cases.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
39 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The Ph.D. program requires a minimum of 39 credits, in addition to 24 thesis credits.

Students are required to take two core courses with a CGSC designator, as well as 3 credits of independent study related to research.

Responsible Conduct of Research training is required and is integrated into the two core courses taken by all students. Other course requirements are distributed among component disciplines and fields. Courses are intended to provide a foundation for the student's research program. Students are expected to conduct two research projects prior to taking their preliminary written exams. A report on the first-year research project should be concluded by the first term of the second year. A report on the second-year research project should be completed by the second term of the third year. The preliminary written exams will typically be (but are not necessarily) expansions of the first- and second-year research projects. The two Ph.D. written preliminary projects are expected to be of near publishable quality. As entry into the Ph.D. program assumes no previous graduate work, students who enter the program with an M.A. or other graduate coursework in a cognitive science-related discipline may apply credits from their previous graduate work towards the required 46 credits.

Introduction to Cognitive Science
CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
or CGSC 8041 - Cognitive Neuroscience (4.0 cr)
or An appropriate substitute approved by the DGS.

Major Electives
Students must take at least 3 credits from each of the 5 disciplines listed below and take a total of at least 30 credits.

**Cognitive Psychology**
Take 3 or more credit(s) from the following:
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
- PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
- PSY 8010 - Advanced Topics in Learning (3.0 cr)
- PSY 8031 - Seminar: Visual Perception (2.0 cr)
- PSY 8036 - Topics in Computational Vision (3.0 cr)
- PSY 8055 - Seminar: Cognitive Neuroscience (3.0 cr)
- PSY 8056 - Seminar: Psychology of Language (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts (3.0 cr)
- EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
- CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
- EEB 5322 - Evolution and Animal Cognition (3.0 cr)

**Computer Science**
Take 3 or more credit(s) from the following:
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5521 - Introduction to Machine Learning (3.0 cr)
- CSCI 5525 - Machine Learning (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
- CSCI 8442 - Computational Geometry and Applications (3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)
- CSCI 8725 - Databases for Bioinformatics (3.0 cr)

**Linguistics**
Take 3 or more credit(s) from the following:
- LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
- LING 5201 - Syntactic Theory I (3.0 cr)
• LING 5202 - Syntactic Theory II (3.0 cr)
• LING 5205 - Semantics (3.0 cr)
• LING 5206 - Linguistic Pragmatics (3.0 cr)
• LING 5801 - Introduction to Computational Linguistics (3.0 cr)
• LING 8200 - Topics in Syntax and Semantics (3.0 cr)
• LING 8210 - Seminar in Syntax (3.0 cr)
• LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
• LING 8920 - Topics in Language and Cognition (3.0 cr)

Neuroscience
Take 3 or more credit(s) from the following:
• NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
• NSC 5461 - Cellular and Molecular Neuroscience (4.0 cr)
• NSC 5561 - Systems Neuroscience (4.0 cr)
• NSC 8217 - Systems and Computational Neuroscience (2.0 cr)

Philosophy
Take 3 or more credit(s) from the following:
• PHIL 4615 - Minds, Bodies, and Machines (3.0 cr)
• PHIL 8131 - Epistemology Survey (3.0 cr)
• PHIL 8180 - Seminar: Philosophy of Language (3.0 cr)
• PHIL 8182 - Formal Semantics of Natural Language (3.0 cr)
• PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
• PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)
Twin Cities Campus
Communication Studies M.A.
Communication Studies
College of Liberal Arts

Contact Information:
Department of Communication Studies, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN  55455 (612-624-5800; fax: 612-624-6544).
Website: http://www.comm.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 31 to 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Communication studies focuses on the study of communicative dimensions of human experience using humanistic and social scientific methods. This program prepares students to become researchers and teachers, offering three concentrations: interpersonal communication, rhetorical studies, and critical media studies. Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended. Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics. Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes television studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, environmental communication, and music. Coursework outside the department is usually in the fields of American studies, political science, cultural studies, mass communication, or women's studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
All applicants must have completed at least 15 undergraduate credits in speech or communication courses related to their proposed area of emphasis in the department. A brochure detailing prerequisite requirements is available from the department or from the department website. All prerequisites must be completed before admission.

Special Application Requirements:
Applicants must submit scores from the GRE General Test, transcripts of all post-secondary academic work, and a written statement of academic and occupational objectives. Three letters of recommendation and a writing sample are required of all applicants for assistantships or fellowships.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 21 to 27 major credits and 6 to 12 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: A publishable, article-length paper consisting of the student's original research.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

It is recommended that students pursue a graduate minor to fulfill the requirement of 6 credits outside the Communication Studies major.

Plan A

Major Concentrations
Student select two concentrations for their master's degree.
Courses are selected in consultation with the Director of Graduate Studies.
Take 15 or more credit(s) from the following:

Primary Concentration
Take 6 - 12 credit(s) from the following:
• COMM 5xxx
• COMM 8xxx

Secondary Concentration
Take 3 - 9 credit(s) from the following:
• COMM 5xxx
• COMM 8xxx

Outside the Major -- Related Fields
Take 6 credits outside Communication Studies for a master's minor or in related fields.

Thesis Credits
Take 10 or more credit(s) from the following:
• COMM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Take 27 - 33 credit(s) from the following:

Major Concentrations
Students select two concentrations for their master's degree.
Courses are selected in consultation with the Director of Graduate Studies.
Take 21 - 27 credit(s) from the following:

Primary Concentration
Take 18 or more credit(s) from the following:
• COMM 5xxx
• COMM 8xxx

Secondary Concentration
Take 3 or more credit(s) from the following:
• COMM 5xxx
• COMM 8xxx

**Outside the Major -- Related Fields**
Take 6-12 credits outside Communication Studies for a master's minor or in related fields.
Twin Cities Campus
Communication Studies Minor
Communication Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Communication Studies, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN  55455
(612-624-5800; fax: 612-624-6544)
Website: [http://www.comm.umn.edu](http://www.comm.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Communication studies focuses on the study of communicative dimensions of human experience using humanistic and social scientific methods. This program prepares students to become researchers and teachers, offering three concentrations: interpersonal communication, rhetorical studies, and critical media studies. Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended. Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics. Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes television studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, environmental communication, and music. Coursework outside the department is usually in the fields of American studies, political science, cultural studies, mass communication, or women's studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Take 6 or more credit(s) from the following:
- COMM 5xxx
- COMM 8xxx
Doctoral

**Required Courses**

Take 12 or more credit(s) from the following:

- COMM 5xxx
- COMM 8xxx
Twin Cities Campus
Communication Studies Ph.D.
Communication Studies
College of Liberal Arts

Contact Information:
Department of Communication Studies, 225 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-5800; fax: 612-624-6544).
Website: http://www.comm.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Communication studies focuses on the study of communicative dimensions of human experience using humanistic and social scientific methods. This program prepares students to become researchers and teachers, offering three concentrations: interpersonal communication, rhetorical studies, and critical media studies. Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended. Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics. Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes television studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, environmental communication, and music. Coursework outside the department is usually in the fields of American studies, political science, cultural studies, mass communication, or women's studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
All applicants must have completed at least 15 undergraduate credits in speech or communication courses related to their proposed area of emphasis in the department. A brochure detailing prerequisite requirements is available from the department or from the department website. All prerequisites must be completed before admission.

Applicants must submit scores from the GRE General Test, transcripts of all postsecondary academic work, and a written statement of academic and occupational objectives. Three letters of recommendation and a writing sample are required of all applicants for assistantships or fellowships.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

Major Requirements
12 credits may be used from the Communications Studies M.A. if the student is pursuing both degrees.

Take 36 or more credit(s) from the following:

Primary Concentration
Take 18 or more credit(s) from the following:
- COMM 5xxx
- COMM 8xxx

Secondary Concentrations
Take 6 or more credit(s) from the following:
- COMM 5xxx
- COMM 8xxx

Research Methods Courses
Take 12 or more credit(s) from the following:
Research methods courses are relevant for completing the degree and continuing a scholarly career.
Under certain circumstances, foreign language courses may be used to satisfy the research methods requirement.

Outside Coursework
Take 12 credits outside the major.

Thesis Credits
Take 24 or more credit(s) from the following:
- COMM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Comparative Literature M.A.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: csclgrad@umn.edu
Website: http://cscl.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted to work toward the M.A. degree. In the event that a PhD student decides not to finish the PhD and is in good standing, that student may apply for a terminal M.A.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, this program focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary studies, directing much of its energies toward the intersection of literature with other media (in various constellations of word, sound, and image) and of literatures of the global North with those of the global South, engaging problems ranging from narrative to post-colonial studies.

The curriculum emphasizes seminars and directed research. The core requirement is a two-semester Basic Research Seminar (CL 8001-8002) that develops critical and analytic skills, and introduces current theoretical perspectives with the study of historical problems. Each entering graduate student also enrolls in courses that focus on developing skills and experience in teaching and other professional domains. Apart from core courses, many courses are nonrecurring and closely relate to current faculty research. A major portion of coursework for degrees in Comparative Literature is cross-listed with the literature and language departments. Approval may also be given to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, political theory, and sociology. In all cases, students should consult their advisors and the director of Graduate Studies concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students are not admitted to work toward the M.A. degree. In the event that a PhD student decides not to finish the PhD and is in good standing, that student may apply for a terminal M.A.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
- Speaking test score: 0

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan B:** Plan B requires 18 to 24 major credits and 6 to 12 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** One Plan B paper of approximately 40 pages is required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

**Required Courses**

- **CL 8001 - Basic Research Seminar in Comparative Literature I** (3.0 cr)
- **CL 8002 - Basic Research Seminar in Comparative Literature II** (3.0 cr)

Take 3 or more credit(s) from the following:

- **CL 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities** (3.0 cr)

**Major Electives**

Take 9 or more credit(s) from the following:

- **CL 5xxx**
- **CL 8xxx**

**Additional Comparative Literature Courses in the Related Minor Field**

Take 6 or more credit(s) from the following:

- **CL 5xxx**
- **CL 8xxx**

**Formal Minor or Supporting Program**

Take 6 or more credits in related fields outside Comparative Literature, or in a formal minor in another program (excluding Comparative Studies in Discourse and Society).
Twin Cities Campus
Comparative Literature Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: csclgrad@umn.edu
Website: http://cscl.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, this program focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study.

This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary studies, directing much of its energies toward the intersection of literature with other media (in various constellations of word, sound, and image) and of literatures of the global North with those of the global South, engaging problems ranging from narrative to postcolonial studies.

The curriculum emphasizes seminars and directed research. The core requirement is a two-semester Basic Research Seminar (CL 8001-8002) that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Each entering graduate student also enrolls in courses that focus on developing skills and experience in teaching and other professional domains. Apart from core courses, many courses are nonrecurring and closely relate to current faculty research. A major portion of coursework for degrees in Comparative Literature is cross-listed with the literature and language departments. Approval may also be given to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, political theory, and sociology. In all cases, students should consult with their advisors and the director of Graduate Studies concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
Required Courses
- CL 8001 - Basic Research Seminar in Comparative Literature I (3.0 cr)
- CL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
Electives
Take 3 or more credit(s) from the following:
• CL 5xxx
• CL 8xxx

Doctoral
Required Courses
• CL 8001 - Basic Research Seminar in Comparative Literature I (3.0 cr)
• CL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)

Electives
Take 6 or more credit(s) from the following:
• CL 5xxx
• CL 8xxx
Twin Cities Campus
Comparative Literature Ph.D.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Dr SE, Minneapolis, MN (612-624-8099; fax: 612-625-4170).
Email: csclgrad@umn.edu
Website: http://cscl.umn.edu/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, this program focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary studies, directing much of its energies toward the intersection of literature with other media (in various constellations of word, sound, and image) and literatures of the global North with those of the global South, engaging problems ranging from narrative to postcolonial studies. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester Basic Research Seminar (CL 8001-8002) that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Each entering graduate student also enrolls in courses that focus on developing skills and experience in teaching and other professional domains. Apart from core courses, many courses are nonrecurring and closely relate to current faculty research. A major portion of coursework for degrees in Comparative Literature is cross-listed with the literature and language departments. Approval may also be given to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, political theory, and sociology. In all cases, students should consult their advisers and the director of Graduate Studies concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The BS and/or MA degree in a humanities or a social science discipline, or other relevant field, is required for admission to the PhD.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

Coursework should include a minimum of 12 course credits at the 8xxx-level (excluding CL 8001 and CL 8002).

Required Courses
CL 8001 - Basic Research Seminar in Comparative Literature I (3.0 cr)
CL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
CL 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

Comparative Literature Electives
With approval of the adviser and the director of Graduate Studies, up to 3 credits of the 15-credit requirement may be taken in the field of the minor or supporting program.

Take 15 or more credit(s) from the following:
• CL 5xxx
• CL 8xxx

Additional Comparative Literature Courses or Courses in a Related Field
Take 11 or more credit(s) from the following:
• CSDS 5xxx
• CSDS 8xxx
• CL 5xxx
• CL 8xxx

Outside the Major in a Supporting Program
Formal Minor Option
Take 12 or more credit(s) from the following:
A formal minor in another graduate program, excluding Comparative Studies in Discourse and Society.

or Supporting Program Option
Take 12 or more credit(s) from the following:
Coursework outside of CSDS, CSCL, or CL courses in a coherent and complementary program to be approved by the adviser and the DGS. This option is for students who do not pursue a formal minor in another program.

Thesis Credits
Take 24 or more credit(s) from the following:
• CL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Comparative Studies in Discourse and Society M.A.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: csclgrad@umn.edu
Website: http://csds.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted to work toward the MA degree. In the event that a PhD student decides not to finish the PhD and is in good standing, that student may apply for a terminal MA. While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages broader topics—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester Basic Research Seminar (CSDS 8001-8002) that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Each entering graduate student also enrolls in courses that focus on developing skills and experience in teaching and other professional domains. Apart from core courses, many courses are nonrecurring and closely relate to current faculty research. In all cases, students should consult their advisers and the Director of Graduate Studies concerning course selections.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students are not admitted to work toward the MA degree. In the event that a PhD student decides not to finish the PhD and is in good standing, that student may apply for a terminal MA.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
Program Requirements

Plan B: Plan B requires 18 to 24 major credits and 6 to 12 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: One Plan B paper of approximately 40 pages is required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

MA Plan B degree requirements: students are not admitted to work toward the MA degree. In the event that a PhD student decides not to finish the PhD and is in good standing, that student may apply for a terminal MA.

Students are advised to check the program website indicated above for updated information.

Required Courses
Take the following courses for a total of 9 credits:

**CSDS 8001** - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
**CSDS 8002** - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
**CSDS 8901** - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

Major Electives
Select major electives in consultation with the advisor.
Take 9 or more credit(s) from the following:

- CSDS 5xxx
- CSDS 8xxx

Additional Coursework
Take at least 6 credits, in consultation with advisor, of courses within or outside CSDS.

CSDS 5xxx
CSDS 8xxx

Outside Coursework
Take at least 6 credits of related fields coursework, either outside of CSDS or as a formal minor (excluding comparative literature).
Twin Cities Campus
Comparative Studies in Discourse and Society Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: csclgrad@umn.edu
Website: http://cscl.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester Basic Research Seminar (CSDS 8001-8002) that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Each entering graduate student also enrolls in courses that focus on developing skills and experience in teaching and other professional domains. Apart from core courses, many courses are nonrecurring and closely relate to current faculty research. In all cases, students should consult their advisers and the Director of Graduate Studies concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Courses
- CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
- CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)

Electives
Take 3 or more credit(s) from the following:
• CSDS 5xxx
• CSDS 8xxx

Doctoral

Required Courses

- CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
- CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)

Electives

Take 6 or more credit(s) from the following:
• CSDS 5xxx
• CSDS 8xxx
Twin Cities Campus
Comparative Studies in Discourse and Society Ph.D.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-8099; fax: 612-625-4170)
Email: csclgrad@umn.edu
Website: http://csds.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 71 to 74
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester Basic Research Seminar (CSDS 8001-8002) that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Each entering graduate student also enrolls in courses that focus on developing skills and experience in teaching and other professional domains. Apart from core courses, many courses are nonrecurring and closely relate to current faculty research. In all cases, students should consult their advisors and the director of Graduate Studies concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The BA and/or MA degree in a humanities or a social science discipline, or other relevant field, is required for admission to the PhD.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in two languages (other than English)

A minimum GPA of 3.50 is required for students to remain in good standing.

Coursework should include a minimum of 12 course credits at the 8xxx-level (excluding CL 8001 and CL 8002).

Required Courses
- CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
- CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
- CSDS 8901 - Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities (3.0 cr)

CSDS Electives
With approval of the advisor and the director of Graduate Studies, up to 3 credits of the 15-credit requirement may be taken in the field of the minor or supporting program.
Take 15 or more credit(s) from the following:
- CSDS 5xxx
- CSDS 8xxx

Additional CSDS Courses or Courses in a Related Field
Take 11 or more credit(s) from the following:
- CSDS 5xxx
- CSDS 8xxx
- CL 5xxx
- CL 8xxx

Outside the Major in a Supporting Program
Formal Minor Option
Take 12 or more credit(s) from the following:
A formal minor in another graduate program, excluding Comparative Literature.

or Supporting Program Option
Take 12 or more credit(s) from the following:
Coursework outside of CSDS, CSCL, or CL courses in a coherent and complementary program to be approved by the adviser and the DGS. This option is for students who do not pursue a formal minor in another program.

Thesis Credits
Take 24 or more credit(s) from the following:
- CSDS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Creative Writing M.F.A.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English, 222 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-6366; fax: 612-624-8228)
Email: creatwri@umn.edu
Website: http://creativewriting.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Creative Writing Program in the Department of English offers the Master of Fine Arts (MFA) degree for students committed to pursuing the writing life. This three-year degree provides advanced, graduate-level coursework in writing, language, and literature, as well as study in a related field. The third year of the program focuses on the final development of a book-length manuscript suitable for publication. At the heart of the program are writing workshops in poetry, fiction, and literary nonfiction, and courses in the "Reading as Writers" and "Topics in Advanced Writing" series, which enable writers to explore a variety of issues relating to contemporary themes in American and world literature. The program encourages experimentation across genres, fostering the discovery of new and varied forms for a developing voice. Students also have the opportunity to work editorially on "Great River Review," the graduate literary magazine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program does not require a graduate degree for admission.

Special Application Requirements:
The MFA in Creative Writing does not require undergraduate work in English literature or an undergraduate degree in literature. Students come from a variety of educational backgrounds and life experiences. Applicants should be aware, however, that graduate coursework in literature and language is required once admitted to the program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 42 major credits and 3 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone project is a publishable thesis manuscript of poetry, fiction, or literary nonfiction. The final exam is an oral defense of the thesis manuscript and literary essay.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MFA requires 45 credits distributed over a three-year period, culminating in a book-length manuscript suitable for publication, an MFA literary essay, and an MFA defense.

Required Courses

ENGW 8101 - Reading Across Genres (4.0 cr)
ENGW 8180 - Thesis Seminar: Multi-Genre (4.0 cr)
Take exactly 4 credit(s) from the following:
• ENGW 8990 - MFA Creative Thesis (2.0 - 8.0 cr)

Workshop Electives

Take exactly 12 credit(s) from the following:
• ENGW 4205 - Screenwriting (3.0 cr)
• ENGW 5102 - Advanced Fiction Writing (4.0 cr)
• ENGW 5104 - Advanced Poetry Writing (4.0 cr)
• ENGW 5106 - Advanced Literary Nonfiction Writing (4.0 cr)
• ENGW 5130 - Topics in Advanced Creative Writing (4.0 cr)
• TH 4115 - Intermediate Playwriting (3.0 cr)

Creative Writing Electives

Take exactly 4 credit(s) from the following:
• ENGW 4xxx
• ENGW 5xxx
• ENGW 8xxx

Seminar Elective

ENGW 8110 - Seminar: Writing of Fiction (4.0 cr)
or ENGW 8120 - Seminar: Writing of Poetry (4.0 cr)
or ENGW 8130 - Seminar: Writing of Literary Nonfiction (4.0 cr)

Literature Language Electives

Take 3 or more credit(s) from the following:
• ENGL 5xxx
• ENGL 8xxx

Other Literature Language Electives

Take 7 or more credit(s) from the following:
• ENGW 5310 - Reading as Writers (4.0 cr)
• ENGW 5130 - Topics in Advanced Creative Writing (4.0 cr)
• ENGW 8110 - Seminar: Writing of Fiction (4.0 cr)
• ENGW 8120 - Seminar: Writing of Poetry (4.0 cr)
• ENGW 8130 - Seminar: Writing of Literary Nonfiction (4.0 cr)
• ENGL 5xxx
• ENGL 8xxx
• ENGL 5701 - Great River Review (4.0 cr)
or ENGW 5701 - Great River Review (4.0 cr)

Outside the Major or in a Supporting Program

Any graduate level course for 3 credits outside the English Department (not ENGW or ENGL).
Twin Cities Campus
Developmental Studies and Social Change Minor
CLA Dean's Office
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Interdisciplinary Center for the Study of Global Change, University of Minnesota, 537 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455 (612-624-0832; fax: 612-625-1879)
Email: icgc@umn.edu
Website: http://www.icgc.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This structured interdisciplinary doctoral minor is offered in conjunction with the Interdisciplinary Center for the Study of Global Change (ICGC). By focusing on the social bases of change in the global south, the program engages a wide range of academic disciplines, including the social sciences, humanities, and biological sciences. The minor focuses on three areas: 1) the relationships between macroscopic processes of political, economic, and social change, and the microscopic conditions of lived experience in the global south; 2) specifically interdisciplinary perspectives (encompassing the social sciences, the biological sciences, and the humanities) on this general thematic concern; and 3) preparation of doctoral students for research on the global south.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission is contingent upon prior admission to a doctoral degree-granting program at the University and upon affiliation with ICGC.

Special Application Requirements:
Students enrolled in a doctoral degree-granting program may apply for the minor at any time during the academic year; acceptance will take effect the following term. Students must be officially in the minor prior to taking their preliminary oral examination.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Required Courses
DSSC 8111 - Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change (3.0 cr)
DSSC 8112 - Scholarship and Public Responsibility (1.0 cr)
DSSC 8211 - Doctoral Research Workshop in Development Studies and Social Change (2.0 cr)
DSSC 8212 - Doctoral Research Workshop in Development Studies and Social Change (1.0 cr)
Take 2 or more credit(s) from the following:
Electives

Students are required to take a minimum of 3 credits from outside their own department or program. This list is intended only as a guide; other graduate courses may qualify as electives for the DSSC minor upon approval by the minor program director of Graduate Studies. The program for an individual student will be developed in consultation among the student, the major advisor, and the director or associate director of Graduate Studies in Development Studies and Social Change.

Take 3 or more credit(s) from the following:

Afro-American Studies

- AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)
- AFRO 5103 - World History and Africa (3.0 cr)
- AFRO 5120 - Social and Intellectual Movements in the African Diaspora (3.0 cr)
- AFRO 5191 - Seminar: The African American Experience in South Africa (3.0 cr)
- AFRO 5876 - Proseminar: Approaches to African Development (3.0 cr)
- AFRO 5910 - Topics in African American and African Studies (2.0 - 4.0 cr)
- AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
- AFRO 8554 - Seminar: Gender, Race, Nation, and Policy—Perspectives from Within the African Diaspora (3.0 cr)
- AFRO 8910 - Topics in Studies of Africa and the African Diaspora (3.0 cr)

American Indian Studies

- AMIN 5109 - Anishinaabe Literature (3.0 cr)
- AMIN 5409 - American Indian Women: Ethnographic and Ethnohistorical Perspectives [HIS, DSJ] (3.0 cr)
- AMIN 5890 - Problems in American Indian History (3.0 cr)

American Studies

- AMST 8239 - Gender, Race, Class, Ethnicity, and Sexuality in the United States: Readings (3.0 cr)
- AMST 8240 - Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development (3.0 cr)

Anthropology

- ANTH 5041 - Ecological Anthropology (3.0 cr)
- ANTH 8001 - Ethnography, Theory, History (3.0 cr)
- ANTH 8002 - Ethnography: Contemporary Theory and Practice (3.0 cr)
- ANTH 8120 - Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- ANTH 8205 - Economic Anthropology (3.0 cr)
- ANTH 8207 - Political and Social Anthropology (3.0 cr)
- ANTH 8213 - Ecological Anthropology (3.0 cr)
- ANTH 8215 - Anthropology of Gender (3.0 cr)

Apparel Studies

- APST 8267 - Dress and Culture (3.0 cr)

Applied Economics

- APEC 5321 - Regional Economic Analysis (3.0 cr)
- APEC 5511 - Labor Economics (3.0 cr)
- APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
- APEC 5731 - Economic Growth and International Development (3.0 cr)
- APEC 5751 - Global Trade and Policy (3.0 cr)
- APEC 8601 - Natural Resource Economics (3.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- APEC 8701 - International Economic Development, Growth, and Trade (3.0 cr)
- APEC 8702 - Economic and Trade Policy: Sectoral and Institutional Issues (3.0 cr)

Chicano Studies

- CHIC 5920 - Topics in Chicana(o) Studies (3.0 cr)

Communication Studies

- COMM 8211 - Critical Communication Studies: History, Theory, Method (3.0 cr)
- COMM 8451 - Seminar: Intercultural and Diversity Research (3.0 cr)

Comparative Literature

- CL 5910 - Topics in Comparative Literature (3.0 - 4.0 cr)
- CL 8001 - Basic Research Seminar in Comparative Literature I (3.0 cr)
- CL 8002 - Basic Research Seminar in Comparative Literature II (3.0 cr)
- CL 8362 - Modernity and Its Others (4.0 cr)
- CL 8910 - Advanced Topics in Comparative Literature (3.0 cr)
- CL 8920 - Advanced Topics in Comparative Literature (3.0 cr)

Comparative Studies in Discourse and Society

- CSDS 8001 - Basic Research Seminar: Comparative Studies in Discourse and Society I (3.0 cr)
- CSDS 8002 - Basic Research Seminar in Comparative Studies in Discourse and Society II (3.0 cr)
- CSDS 8910 - Advanced Topics in Comparative Studies in Discourse and Society (3.0 cr)
- CSDS 8920 - Advanced Topics in Comparative Studies in Discourse and Society (3.0 cr)

Conservation Biology

- CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
CONS 8095 - Contemporary Problems in Conservation Biology (1.0 cr)

- Curriculum and Instruction
  • CI 5137 - Multicultural Gender-Fair Curriculum (3.0 cr)
  • CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)

- Design
  • DES 5165 - Design and Globalization (3.0 cr)
  • DES 8166 - Material Culture and Design (3.0 cr)

- Economics
  • ECON 8311 - Economic Growth and Development (2.0 cr)
  • ECON 8312 - Economic Growth and Development (2.0 cr)
  • ECON 8313 - Economic Growth and Development (2.0 cr)
  • ECON 8381 - Advanced Topics in Economic Development (2.0 cr)
  • ECON 8391 - Workshop in Economic Growth and Development (1.0 - 3.0 cr)
  • ECON 8401 - International Trade and Payments Theory (2.0 cr)
  • ECON 8402 - International Trade and Payments Theory (2.0 cr)
  • ECON 8403 - International Trade and Payments Theory (2.0 cr)
  • ECON 8404 - International Trade and Payments Theory (2.0 cr)
  • ECON 8481 - Advanced Topics in International Trade (2.0 cr)
  • ECON 8482 - Advanced Topics in International Trade (2.0 cr)
  • ECON 8491 - Workshop in Trade and Development (1.0 - 3.0 cr)
  • ECON 8492 - Workshop in Trade and Development (1.0 - 3.0 cr)

- English Literature
  • ENGL 5510 - Readings in Criticism and Theory (3.0 cr)
  • ENGL 8190 - Seminar in 20th-Century Anglophone Literatures and Cultures (3.0 cr)
  • ENGL 8400 - Seminar in Post-Colonial Literature, Culture, and Theory (3.0 cr)
  • ENGL 8510 - Studies in Criticism and Theory (3.0 cr)
  • ENGL 8520 - Seminar: Cultural Theory and Practice (3.0 cr)
  • ENGL 8530 - Seminar in Feminist Criticism (3.0 cr)

- Environmental Sciences, Policy and Management
  • ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
  • ESPM 5101 - Conservation of Plant Biodiversity (3.0 cr)
  • ESPM 5241 - Natural Resource and Environmental Policy (3.0 cr)
  • ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
  • ESPM 5261 - Economics and Natural Resources Management (4.0 cr)
  • ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)

- Fisheries and Wildlife
  • FW 5003 - Human Dimensions of Biological Conservation (3.0 cr)
  • FW 8452 - Conservation Biology (3.0 cr)

- French
  • FREN 5470 - Post/Colonial Francophone Literatures (3.0 cr)

- Geography
  • GEOG 5385 - Globalization and Development: Political Economy (4.0 cr)
  • GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
  • GEOG 8005 - Proseminar: Population Geography (3.0 cr)
  • GEOG 8007 - Proseminar: Theories of Development and Change (3.0 cr)
  • GEOG 8101 - Proseminar: Nature and Society (3.0 cr)
  • GEOG 8212 - Africa (3.0 cr)
  • GEOG 8213 - East Asia and China (3.0 cr)
  • GEOG 8214 - South Asia (3.0 cr)
  • GEOG 8220 - Agrarian Change and Rural Development (3.0 cr)
  • GEOG 8240 - Medical Geography (3.0 cr)
  • GEOG 8336 - Development Theory and the State (3.0 cr)

- Gender, Women, and Sexuality Studies
  • GWSS 5104 - Transnational Feminist Theory (3.0 cr)
  • GWSS 5290 - Topics: Biology, Health, and Environmental Studies (3.0 cr)
  • GWSS 5390 - Topics: Visual, Cultural, and Literary Studies (3.0 cr)
  • GWSS 5490 - Topics: Political Economy and Global Studies (3.0 cr)
  • GWSS 8101 - Intellectual History of Feminism (3.0 cr)
  • GWSS 8102 - Advanced Studies in Sexuality (3.0 cr)
  • GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
  • GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
  • GWSS 8109 - Feminist Knowledge Production (3.0 cr)
  • GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)
  • GWSS 8301 - Feminist Literary Criticism (3.0 cr)

- Global Studies
•GLOS 5602 - Other Worlds: Globality and Culture (3.0 cr)
GLOS 5900 - Topics in Global Studies (1.0 - 4.0 cr)

•History
•HIST 5439 - Environment and Society in Africa (3.0 cr)
HIST 5468 - Social Change in Modern China (3.0 cr)
HIST 5479 - History of Chinese Cities and Urban Life (3.0 cr)
HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
HIST 5633 - Socio-Economic History of China (3.0 cr)
HIST 5881 - American Foreign Relations to 1895 (3.0 cr)
HIST 5890 - Problems in American Indian History (3.0 cr)
HIST 5901 - Latin America Proseminar: Colonial (3.0 cr)
HIST 5902 - Latin America Proseminar: Modern (3.0 cr)
HIST 5920 - Topics in African History (3.0 cr)
HIST 5932 - The Production of Knowledge, Negotiating the Past, and the Writing of African Histories (3.0 cr)
HIST 5940 - Topics in Asian History (1.0 - 4.0 cr)
HIST 5950 - Topics in Latin American History (1.0 - 4.0 cr)
HIST 5962 - Bell Library Research Seminar in Comparative World History, ca. 1000-1800 CE (3.0 cr)
HIST 5964 - Comparative Economic History (3.0 cr)
HIST 5980 - Topics in Comparative Women's History (3.0 - 4.0 cr)
HIST 5990 - Readings in Comparative History (3.0 cr)
HIST 8239 - Readings in Gender, Race, Class, and/or Ethnicity in the United States (3.0 cr)
HIST 8240 - Topics in Research in Gender, Race, Class, or Ethnicity in the United States (3.0 cr)
HIST 8245 - Human Rights and Crimes Against Humanity: A Global History (3.0 cr)
HIST 8390 - Research in American Indian History (3.0 cr)
HIST 8464 - Research in Yuan, Ming, and Qing History (3.0 cr)
HIST 8465 - Research in Yuan, Ming, and Qing History (3.0 cr)
HIST 8630 - Seminar in World History (3.0 cr)
HIST 8709 - Seminar: History of Sexuality (3.0 cr)
HIST 8920 - Topics in African History (1.0 - 4.0 cr)
HIST 8940 - Topics in Asian History (1.0 - 4.0 cr)
HIST 8944 - Research Seminar: New Directions in African Social History I (3.0 cr)
HIST 8945 - Research Seminar: New Directions in African Social History II (3.0 cr)
HIST 8950 - Topics in Latin American History (1.0 - 4.0 cr)
HIST 8990 - Topics in Comparative History-Research (3.0 cr)

•History of Science and Technology
•HSCI 5244 - History of Ecology and Environmentalism (3.0 cr)
HSCI 5331 - Technology and American Culture (3.0 cr)
HSCI 5332 - Science and American Culture (2.0 - 3.0 cr)
HSCI 8441 - Women in Science: Historical Perspectives (3.0 cr)
HSCI 8940 - Seminar: History of Science and Technology in the Americas (3.0 cr)
HSCI 8950 - Seminar: Science and Technology in Cultural Settings (3.0 cr)

•Housing Studies
•HSG 8463 - Housing: Race and Class (3.0 cr)

•Journalism and Mass Communication
•JOUR 8513 - Seminar: Ethnographic Methods in Mass Communication Research (3.0 cr)
JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
JOUR 8721 - Seminar: Communication Agencies as Social Institutions (3.0 cr)
JOUR 8801 - Seminar: Comparative Research in Mass Communication, a Cross-National Approach (3.0 cr)

•Music
•MUS 8864 - Current Issues in Ethnomusicology (3.0 cr)

•Organizational Leadership, Policy and Development
•OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5121 - Educational Reform in International Context (3.0 cr)
OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
OLPD 5128 - Anthropology of Education (3.0 cr)
OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
OLPD 8121 - Doctoral Seminar: Comparative and International Development Education (1.0 - 6.0 cr)

•Philosophy
•PHIL 8600 - Workshop in the Philosophy of Science (1.0 cr)
PHIL 8660 - Seminar: Social and Cultural Studies of Science (3.0 cr)
PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)

•Political Science
•POL 5410 - Topics in Comparative Politics (1.0 - 3.0 cr)
POL 5477 - Struggles and Issues in the Middle East (4.0 cr)
POL 5485 - Human Rights Policy: Issues and Actors (3.0 cr)
POL 5525 - Federal Indian Policy (3.0 cr)
POL 5833 - The United States in the Global Economy/US For Econ Policy (3.0 - 4.0 cr)
POL 5885 - International Conflict and Security (3.0 cr)
POL 8235 - Democratic Theory (3.0 cr)
POL 8275 - Contemporary Political Thought (3.0 cr)
POL 8401 - International Relations (3.0 cr)
POL 8402 - International Security (3.0 cr)
POL 8403 - International Norms and Institutions (3.0 cr)
POL 8404 - International Hierarchy (3.0 cr)
POL 8405 - International Political Economy (3.0 cr)
POL 8406 - Politics of International Finance (3.0 cr)
POL 8407 - Morality in World Politics (3.0 cr)
POL 8408 - International Relations of the Environment (3.0 cr)
POL 8411 - Political Psychology and Foreign Policy (3.0 cr)
POL 8412 - American Foreign Policy (3.0 cr)
POL 8460 - Topics in International Relations (3.0 cr)
POL 8601 - Introduction to Comparative Politics (3.0 cr)
POL 8605 - Government and Politics in Africa (3.0 cr)
POL 8608 - Government and Politics of Russia and the Commonwealth of Independent States (3.0 cr)
POL 8611 - Chinese Politics (3.0 cr)
POL 8619 - Latin American Politics (3.0 cr)
POL 8633 - Comparative Sociopolitical Change (3.0 cr)
POL 8637 - Comparative Political Economy (3.0 cr)
POL 8641 - Comparative Mass Political Behavior (3.0 cr)
POL 8643 - Comparative Political Institutions (3.0 cr)
POL 8660 - Topics in Comparative Politics (3.0 cr)

• Portuguese
  PORT 5530 - Brazilian Literary and Cultural Studies (3.0 cr)
  PORT 5540 - Literatures and Cultures of Lusophone Africa (3.0 cr)
  PORT 5910 - Topics in Lusophone Cultures and Literatures (3.0 cr)

• Public Affairs
  PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
  PA 5421 - Racial Inequality and Public Policy (3.0 cr)
  PA 5451 - Immigration, Health and Public Policy (3.0 - 4.0 cr)
  PA 5460 - Topics in Race, Ethnicity, and Public Policy (1.0 - 3.0 cr)
  PA 5501 - Theories and Policies of Development (3.0 cr)
  PA 5511 - Community Economic Development (3.0 cr)
  PA 5521 - Development Planning and Policy Analysis (4.0 cr)
  PA 5522 - International Development Policy, Families, and Health (3.0 cr)
  PA 5590 - Topics in Economic and Community Development (1.0 - 3.0 cr)
  PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
  PA 5690 - Topics in Women and Public Policy (1.0 - 3.0 cr)
  PA 5701 - Science and State (3.0 cr)
  PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
  PA 5721 - Energy and Environmental Policy (3.0 cr)
  PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
  PA 5801 - Global Public Policy (3.0 cr)
  PA 5890 - Topics in Foreign Policy and International Affairs (1.0 - 5.0 cr)
  PA 5952 - Global Commons Seminar II (2.0 cr)
  PA 6866 - Feminist Organizations (3.0 cr)
  PA 8690 - Advanced Topics in Women and Public Policy (1.0 - 3.0 cr)
  PA 8811 - Strategic Issues in International Economic Policy (3.0 cr)
  PA 8821 - National Security Policy (3.0 cr)
  PA 8890 - Advanced Topics in Foreign Policy and International Affairs (1.0 - 3.0 cr)

• Public Health
  PUBH 6055 - Social Inequalities in Health (2.0 cr)
  PUBH 6131 - Working in Global Health (2.0 cr)
  PUBH 6281 - Immigrant Health Issues (3.0 - 4.0 cr)

• Sociology
  SOC 8211 - The Sociology of Race & Racialization (3.0 cr)
  SOC 8221 - Sociology of Gender (3.0 cr)
  SOC 8290 - Topics in Social Stratification (3.0 cr)
  SOC 8311 - Political Sociology (3.0 cr)
  SOC 8701 - Sociological Theory (4.0 cr)
SOC 8790 - Advanced Topics in Sociological Theory (3.0 cr)

• Spanish
  • SPAN 5531 - Hispanic Literature of the United States (3.0 cr)
  • SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)
  • SPAN 8960 - Workshop: Research in Hispanic Cultural Issues (3.0 cr)
  • SPAN 8990 - Advanced Comparative Research of Caribbean Genres (3.0 cr)
  • SPPT 5930 - Selected Topics in Hispanic and Lusophone Cultural Discourse (1.0 - 3.0 cr)

• Studies in Cinema and Media Culture
  • SCMC 5001 - Critical Debates in the Study of Cinema and Media Culture (4.0 cr)

• Studies of Science and Technology
  • SST 8400 - Seminar: Science, Technology, and Society (3.0 cr)
  • SST 8420 - Seminar: Social and Cultural Studies of Science (3.0 cr)

• Sustainable Agriculture
  • SAGR 8010 - Colloquium in Sustainable Agriculture (2.0 cr)
  • SAGR 8020 - Field Experience in Sustainable Agriculture (1.0 - 4.0 cr)

• Theatre Arts
  • TH 5117 - Performance and Social Change (3.0 cr)
Twin Cities Campus
Early Modern Studies Minor
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Email: emsdgs@umn.edu
Website: http://www.cemh.umn.edu/minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The early modern studies (EMS) minor is available to master's and doctoral students. The program encourages inquiry into the early modern period, roughly 1300 to 1800 A.C.E., using insights and perspectives from multiple disciplines. The minor provides graduate students with solid grounding in the theories and multi-disciplinary methods used by scholars studying the early modern period, particularly through the required core seminar (EMS 8250 - Seminar in EMS: Current Research and Methodologies), which is co-taught by professors from two distinct departments.

The minor also offers an opportunity to interact with the current research of visiting scholars and University of Minnesota faculty and graduate students through EMS 8100 - Workshop in Early Modern Studies, in which students share written responses to workshops and lectures on campus. Finally, the minor draws electives from existing courses in departments across the College of Liberal Arts, as well as those in the History of Science, Technology, and Medicine. The University of Minnesota has numerous library collections and research centers which include a focus on the early modern period. For more information on the minor, visit www.cemh.umn.edu/minor.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Admission to the early modern studies graduate minor is contingent upon prior admission to a master's or doctoral degree-granting program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses
EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
Students are required to enroll in EMS 8100 for 1 credit worth of workshop experience.
Take 1 or more credit(s) from the following:
• EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)
Elective Credits
Take 3 or more credit(s) from the following:
• EMS 5500 - Topics in Early Modern Studies (3.0 cr)
• EMS 8500 - Topics in Early Modern Studies (3.0 cr)
• EMS 8993 - Directed Study (1.0 - 6.0 cr)
*These electives can apply towards the minor. Not all courses are offered every semester.
• ARTH 5301 - Visual Culture of the Atlantic World (3.0 cr)
  or ARTH 5302 - Print Culture in Early Modern Europe (3.0 cr)
  or ARTH 5324 - 15th-Century Painting (3.0 cr)
  or ARTH 5335 - Baroque Rome: Art and Politics in the Papal Capital (3.0 cr)
  or ARTH 5777 - The Diversity of Traditions: Indian Art 1200 to Present (3.0 cr)
  or ARTH 5781 - Age of Empire: The Mughals, Safavids, and Ottomans (3.0 cr)
  or ARTH 5785 - Art of Islamic Iran (3.0 cr)
  or ARTH 8320 - Seminar: Issues in Early Modern Visual Culture (3.0 cr)
  or ARTH 8340 - Seminar: Baroque Art (3.0 cr)
  or ENGL 5121 - Readings in Early Modern Literature and Culture (3.0 cr)
  or ENGL 8120 - Seminar in Early Modern Literature and Culture (3.0 cr)
  or FREN 8371 - The Rule of Reason, The Reign of Madness: Readings in Early Modern France (3.0 cr)
  or FREN 8271 - The Novel of the Ancien Regime (3.0 cr)
  or GER 8210 - Seminar in Early Modern German Literature and Culture (3.0 cr)
  or HIST 5379 - Problems in Early American History (3.0 cr)
  or HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
  or HIST 5469 - Historiographies of China, 1000-1700 (3.0 cr)
  or HIST 5612 - New Directions in the Middle Ages, ca. 1100-1500 (3.0 cr)
  or HIST 5715 - Readings in European Women's History: 1450-1750 (3.0 cr)
  or HIST 5801 - Seminar in Early American History (3.0 cr)
  or HIST 5901 - Latin America Proseminar: Colonial (3.0 cr)
  or HIST 5962 - Bell Library Research Seminar in Comparative World History, ca. 1000-1800 CE (3.0 cr)
  or HIST 5964 - Comparative Economic History (3.0 cr)
  or HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
  or HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
  or MUS 5624 - Music of J. S. Bach (3.0 cr)
  or PHIL 8085 - Seminar: History of Philosophy--Modern Philosophers (3.0 cr)
  or PHIL 8090 - Seminar: History of Modern Philosophy (3.0 cr)
  or PORT 5520 - Portuguese Literary and Cultural Studies (3.0 cr)
  or PORT 5530 - Brazilian Literary and Cultural Studies (3.0 cr)
  or SPAN 5316 - Spanish Picaresque Narratives (3.0 cr)
  or SPAN 8212 - Spanish Theater of the 16th Century: Drama up to Lope (3.0 cr)
  or SPAN 8223 - The Poetry of the Spanish Golden Age (3.0 cr)
  or SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
  or SPPT 8400 - Topics in Modern Hispanic and Lusophone Culture (3.0 cr)
  or TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)
  or TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)
  or PHIL 4055 - Kant (3.0 cr)
  with PHIL 8010 - Workshop in History of Philosophy (1.0 cr)

Doctoral
Required Courses
EMS 8250 - Seminar in Early Modern Studies (3.0 cr)
Students are required to enroll in the following course for 3 credits, either all at once, or split between separate semesters:
  Take 3 or more credit(s) from the following:
  • EMS 8100 - Workshop in Early Modern Studies (1.0 - 3.0 cr)

Elective Credits
Take 6 or more credit(s) from the following:
• EMS 5500 - Topics in Early Modern Studies (3.0 cr)
• EMS 8500 - Topics in Early Modern Studies (3.0 cr)
• EMS 8993 - Directed Study (1.0 - 6.0 cr)
*These electives can apply towards the minor. Not all courses are offered every semester.
• ARTH 5301 - Visual Culture of the Atlantic World (3.0 cr)
  or ARTH 5302 - Print Culture in Early Modern Europe (3.0 cr)
  or ARTH 5324 - 15th-Century Painting (3.0 cr)
  or ARTH 5335 - Baroque Rome: Art and Politics in the Papal Capital (3.0 cr)
  or ARTH 5777 - The Diversity of Traditions: Indian Art 1200 to Present (3.0 cr)
  or ARTH 5781 - Age of Empire: The Mughals, Safavids, and Ottomans (3.0 cr)
  or ARTH 5785 - Art of Islamic Iran (3.0 cr)
or ARTH 8320 - Seminar: Issues in Early Modern Visual Culture (3.0 cr)
or ARTH 8340 - Seminar: Baroque Art (3.0 cr)
or ENGL 5121 - Readings in Early Modern Literature and Culture (3.0 cr)
or ENGL 8120 - Seminar in Early Modern Literature and Culture (3.0 cr)
or FREN 8371 - The Rule of Reason, The Reign of Madness: Readings in Early Modern France (3.0 cr)
or FREN 8271 - The Novel of the Ancien Regime (3.0 cr)
or GER 8210 - Seminar in Early Modern German Literature and Culture (3.0 cr)
or HIST 5379 - Problems in Early American History (3.0 cr)
or HIST 5547 - Empire and Nations in the Middle East (3.0 cr)
or HIST 5469 - Historiographies of China, 1000-1700 (3.0 cr)
or HIST 5612 - New Directions in the Middle Ages, ca. 1100-1500 (3.0 cr)
or HIST 5715 - Readings in European Women's History: 1450-1750 (3.0 cr)
or HIST 5801 - Seminar in Early American History (3.0 cr)
or HIST 5901 - Latin America Proseminar: Colonial (3.0 cr)
or HIST 5962 - Bell Library Research Seminar in Comparative World History, ca. 1000-1800 CE (3.0 cr)
or HIST 5964 - Comparative Economic History (3.0 cr)
or HMED 8001 - Foundations in the History of Early Medicine (3.0 cr)
or HSCI 8125 - Foundations for Research in the Scientific Revolution (3.0 cr)
or MUS 5624 - Music of J. S. Bach (3.0 cr)
or PHIL 8085 - Seminar: History of Philosophy--Modern Philosophers (3.0 cr)
or PHIL 8090 - Seminar: History of Modern Philosophy (3.0 cr)
or PORT 5520 - Portuguese Literary and Cultural Studies (3.0 cr)
or PORT 5530 - Brazilian Literary and Cultural Studies (3.0 cr)
or SPAN 5316 - Spanish Picaresque Narratives (3.0 cr)
or SPAN 8212 - Spanish Theater of the 16th Century: Drama up to Lope (3.0 cr)
or SPAN 8223 - The Poetry of the Spanish Golden Age (3.0 cr)
or SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
or SPPT 8400 - Topics in Modern Hispanic and Lusophone Culture (3.0 cr)
or TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)
or TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)
or PHIL 4055 - Kant (3.0 cr)

with PHIL 8010 - Workshop in History of Philosophy (1.0 cr)
Twin Cities Campus
Economics M.A.
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econgrad@umn.edu
Website: http://www.econ.umn.edu/graduate/index.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only for the PhD in economics; the MA is an optional part of the PhD program.

The economics graduate program offers degree work in both theoretical and applied fields of economics. It is possible to pursue thesis research in microeconomic or macroeconomic theory. In addition, the following fields of specialization are offered: econometrics, economic growth and development, financial economics, game theory, industrial organization, international economics, labor economics, mathematical economics, monetary economics, and public economics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 16 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 26 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: Two Plan B projects consisting of research papers or literature reviews are required; the PhD written preliminary exams required in two fields outside of economic theory ("field exams") may be used to satisfy either or both of the Plan B projects. Because the standards used to judge whether a preliminary exam has satisfied the requirement for the MA are less rigorous than those for the PhD, students may qualify for the master’s Plan B without having satisfied all requirements for the PhD written preliminary exams.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.20 is required for students to remain in good standing.

Required Core Courses
Take the following courses for 16 credits:
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)
ECON 8105 - Macroeconomic Theory (2.0 cr)
ECON 8106 - Macroeconomic Theory (2.0 cr)
ECON 8107 - Macroeconomic Theory (2.0 cr)
ECON 8108 - Macroeconomic Theory (2.0 cr)

Outside Coursework
Take at least 6 credits outside the major. Courses are selected in consultation with the director of graduate studies.

Plan Options

Plan A
Thesis Credits
Take 10 or more credit(s) from the following:
• ECON 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Economics Electives
Choose courses in consultation with the director of graduate studies.
Take 10 or more credit(s) from the following:
• ECON 5xxx
• ECON 8xxx
Twin Cities Campus
Economics Minor
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econgbss@umn.edu
Website: http://www.econ.umn.edu/graduate/index.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The economics graduate program offers degree work in both theoretical and applied fields of economics. It is possible to pursue thesis research in microeconomic or macroeconomic theory. In addition, the following fields of specialization are offered: econometrics, economic growth and development, financial economics, game theory, industrial organization, international economics, labor economics, mathematical economics, monetary economics, and public economics.

Students are admitted only for the Ph.D.; the M.A. is an optional part of the Ph.D. program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
All courses must be taken A-F and completed with grades of B or better (one 8xxx-level course may carry a grade of C). Option 2 is for master's-level students whose previous work in economics courses, in the judgement of the Economics director of graduate studies, has included coursework equivalent to the 4xxx-level economic theory courses.

Advanced Economic Theory Requirement
Option 1
Take 4 or more credits from the following (or from the 8-xxx theory sequences in the doctoral minor):
- Microeconomic Analysis Sequence
  - ECON 4161 - Microeconomic Analysis (2.0 cr)
  - ECON 4162 - Microeconomic Analysis (2.0 cr)
  - ECON 4163 - Microeconomic Analysis (2.0 cr)
  - ECON 4164 - Microeconomic Analysis (2.0 cr)
- Macroeconomic Analysis Sequence
**ECON 4165 - Macroeconomic Theory (2.0 cr)**
**ECON 4166 - Macroeconomic Theory (2.0 cr)**
**ECON 4167 - Macroeconomic Theory (2.0 cr)**
**ECON 4168 - Macroeconomic Theory (2.0 cr)**

**Additional Electives**
Take 2 or more credit(s) from the following:
- ECON 4xxx
- ECON 5xxx
- ECON 8xxx

**Option 2**
For students whose previous work in economic theory, in the judgement of the Economics director of graduate studies, satisfies the theory sequence requirement. Option 2 students instead take economics electives chosen in consultation with the director of graduate studies.
Take 6 or more credit(s) from the following:
- ECON 4xxx
- ECON 5xxx
- ECON 8xxx

**Doctoral**

**Microeconomic Sequence Requirement**
Take 10 credits from the following:

- Microeconomic Analysis Sequence
  - ECON 8001 - Microeconomic Analysis (2.0 cr)
  - ECON 8002 - Microeconomic Analysis (2.0 cr)
  - ECON 8003 - Microeconomic Analysis (2.0 cr)
  - ECON 8004 - Microeconomic Analysis (2.0 cr)

- Microeconomic Theory Sequence
  - ECON 8101 - Microeconomic Theory (2.0 cr)
  - ECON 8102 - Microeconomic Theory (2.0 cr)
  - ECON 8103 - Microeconomic Theory (2.0 cr)
  - ECON 8104 - Microeconomic Theory (2.0 cr)

- Macroeconomic Theory Sequence
  - ECON 8105 - Macroeconomic Theory (2.0 cr)
  - ECON 8106 - Macroeconomic Theory (2.0 cr)
  - ECON 8107 - Macroeconomic Theory (2.0 cr)
  - ECON 8108 - Macroeconomic Theory (2.0 cr)

**Electives**
Take 5 or more credit(s) from the following:
- ECON 8xxx
Twin Cities Campus
Economics Ph.D.
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econdgs@umn.edu
Website: http://www.econ.umn.edu/graduate/index.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The economics graduate program offers degree work in both theoretical and applied fields of economics. It is possible to pursue thesis research in microeconomic or macroeconomic theory. In addition, the following fields of specialization are offered: econometrics, economic growth and development, financial economics, game theory, industrial organization, international economics, labor economics, mathematical economics, monetary economics, and public economics.

Students are admitted only for the PhD; the MA is an optional part of the PhD program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Special Application Requirements:
Coursework in linear algebra and multivariate calculus is required for admission to the Ph.D. program.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Quantitative Reasoning: 159

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 84

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.20 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Emphasis in all aspects of the program is on careful development of the theoretical basis for the work, whether the work is theoretical or applied, and whether the relevant theory is drawn from economics, econometrics, mathematics, statistics, or other related disciplines.

Before undertaking research for a doctoral thesis, the student must pass written preliminary exams in micro- and macroeconomic theory, plus in two of the fields listed under the curriculum section above. The number of courses taken to help students prepare for the preliminary examinations is determined through consultation with the student’s advisor.

Required Core Courses
Take the following courses for 16 credits:
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
- ECON 8107 - Macroeconomic Theory (2.0 cr)
- ECON 8108 - Macroeconomic Theory (2.0 cr)

Economics Electives
Take 12 or more credit(s) from the following:
- ECON 8xxx

Outside Coursework
Take at least 12 credits outside the major. Courses are chosen in consultation with the director of graduate studies.

Thesis Credits
Take exactly 24 credit(s) from the following:
- ECON 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

English M.A.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228).
Email: gradeng@umn.edu
Website: http://english.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the discipline—the traditional study of the literatures and languages in English—as well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to re-imagine its future shape.

The department offers a master of arts in English language and literature. The M.A. offers training in the areas of literary history, literary theory and interpretation, language, linguistics, rhetoric, and composition. Students in the M.A. can develop specific concentrations through consultation with the director of graduate studies.

Course requirements for the M.A. program are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
A minimum of four courses in English, three of which must be at the upper-division level, is required for degree program admission. The courses should be widely distributed.

Special Application Requirements:
Required admission materials include three letters of recommendation; scores from the General Test of the GRE; a short essay explaining scholarly, professional, and personal goals and reason(s) for choosing the University of Minnesota; and a writing sample, such as a course paper. Candidates for all degrees are admitted fall semester only; all materials must be received by December 15th.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 164

International applicants must submit score(s) from one of the following tests:

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of December 20, 2016
• TOEFL
  - Internet Based - Total Score: 105
  - Paper Based - Total Score: 620
• IELTS
  - Total Score: 7.5
• MELAB
  - Final score: 88

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 21 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is made up of three Plan B papers. Each is a tightly argued essay of about 5,000 words, usually a reworking of a paper done originally for a course.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: A reading knowledge of one language.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses

- ENGL 5001 - Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University (3.0 cr)

Major Electives

Emphases are chosen in consultation with the student's advisor and the Director of Graduate Studies.

Take 21 or more credit(s) from the following:

Emphasis One
Take 9 - 12 credit(s) from the following:
• ENGL 5xxx
• ENGL 8xxx

Emphasis Two
Take 9 - 12 credit(s) from the following:
• ENGL 5xxx
• ENGL 8xxx

Outside the Major -- Related Fields

Take 6 or more credits outside the program, in consultation with the Director of Graduate Studies.
Twin Cities Campus
English Minor
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, 207 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228)
Email: gradeng@umn.edu
Website: http://english.cla.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

During the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the disciplinethe traditional study of the literatures and languages in Englishas well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to reimagine its future shape.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students interested in pursuing a minor in English should obtain approval from the director of graduate studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Course selection is determined in consultation with the director of graduate studies.

Required Courses
Take 9 or more credit(s) from the following:
Doctoral Course selection is determined in consultation with the director of graduate studies.

**Required Courses**
Take 12 or more credit(s) from the following:
- ENGL 5xxx
- ENGL 8xxx
Twin Cities Campus
English Ph.D.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, 207 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228)
Email: gradeng@umn.edu
Website: http://english.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 63 to 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the disciplinethe traditional study of the literatures and languages in Englishas well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to re-imagine its future shape.

Course requirements for the Ph.D. program are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
A minimum of four courses in English, three of which must be at the upper division level, is required. The courses should be widely distributed.

Special Application Requirements:
Students with a bachelor's degree may apply either to the master's program or the doctoral program. An M.A. degree, but not an M.F.A. degree, can be gained en route to the Ph.D. degree. M.A. candidates who wish to continue their studies must formally apply for admission to the Ph.D. program. Required application materials include three letters of recommendation; a short essay explaining scholarly, professional, and personal goals and reason(s) for choosing the University of Minnesota; and a writing sample, such as a course paper. Candidates for all degrees are admitted fall semester only; all materials must be received by December 15th.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 164

International applicants must submit score(s) from one of the following tests:
• TOEFL
- Internet Based - Total Score: 105
- Paper Based - Total Score: 620

**IELTS**
- Total Score: 7.5

**MELAB**
- Final score: 88

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements
33 to 39 credits are required in the major.
6 to 12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of two languages.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

A minimum of 39 course credits and 24 thesis credits is required. Course requirements for the Ph.D. program are broadly defined, allowing students to shape a personal program of study. The following courses are required: ENGL 5001 and 5800, preferably during the first year of doctoral study (6 cr); three English courses distributed among broad areas (minimum of 9 cr); four additional English courses in a focused area of emphasis (minimum of 12 cr); 12 credits in a supporting program, with a minimum of two courses outside the department. Students are encouraged to enroll in additional courses as appropriate.

**Required Courses**
- **ENGL 5001** - Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University (3.0 cr)
- **ENGL 5800** - Practicum in the Teaching of English (1.0 - 3.0 cr)

**Thesis Credits**
Take exactly 24 credit(s) from the following:
- **ENGL 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Emphasis Area**
Take exactly 12 credit(s) from the following:
- **ENGL 5xxx**
- **ENGL 8xxx**

**Distribution Requirement**
Take exactly 9 credit(s) from the following:
1 course in 3 of the following areas, but NOT in the students area of emphasis.
- **ENGL 5xxx**
- **ENGL 8xxx**
  - Medieval
  - Early modern, to 1800
  - 19th century
  - 20th and 21st century
  - Creative writing
  - Rhetoric, literacy, language
  - Criticism, theory

**Outside the Major in a Supporting Program**
Take 12 credits in an established doctoral minor, or fulfill a supporting program requirement. The supporting program is 12 credits, with a minimum of 6 credits outside the major.
Twin Cities Campus
Feminist and Critical Sexuality Studies Minor
Gender, Women and Sexuality
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-6006; fax: 612-624-3573)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor program in Feminist and Critical Sexuality Studies is located in the Department of Gender, Women, and Sexuality Studies (GWSS). The feminist and critical sexuality studies minor is a supplementary program for graduate students already admitted to the University of Minnesota and enrolled in another graduate program. The minor is designed for students with widely flexible interests and academic aims looking for advanced graduate academic training in feminist and critical sexuality studies. The program is also designed to provide an interdisciplinary graduate program in GLBTQ studies. Students must apply for special admission through the Feminist and Critical Sexuality Studies director of Graduate Studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students must apply to the feminist and critical sexuality studies minor for admission by submitting a letter of interest to the director of graduate studies that demonstrates a clear relationship between the focus and objectives of their doctoral research and the goals, curriculum, and scholarly resources of the minor.
Since the emphasis of the graduate minor is interdisciplinary, a focus or strong interest in such work is preferred.
A prerequisite undergraduate major or minor in gender, women and/or GLBTQ/sexuality studies is not required for admission, but preferable. Applicants are expected to demonstrate general knowledge of this relevant scholarship in some combination of previous coursework, research and writing, and/or organizational activity/experience.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Feminist Theories and Methods
Take at least 3 credits from one of the following two courses:
GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
or GWSS 8109 - Feminist Knowledge Production (3.0 cr)

**Electives**

Students complete a minimum of 12 elective credits, at least 9 of which must be from graduate-level GWSS courses. With approval of the Feminist and Critical Sexuality Studies director of Graduate Studies, up to one course from the student's home department that aligns with the field of feminist and critical sexuality studies may be applied towards the minor.

GWSS 5xxx
GWSS 8xxx
Twin Cities Campus
Feminist Studies M.A.
Gender, Women and Sexuality
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-6006; fax: 612-624-3573)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The MA is available only to students admitted to the feminist studies PhD program who wish to secure a Plan B MA along the way to obtaining a PhD. This credential is helpful for ABD employment purposes or for students who must exit the program. It is similar to the PhD milestones but does not require a dissertation.

The PhD program in feminist studies is designed to help students develop a high level of competence in feminist theories, research methods, interdisciplinarity, and pedagogies. The program is especially strong on feminist theory and issues related to women's diversity, nationally and globally. To guarantee a high level of interdisciplinary exchange, the program is designed to bring feminist studies doctoral students together with graduate minor students who are pursuing a disciplinary specialty in their own home department. The program's interdisciplinary curriculum emphasizes the interaction of social conditions such as class, ethnicity, race, sexualities, and national identity with gender. These interactions and their effects are examined in cultural productions such as media representations or colonialist paradigms in social systems and relations of power; in aspects of science such as genetics and new technologies; in epistemologies and philosophy; in professional areas such as health care to public policy; and in social, political, and environmental justice studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is written and oral.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

**Required Core Courses and Colloquia**

**Required Core**
- GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)
- GWSS 8109 - Feminist Knowledge Production (3.0 cr)
- GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)

**Colloquia Credits**
- Take 4 or more credit(s) from the following:
  - GWSS 8996 - Feminist Studies Colloquium (1.0 cr)

**GWSS Seminars**
- Take 6 or more credit(s) from the following:
  - GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
  - GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
  - GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)
  - GWSS 8240 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
  - GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
  - GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
  - GWSS 8270 - Seminar: Theories of Body (3.0 cr)
  - GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
  - GWSS 5104 - Transnational Feminist Theory (3.0 cr)
  - GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)

**Research Methods & Tools**
- Take at least 6 research methods & tools credits from the list below, or chosen in consultation with the director of graduate studies. Up to 6 of these credits can be applied to the 6-credit requirement for outside coursework.
  - Take 0 - 6 credit(s) from the following:
    - GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)

**GWSS Electives**
- Take additional GWSS courses as necessary to meet the 28-credit minimum for the major.
  - Take 0 - 6 credit(s) from the following:
    - GWSS 5xxx
    - GWSS 8xxx

**Outside Coursework**
- Take at least 6 credits outside the major.
Twin Cities Campus
Feminist Studies Ph.D.
Gender, Women and Sexuality
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-6006; fax: 612-624-3573)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 56 to 58
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in feminist studies is designed to help students develop a high level of competence in feminist theories, research methods, interdisciplinarity, and pedagogies. The program is especially strong on feminist theory and issues related to women's diversity, nationally and globally. To guarantee a high level of interdisciplinary exchange, the program is designed to bring feminist studies doctoral students together with graduate minor students who are pursuing a disciplinary specialty in their own home department. The program's interdisciplinary curriculum emphasizes the interaction of social conditions such as class, ethnicity, race, sexualities, and national identity with gender. These interactions and their effects are examined in cultural productions such as media representations or colonialist paradigms in social systems and relations of power; in aspects of science such as genetics and new technologies; in epistemologies and philosophy; in professional areas such as health care to public policy; and in social, political, and environmental justice studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A MA in gender, women, and/or sexuality studies or a related field will be considered important, but is not required.

Other requirements to be completed before admission:
Preference is given to students with academic training or an undergraduate degree in gender, women, and/or sexuality studies or a related field. Extensive political work in these areas will also be considered important but not required.

Special Application Requirements:
Applicants for the Ph.D. program must submit scores from the General (Aptitude) Test of the GRE, three letters of recommendation, a writing sample, a current curriculum vitae, and a clearly written statement of career interests, goals, and objectives by electronic application through the Graduate Office (Apply Yourself). Graduate study in the program begins in the fall semester following admission. The application deadline is December 1; all applications are evaluated once each year in December.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
20 to 22 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The course and credit requirements for the PhD fall into roughly two categories: interdisciplinary courses satisfying core requirements, and courses constituting or enhancing a concentration.

Students are expected to participate in the department colloquium series of faculty, student, and guest lecturer presentations.

Interdisciplinary Core and Required Courses

<table>
<thead>
<tr>
<th>Required Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>GWSS 8108 - Genealogies of Feminist Theory (3.0 cr)</td>
</tr>
<tr>
<td>GWSS 8109 - Feminist Knowledge Production (3.0 cr)</td>
</tr>
<tr>
<td>GWSS 8107 - Feminist Pedagogies (3.0 cr)</td>
</tr>
<tr>
<td>GWSS 8997 - Feminist Research and Writing (1.0 - 3.0 cr)</td>
</tr>
</tbody>
</table>

Colloquia Credits
Take 4 or more credit(s) from the following:
- GWSS 8996 - Feminist Studies Colloquium (1.0 cr)

GWSS Seminars
Take 6 or more credit(s) from the following:
- GWSS 8210 - Seminar: Feminist Theory & Praxis (3.0 cr)
- GWSS 8220 - Seminar: Science, Technology & Environmental Justice (3.0 cr)
- GWSS 8230 - Seminar: Cultural Criticism and Media Studies (3.0 cr)
- GWSS 8240 - Seminar: Transnational, Postcolonial, Diaspora (3.0 cr)
- GWSS 8250 - Seminar: Nation, State, and Citizenship (1.0 - 3.0 cr)
- GWSS 8260 - Seminar: Race, Representation and Resistance (3.0 cr)
- GWSS 8270 - Seminar: Theories of Body (3.0 cr)
- GWSS 8103 - Feminist Theories of Knowledge (3.0 cr)
- GWSS 5104 - Transnational Feminist Theory (3.0 cr)
- GWSS 5406 - Black Feminist Thought in the American and African Diasporas (3.0 cr)

Research Methods & Tools
Take at least 6 Research Methods & Tools credits from the list below, or chosen in consultation with the director of graduate studies.
Up to 6 of these credits can be applied to the 12-credit requirement for outside coursework.
Take 0 - 6 credit(s) from the following:
- GWSS 8201 - Feminist Theory and Methods in the Social Sciences (3.0 cr)

Outside Coursework
Take at least 12 credits outside the major. Courses are chosen in consultation with the director of graduate studies.

Thesis Credits
Take 24 or more credit(s) from the following:
- GWSS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
French M.A.
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-626-0418, fax: 612-624-6021)
Email: fritgrad@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 31 to 35
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The French program, which offers MA and PhD degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, cinema studies, and francophone studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, a sample of their academic writing, evidence of spoken French proficiency (audio sample or phone interview), and a written statement of research interests and goals. International student applicants should also submit scores for the TOEFL or equivalent English proficiency testing program. The program offers funding packages of five years for those admitted at the M.A. level. Submission of all application materials by January 10 ensures consideration for other fellowships and graduate instructorships for the next academic year. New teaching assistants and fellowship recipients are only admitted for fall semester; others may be admitted in mid-year.

Special Application Requirements:
A B.A. in French (or equivalent), with a literary emphasis, is required for the M.A. programs. Applicants have generally completed at least 18 credits in French literature and culture. Prospective students whose undergraduate degree is in another field, but who have taken substantial coursework in French and are strongly motivated to pursue literary studies, are invited to contact the director of graduate studies in French.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 22 major credits and 9 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in one foreign language.

Required Courses

FRIT 5999 - Teaching of French and Italian: Theory and Practice (3.0 cr)
Take exactly 1 credit(s) from the following:
• FREN 5995 - Directed Teaching (1.0 cr)

Plan Options

Plan A

Major Electives
Take 15 or more credit(s) from the following:
• FREN 5xxx
• FREN 8xxx
• FRIT 5xxx
• FRIT 8xxx

Outside the Major -- Related Fields
Students take at least 6 credits outside the major or in a master's-level minor.

Thesis Credits
Take exactly 10 credit(s) from the following:
• FREN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Major Electives
Take 18 or more credit(s) from the following:
• FREN 5xxx
• FREN 8xxx
• FRIT 5xxx
• FRIT 8xxx

Outside the Major -- Related Fields
Students take at least 9 credits outside the major or in a master's-level minor.
Twin Cities Campus
French Minor
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Email: dgsfren@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The French program, which offers M.A. and PhD degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, and francophone studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Note: Neither FREN 5995 nor FRIT 5999 can be used to meet the master's minor requirement.
Take 9 or more credit(s) from the following:
- FREN 5xxx
- FREN 8xxx
- FRIT 5xxx
- FRIT 8xxx

Doctoral
Required Courses
Note: Neither FREN 5995 nor FRIT 5999 can be used to meet the doctoral minor requirement.
Take 12 or more credit(s) from the following:
- FREN 5xxx
- FREN 8xxx
- FRIT 5xxx
**Twin Cities Campus**

**French Ph.D.**

French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

**Contact Information:**
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-626-0418; fax: 612-624-6021).
Email: dgsfren@umn.edu
Website: [http://www.frit.umn.edu](http://www.frit.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 82
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](http://www.umn.edu) section of the catalog website for requirements that apply to all major fields.

The French program, which offers MA and PhD degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, cinema studies, and francophone studies.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

For the PhD program, an MA in French (or equivalent) is required.

Other requirements to be completed before admission:
A bachelor of arts in French (or equivalent), with a literary emphasis, is required for the MA programs. Applicants have generally completed at least 18 credits in French literature and culture. Prospective students whose undergraduate degree is in another field, but who have taken substantial coursework in French and are strongly motivated to pursue literary studies, are invited to contact the director of graduate studies in French.

**Special Application Requirements:**

Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, a sample of their academic writing, evidence of spoken French proficiency (audio sample or phone interview), and a written statement of research interests and goals. International student applicants should also submit scores for the TOEFL or equivalent English proficiency testing program. The program offers funding packages of five years for those admitted at the M.A. level. Submission of all application materials submission by January 10 ensures consideration for other fellowships and graduate instructorships for the next academic year. New teaching assistants and fellowship recipients are only admitted for fall semester; others may be admitted in mid-year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of December 20, 2016
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
46 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in one foreign language

Required Courses
FRIT 5999 - Teaching of French and Italian: Theory and Practice (3.0 cr)
Take exactly 1 credit(s) from the following:
• FREN 5995 - Directed Teaching (1.0 cr)

Major Electives
Take 42 or more credit(s) from the following:
• FREN 5xxx
• FREN 8xxx
• FRIT 5xxx
• FRIT 8xxx

Outside Coursework
Take at least 12 credits outside the major, not including foreign language credits.

Thesis Credits
Take exactly 24 credit(s) from the following:
• FREN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Optional Emphases

Medieval Emphasis
The medieval emphasis comprises coursework in Old French and Latin. With the exception of LAT courses, credits can be applied toward the emphasis and the 42-credit major electives requirement. Students may be exempt from coursework by passing a department-specific examination. Confer with the adviser and director of graduate studies regarding options for completing the emphasis.

Successful completion of the emphasis satisfies the foreign language requirement.

-OR-

Early Modern (Pre-1600) Emphasis
The early modern emphasis requires the demonstration of intermediate knowledge of Latin. LAT courses cannot be applied toward both the emphasis and the 42-credit major electives requirement. Students may be exempt from coursework by passing a department-specific examination. Confer with the adviser and director of graduate studies regarding options for completing the emphasis.

Successful completion of the emphasis satisfies the foreign language requirement.
Twin Cities Campus
French Studies Postbaccalaureate Certificate
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant St SE, Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Email: frit@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: French Studies PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This 15-credit graduate program is primarily for secondary teachers of French, but welcomes any prospective students wishing to enhance their knowledge of diverse areas of French and francophone studies, including linguistics, culture, literature, and film. Consisting of coursework only, the certificate provides the opportunity to explore in-depth aspects of French and francophone literature, culture, and language, while also sharpening language skills. An additional benefit is the potential for professional advancement.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must have a BA in French or equivalent (BA/BS in another field, but relevant professional experience or academic preparation in French language and culture) with a preferred GPA of 3.0.

Special Application Requirements:
Applicants must submit the following materials: transcripts, a personal statement (in English) explaining how this certificate meets their personal or professional goals, a writing sample in French (a 500-1,000 word essay on applicant's topic of choice), and two letters of recommendation from individuals who can comment knowledgeably on applicant's interest and abilities in French studies. Applications must be received by April 15 for fall semester and by October 15 for spring semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
Linguistics
Take at least one course from the following:
- FREN 5501 - Structure of French: Phonology (3.0 cr)
- or FREN 5531 - Sociolinguistics of French (3.0 cr)
- or FREN 5541 - Oral Discourse of French (3.0 cr)
- or FREN 4510

French or Francophone Literature or Culture
Take at least one course from the following list. Note that neither FRIT 5999 nor FREN 5995 can be used to meet this requirement.
- FREN 4510
- or FREN 5xxx
- or FREN 8xxx
- or FRIT 5xxx
- or FRIT 8xxx

Electives
A maximum of 3 elective credits can be taken in a French-culture related area outside French studies, such as linguistics, second language and cultures, history, English, art history, theatre arts, and music. Course selection is subject to advisor approval. Note that neither FRIT 5999 nor FREN 5995 can be used to meet this requirement.
Take 9 or more credit(s) from the following:
- FREN 5xxx
- FREN 8xxx
- FRIT 5xxx
- FRIT 8xxx
Twin Cities Campus
Geographic Information Science M.G.I.S.
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-1498; fax: 612-624-1044)
Email: mgis@umn.edu
Website: http://cla.umn.edu/mgis

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 35
• This program does not require summer semesters for timely completion.
• Degree: Master of Geographic Information Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The professional master of geographic information science (MGIS), administered by the Department of Geography, provides graduate-level work in the theory, applications, and technology of geographic information science (GIS). Courses for the program are divided into three broad categories. Core courses provide the conceptual and theoretical underpinnings for a comprehensive, well-rounded knowledge of GIS, including an introductory seminar for entering students (GIS 8501). A set of technology courses focuses on specific software and techniques of GIS. Elective courses provide additional breadth to the program by allowing students to take courses related to their area of interest.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applicants must submit an application form; a M.G.I.S. supplemental application form; transcripts; a clearly written personal statement of career interests and goals; and three letters of recommendation from persons familiar with their academic and/or employment background. The GRE is not required. All materials must be submitted by January 30 for fall semester entrance and by September 1 for spring semester entrance.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7.5
• MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 29 major credits and 6 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must complete a professional portfolio, and a set of concluding experiences including a public presentation, an exit survey, and a final meeting with an advisor.

Required Courses

GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
or FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)
GIS 8501 - GIS Project Management and Professional Development (3.0 cr)
GIS 5571 - ArcGIS I (3.0 cr)
GIS 5572 - ArcGIS II (3.0 cr)

Advanced GIS Focus Courses

5xxx-level Requirement
Take 3 credits from the following:
GEOG 5562 - GIS Development Practicum (3.0 cr)
GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
GIS 5577 - Spatial Database Design and Administration (3.0 cr)
GIS 5574 - Web GIS and Services (3.0 cr)
GIS 5576 - GIS Programming (3.0 cr)
CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)

8xxx-Level Requirement
Take 3 credits from the following:
GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
GIS 8990 - Research Problems in GIS (1.0 - 6.0 cr)
FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
CSCI 8715 - Spatial Databases and Applications (3.0 cr)

Electives
Take remaining credits from the following list to meet the 35-credit minimum. At least 6 elective credits must be other than those with GEOG or GIS course designators.
Take 16 or more credit(s) from the following:
• GEOG 5361 - Geography and Real Estate (4.0 cr)
• GEOG 5511 - Principles of Cartography (3.0 cr)
• GEOG 5531 - Numerical Spatial Analysis (4.0 cr)
• GEOG 5562 - GIS Development Practicum (3.0 cr)
• GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
• GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
• GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
• GEOG 8280 - Biogeography (3.0 cr)
• GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
• GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
• GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
• GIS 5530 - GIS Internship (1.0 - 3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GIS 5573 - Introduction to Digital Mapping: ArcGIS Basics (2.0 cr)
• GIS 5574 - Web GIS and Services (3.0 cr)
• GIS 5575 - Practical Surveying for GIS (2.0 cr)
• GIS 5577 - Spatial Database Design and Administration (3.0 cr)
• GIS 5578 - GIS Programming (3.0 cr)
• GIS 5590 - Special Topics in GIS (3.0 cr)
• GIS 8990 - Research Problems in GIS (1.0 - 6.0 cr)
• CI 5365 - Contemporary Software Development Issues and Tools (3.0 cr)
• CSCI 4041 - Algorithms and Data Structures (4.0 cr)
• CSCI 4131 - Internet Programming (3.0 cr)
• CSCI 4707 - Practice of Database Systems (3.0 cr)
• CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
• CSCI 8715 - Spatial Databases and Applications (3.0 cr)
• ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
• ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5228 - Advanced Topics in Assessment and Modeling of Forests (3.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• PA 5231 - Transit Planning and Management (3.0 cr)
• VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
**Twin Cities Campus**

**Geographic Information Science Minor**

*Geography, Environment, Society*

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-1498; fax: 612-624-1044).
Email: mgis@umn.edu
Website: http://cla.umn.edu/mgis

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 10
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The professional master of geographic information science (M.G.I.S.), administered by the Department of Geography, offers a master's and doctoral minor.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A graduate minor is developed in consultation with the M.G.I.S. director of graduate studies.

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Masters**

**Required Course**

- GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
  or FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)

**Electives**
Take 6 or more credit(s) from the following:
- CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
- CSCI 8715 - Spatial Databases and Applications (3.0 cr)
- ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
- ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
- FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
- FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
- FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
- GEOG 5511 - Principles of Cartography (3.0 cr)
- GEOG 5562 - GIS Development Practicum (3.0 cr)
• GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
• GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
• GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
• GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
• GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
• GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GIS 5571 - ArcGIS I (3.0 cr)
• GIS 5572 - ArcGIS II (3.0 cr)
• GIS 5574 - Web GIS and Services (3.0 cr)
• GIS 5575 - Practical Surveying for GIS (2.0 cr)
• GIS 5577 - Spatial Database Design and Administration (3.0 cr)
• GIS 5578 - GIS Programming (3.0 cr)
• VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)

Doctoral
Required Course
GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
or FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)

Electives
Take 9 or more credit(s) from the following:
• CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
• CSCI 8715 - Spatial Databases and Applications (3.0 cr)
• ESPM 5031 - Applied Global Positioning Systems for Geographic Information Systems (3.0 cr)
• ESPM 5295 - GIS in Environmental Science and Management (4.0 cr)
• FNRM 5262 - Remote Sensing and Geospatial Analysis of Natural Resources and Environment (3.0 cr)
• FNRM 5412 - Advanced Remote Sensing and Geospatial Analysis (3.0 cr)
• FNRM 8205 - Research Problems: Spatial Data Analysis (1.0 - 5.0 cr)
• GEOG 5511 - Principles of Cartography (3.0 cr)
• GEOG 5562 - GIS Development Practicum (3.0 cr)
• GEOG 5563 - Advanced Geographic Information Science (3.0 cr)
• GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)
• GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
• GEOG 8290 - Seminar in GIS and Cartography (3.0 cr)
• GEOG 8291 - Seminar in GIS, Technology, and Society (3.0 cr)
• GEOG 8292 - Seminar in GIS: Spatial Analysis and Modeling (3.0 cr)
• GIS 5555 - Basic Spatial Analysis (3.0 cr)
• GIS 5571 - ArcGIS I (3.0 cr)
• GIS 5572 - ArcGIS II (3.0 cr)
• GIS 5574 - Web GIS and Services (3.0 cr)
• GIS 5575 - Practical Surveying for GIS (2.0 cr)
• GIS 5577 - Spatial Database Design and Administration (3.0 cr)
• GIS 5578 - GIS Programming (3.0 cr)
• VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
Twin Cities Campus
Geography M.A.
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: geog-dgs@umn.edu
Website: http://www.geog.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30 to 31
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at the University of Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 600
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 25 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Three Plan B papers are required. These papers have the quality but not the scope of a master's thesis, and usually are enhanced versions of research papers done in connection with coursework and seminars.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Competency in a foreign language.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Required Coursework**

- **GEOG 8001** - Problems in Geographic Thought (3.0 cr)
- **GEOG 8405** - Seminar: Graduate Student Professional Development (1.0 cr)

**Additional Geography Coursework**

- Take exactly 6 credit(s) from the following:
  - GEOG 8xxx

**Methods Coursework Requirement**

- Take at least 4 credits of methods coursework, chosen in consultation with the advisor.

**Outside Coursework**

- Take at least 6 credits outside the major.

**Plan Options**

**Plan A**

**Thesis Credits**

- Take 10 or more credit(s) from the following:
  - GEOG 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

- OR -

**Plan B**

**Additional Major Elective Credits**

- Take 10 or more credit(s) from the following:
  - GEOG 5xxx
  - GEOG 8xxx

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Information current as of December 20, 2016
Twin Cities Campus
Geography Minor
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: geog-dgs@umn.edu
Website: http://www.geog.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisors to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minor must be developed in consultation with a faculty advisor. Consult the director of graduate studies about selecting an advisor.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Take 6 or more credit(s) from the following:
- GEOG 5xxx
- GEOG 6xxx

Doctoral
Required Courses
Take 12 or more credit(s) from the following:
- GEOG 5xxx
Twin Cities Campus
Geography Ph.D.
Geography, Environment, Society
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: geog-dgs@umn.edu
Website: http://www.geog.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 52
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Graduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 600
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must earn certification of expertise in language(s), techniques(s) or both as determined by the advising committee. The committee must verify completion of the requirements prior to scheduling of the PhD final examination.

Required Courses
GEOG 8001 and 8405 should be taken within the first year of study.
GEOG 8001 - Problems in Geographic Thought (3.0 cr)
GEOG 8405 - Seminar: Graduate Student Professional Development (1.0 cr)

Take 6 credits of GEOG 81xx and/or GEOG 82xx coursework, with at least 3 credits of GEOG 82xx. With advisor approval, GEOG 8970 and GEOG 8980 may be used for GEOG 81xx or GEOG 82xx courses.

Take exactly 6 credit(s) from the following:
•GEOG 8xxx

Methods Course Requirement
Take at least 3 credits of methods coursework, which can be from outside the Geography, Environment & Society department. Course selection must be done in consultation with the Geography director of graduate studies.

Proposal-Writing Course Requirement
Take GEOG 8302 or at least 3 credits of coursework from outside the Geography, Environment & Society department. Course selection must be done in consultation with the Geography director of graduate studies.
GEOG 8302 - Research Development (3.0 cr)

Supporting Program Coursework
Take at least 12 credits from outside the department.

Thesis Credits
Take 24 or more credit(s) from the following:
•GEOG 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
**Twin Cities Campus**

**Germanic Studies M.A.**

**German, Scandinavian, & Dutch**

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**
Department of German, Scandinavian & Dutch, 320 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)  
Email: gradgsd@umn.edu  
Website: [http://gsd.umn.edu](http://gsd.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 33  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](http://gsd.umn.edu) section of the catalog website for requirements that apply to all major fields.

The Germanic studies program in the Department of German, Scandinavian, and Dutch (GSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration.

The Germanic studies program offers both MA and PhD degrees and allows students to tailor their programs to their individual needs and interdisciplinary interests. Students have the option to pursue a emphasis in German (MA, PhD), Germanic Medieval Studies (MA, PhD) or Scandinavian Studies (MA) by completing a specified number of courses in one of those areas.

**Program Delivery**

This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:  
- BA or equivalent in German, Scandinavian, or related field. Students are usually admitted to the PhD program, but the MA must be completed first. Applicants must have fluency in German or a Scandinavian language.

**Special Application Requirements:**

In addition to the University's application requirements, the department requires the following: the department's Supplemental Application Information form (download from the department's website); a copy of one or more papers representative of the applicant's level of scholarly development (not to exceed 25 total pages); three letters of recommendation; the General (Aptitude) Test of the GRE (required for master's program applicants, but optional for those whose native language is not English). Students are admitted for fall semester only. All application materials may be uploaded into the online application and must be submitted by December 15.

For an online application or for more information about graduate education admissions, see the General Information section of this website.

Applicants must submit their test score(s) from the following:  
- GRE

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19

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Information current as of December 20, 2016
- Internet Based - Speaking Score: 27
- Paper Based - Total Score: 550
  - IELTS
    - Total Score: 6.5
  - MELAB
    - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 27 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B paper is usually an improved, reworked seminar paper written for a specific course in the major.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must demonstrate oral and written proficiency in German or one Scandinavian language.

Required Core

GSD 8001 - Approaches to Textual Analysis (3.0 cr)
GSD 5103 - Teaching of Germanic Languages (3.0 cr)

Germanic Medieval Studies Requirement
Take 3 or more credit(s) from the following:

- GER 5711 - History of the German Language I (3.0 cr)
- GER 5721 - Introduction to Middle High German (3.0 cr)
- GER 5734 - Old Saxon (3.0 cr)
- GER 5740 - Topics in Germanic Medieval Studies (3.0 cr)
- GER 8200 - Seminar in Medieval German Literature and Culture (3.0 cr)
- SCAN 5502 - The Icelandic Saga (3.0 cr)
- SCAN 5701 - Old Norse Language and Literature (3.0 cr)
- SCAN 5703 - Old Norse Poetry (3.0 cr)
- SCAN 5710 - Topics in Old Norse Literature (3.0 cr)
- SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)

Outside the Major in a Supporting Program
Take 6 credits outside the major in supporting program.

Germanic Studies - No Emphasis

Students who elect not to pursue a formal track can choose from any of the department's course offerings to complete remaining credit requirements.

Take 18 or more credit(s) from the following:

- DTCH 5xxx
- FIN 5xxx
- GER 5xxx
- GER 8xxx
- GSD 5xxx
- GSD 8xxx
- SCAN 5xxx
- SCAN 8xxx

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Information current as of December 20, 2016
Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

German
The Plan B paper must reflect the emphasis.

German Emphasis Electives
*GER 5011 cannot count towards credit requirements.
Take 15 or more credit(s) from the following:
• GER 5xxx
• GER 8xxx
• GSD 8xxx

Additional Elective
Take 3 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GER 5xxx
• GER 8xxx
• GSD 5xxx
• GSD 8xxx
• SCAN 5xxx
• SCAN 8xxx

Germanic Medieval Studies
The Plan B paper must reflect the emphasis.

Germanic Medieval Studies Emphasis Electives
Take 15 or more credit(s) from the following:
• GER 5711 - History of the German Language I (3.0 cr)
• GER 5721 - Introduction to Middle High German (3.0 cr)
• GER 5734 - Old Saxon (3.0 cr)
• GER 5740 - Topics in Germanic Medieval Studies (3.0 cr)
• GER 8200 - Seminar in Medieval German Literature and Culture (3.0 cr)
• GER 8210 - Seminar in Early Modern German Literature and Culture (3.0 cr)
• SCAN 5502 - The Icelandic Saga (3.0 cr)
• SCAN 5701 - Old Norse Language and Literature (3.0 cr)
• SCAN 5703 - Old Norse Poetry (3.0 cr)
• SCAN 5710 - Topics in Old Norse Literature (3.0 cr)
• SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)

Additional Elective
Take 3 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GER 5xxx
• GER 8xxx
• GSD 5xxx
• GSD 8xxx
• SCAN 5xxx
• SCAN 8xxx

Scandinavian Studies
The Plan B paper must reflect the emphasis.

Scandinavian Emphasis Electives
Take 15 or more credit(s) from the following:
• SCAN 5xxx
• SCAN 8xxx
• FIN 5xxx

Additional Elective
Take 3 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GER 5xxx
• GER 8xxx
• GSD 5xxx
• GSD 8xxx
• SCAN 5xxx
• SCAN 8xxx
Twin Cities Campus
Germanic Studies Minor
German, Scandinavian, & Dutch
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Scandinavian & Dutch, 320 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297).
Email: gradgsd@umn.edu
Website: http://gsd.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 15
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic studies program in the Department of German, Scandinavian, and Dutch (GSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration. GSD faculty represent all historical areas of specialization from the medieval to the contemporary periods.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

MA minors are required to take GSD 8001 - Approaches to Textual Analysis and two other courses, for at least 9 credits. PhD minors who have not completed GSD 8001 at the MA level must fulfill this requirement at the PhD level. In addition, PhD minors must complete at least four other courses for a total of at least 15 credits (usually five courses).

Required Core
GSD 8001 - Approaches to Textual Analysis (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Electives
Take 6 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GSD 5xxx
• GSD 8xxx
• GER 5xxx
• GER 8xxx
• SCAN 5xxx
• SCAN 8xxx

Doctoral Electives
Take 12 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GSD 5xxx
• GSD 8xxx
• GER 5xxx
• GER 8xxx
• SCAN 5xxx
• SCAN 8xxx
Twin Cities Campus
Germanic Studies Ph.D.
German, Scandinavian, & Dutch
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Scandinavian & Dutch, 320 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)
Email: gradgsd@umn.edu
Website: http://gsd.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 54 to 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic studies program in the Department of German, Scandinavian, and Dutch (GSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration.

The Germanic studies program offers both MA and PhD degrees and allows students to tailor their programs to their individual needs and interdisciplinary interests. Students have the option to pursue a track in German (MA, PhD), Germanic Medieval studies (MA, PhD) or Scandinavian studies (MA) by completing a specified number of courses in one of those areas.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

MA or equivalent from another institution in German or a related field.

Other requirements to be completed before admission:
Students with a BA only are usually admitted to the PhD program, but the MA must be completed first. Those applying with an MA must have fluency in German

Special Application Requirements:
In addition to the University's application requirements, the department requires the following: the department's Supplemental Application Information form (download from the department's website); a copy of one or more papers representative of the applicant's level of scholarly development (not to exceed 25 total pages); three letters of recommendation; the General (Aptitude) Test of the GRE (recommended but not required for applicants who already have an M.A.). Students are admitted for fall semester only. All application materials may be uploaded into the online application and must be submitted by December 15. For an online application or for more information about graduate education admissions, see the General Information section of this website.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27
  - Paper Based - Total Score: 550
- IELTS
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
18 to 24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See requirements listed below.

A minimum GPA of 3.00 is required for students to remain in good standing.

Reading competence in at least two languages or a high degree of proficiency in one language other than English or German.

Students with an MA from another institution must also take one theory course and a pedagogy seminar.

Required Core
GSD 8001 - Approaches to Textual Analysis (3.0 cr)
GSD 5103 - Teaching of Germanic Languages (3.0 cr)

Outside the Major in a Supporting Program
Take 12 credits outside the major in supporting program.

Thesis Credits
Take 24 or more credit(s) from the following:
• GSD 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Germanic Studies - No Emphasis
Take 15 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GER 5xxx
• GER 8xxx
• GSD 5xxx
• GSD 8xxx
• SCAN 5xxx
• SCAN 8xxx

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

German Emphasis
The dissertation must reflect the German track.

German Emphasis Electives
Take 12 or more credit(s) from the following:
• GER 5xxx
• GER 8xxx
• GSD 8xxx

**Additional Elective**
Take 3 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GER 5xxx
• GER 8xxx
• GSD 5xxx
• GSD 8xxx
• SCAN 5xxx
• SCAN 8xxx

**Germanic Medieval Studies Emphasis**
The dissertation must reflect the Germanic medieval studies track.

**Germanic Medieval Studies Emphasis Electives**
Take 12 or more credit(s) from the following:
• GER 5711 - History of the German Language I (3.0 cr)
• GER 5721 - Introduction to Middle High German (3.0 cr)
• GER 8210 - Seminar in Early Modern German Literature and Culture (3.0 cr)
• GER 5734 - Old Saxon (3.0 cr)
• GER 5740 - Topics in Germanic Medieval Studies (3.0 cr)
• GER 8200 - Seminar in Medieval German Language and Culture (3.0 cr)
• SCAN 5502 - The Icelandic Saga (3.0 cr)
• DTCH 5701 - Old Norse Language and Literature (3.0 cr)
• SCAN 5703 - Old Norse Poetry (3.0 cr)
• SCAN 5710 - Topics in Old Norse Literature (3.0 cr)
• SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)

**Additional Elective**
Take 3 or more credit(s) from the following:
• DTCH 5xxx
• FIN 5xxx
• GER 5xxx
• GER 8xxx
• GSD 5xxx
• GSD 8xxx
• SCAN 5xxx
• SCAN 8xxx
Twin Cities Campus
Health Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
111 Murphy Hall
206 Church Street
Minneapolis, MN 55455
612/625-0120
Email: sjmcho@umn.edu
Website: http://sjmc.umn.edu/grad

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Journalism & Mass Communication's (SJMC) MA health communication (integrated BA/MA track) program prepares students for healthcare careers that rely on the strategic use of health information to communicate with patient and nonpatient publics, care providers, administrators and other public health stakeholders. The program is designed around a curriculum of academic and professional skills courses from strategic communication, public health and other relevant disciplines.

The curriculum includes a summer practicum experience in a health media or health care organization. The program's balance of conceptual prowess and practical skills prepares its graduates to be expert health communication professionals in a variety of health care positions. Students who complete this program will have a combination of specific message strategy/content development skills and the subject knowledge demanded by the healthcare workplace. Every workplace now requires professionals who can communicate clearly and strategically about their subject matter with multiple audiences and using a variety of communication channels. This is especially true in the arena of health care.

This program provides an Integrated BA/MA option for eligible University of Minnesota journalism/strategic communication track BA students also interested in completing the school's health communication MA degree. The integrated BA journalism/MA health communication sub-plan enables students to complete both degrees in five years.

The combination of skills and context courses at the undergraduate level, and the sophisticated academic and practice-based courses at the graduate level will ensure that graduates of this program are fully prepared to contribute to their workplaces from day one.

Students who complete this program will have a combination of specific message strategy/content development skills and the subject knowledge demanded by the healthcare workplace. Every workplace now requires professionals who can communicate clearly and strategically about their subject matter with multiple audiences and using a variety of communication channels. This is especially true in the arena of health care. The combination of skills and context courses at the undergraduate level, and the sophisticated academic and practice-based courses at the graduate level will ensure that graduates of this program are fully prepared to contribute to their workplaces from day one.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Students must be enrolled in the BA in journalism/strategic communication track to apply for Integrated BA journalism/MA health communication sub-plan admission. Admission is considered for summer term only; the application deadline is February 15.
Special Application Requirements:
Applicants must submit a department application; a statement of objectives articulating interest and readiness for the program; a complete set of transcripts; an academic and professional work sample; a resume or curriculum vita; and scores from the General Test of the GRE.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 155
  - General Test - Analytical Writing: 4.5

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: JOUR 8193, Health Communication Capstone, allows you to focus on different aspects of health communication relevant to your interests. Students will prepare a final project, a publishable article, a multimedia projection, an original research paper or other options aimed at a particular audience. This project is completed during the second semester of the MA program.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 0 semesters must be completed before filing a Degree Program Form.

Core Courses
JOUR 5541 - Mass Communication and Public Health (3.0 cr)
JOUR 5542 - Theory-based Health Message Design (3.0 cr)
JOUR 5543 - Public Health Campaign Evaluation (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

Electives
Take 12 or more credit(s) from the following:
- JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
- JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
- JOUR 8720 - Seminar: Mass Media and Health (3.0 cr)
- PUBH 6025 - e-Public Health (2.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6085 - Alcohol and Tobacco: Ongoing Threats to Global Health (2.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- PUBH 7226 - Media Relations Practicum (1.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
- WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
- WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)
- WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)

Capstone
JOUR 8193 - Health Communication Capstone (3.0 cr)

Practicum
JOUR 8194 - Health Communication Practicum (3.0 cr)
Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Integrated BA Journalism/ MA Health Communication
This sub-plan is limited to students completing the program under Plan B.

The SJMC offers an early-admission opportunity for eligible University of Minnesota journalism/strategic communication BA students also interested in completing the health communication MA degree. The integrated BA journalism/MA health communication sub-plan enables journalism/strategic communication majors to take 9 credits during their senior (fourth) year, and to complete the MA after a fifth year of full-time graduate study plus one summer. Interested journalism/strategic communication undergraduates should contact the SJMC advisor for more information. The integrated BA journalism/MA health communication sub-plan application deadline is February 15 of the student's junior year, and admission to the sub-plan is contingent on a formal admissions process. Students admitted to the sub-plan must maintain timely degree progress to ensure all undergraduate degree requirements are completed by the end of their fourth year. The sub-plan is open to journalism/strategic communication track undergraduates only. Double majors may apply, but only if they choose to complete the senior project requirement in journalism.
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics M.A.
Spanish & Portuguese Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street SE, Minneapolis, Minnesota, 55455 (612-625-5858; fax: 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33 to 37
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's degree in Hispanic and Lusophone literatures, cultures, and linguistics is a free-standing, two-year degree with three formal tracks: Hispanic literatures and cultures, Lusophone literatures and cultures, and Hispanic linguistics. The MA is designed as a preparatory degree for students planning to obtain a PhD in the field. The MA program is built around classes taught by graduate faculty and designed to give the student a solid intellectual and professional preparation upon which they can build further in a PhD program in the field or in a related career. The MA program also features professional training in the field, including a methodology class that focuses on the teaching of foreign languages and cultures. Students are encouraged to pursue deeper knowledge of related fields through courses taken with graduate faculty outside of the department.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Prospective students generally have completed an undergraduate degree or substantial coursework in the fields of Hispanic literatures and cultures, Lusophone literatures and cultures, and Hispanic linguistics, although individuals with other backgrounds may be admitted.

Students admitted to the program are required to be fluent in Spanish or Portuguese. The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.

Special Application Requirements:
All application materials must be submitted electronically through the ApplyYourself application system by December 15. Applicants are accepted for admission for fall semester only. Please refer to the Application Checklist for important details. The following is required for the application: the Departmental Application; a personal statement; a writing sample representative of the applicant's level of scholarly development; three letters of recommendation; five-minute voice sample; a Curriculum Vitae; GRE or TOEFL (or MELAB or IELTS) test scores; and transcripts. For more information, see the Department of Spanish & Portuguese Studies Applying page: http://spanport.umn.edu/grad/applying.html

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Part 1 (Composition) score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 27 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 27 major credits and 6 credits outside the major. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of a foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

For the master's degree, students must have a reading knowledge of a foreign language outside of their principal area of study. Competence in both Spanish and Portuguese satisfies this requirement. Students who wish to continue to the PhD after the MA are strongly encouraged to begin their study of Portuguese immediately so as to be prepared for the PhD requirement of two Portuguese courses.

Required Teaching Training
  - SPPT 5999 - The Teaching of College-Level Spanish: Theory and Practice (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Hispanic Literatures and Cultures

Students receive a solid intellectual and professional preparation in Iberian and Latin American literatures and cultures. Works and intellectual movements are studied in their historical, social, and cultural contexts, combining the approaches of literary and cultural criticism with those of intellectual history, sociology, gender and sexuality studies, among others.

Spanish Peninsular and/or Spanish American Literatures and Cultures

Take 24 or more credit(s) from the following:
  - SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
  - SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
  - SPAN 5180 - Don Quixote (3.0 cr)
  - SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)
  - SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
  - SPAN 5190 - Caribbean Literature: An Integral Approach (3.0 cr)
  - SPAN 5550 - Global Colonial Studies in the Hispanic World (3.0 cr)
  - SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
  - SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
  - SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)

Plan Options

Plan A

Two of the listed core courses may be replaced by:
  - SPAN 5930 - Topics in Ibero-Romance Linguistics (3.0 cr)
  - or SPAN 8900 - Spanish Seminar (3.0 cr)
Thesis Credits
Take exactly 10 credit(s) from the following:
• PORT 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
• SPAN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Outside Coursework
Take 2 courses outside the major, for a total of at least 6 credits.

Hispanic Linguistics
This track is centered on the relation between language and its context of use, encompassing social, pragmatic, and discourse factors. It provides students with a strong background in the following areas of Hispanic linguistics: phonetics, phonology, syntax, pragmatics and discourse, historical linguistics, language variation, and second language acquisition.

Required Linguistics Courses
Phonology
Take 6 or more credit(s) from the following:
• SPAN 5711 - The Structure of Modern Spanish: Phonology (3.0 cr)
• SPAN 5721 - Spanish Laboratory Phonology (3.0 cr)
• LING 5302 - Phonological Theory I (3.0 cr)

Syntax/Pragmatics
Take 6 or more credit(s) from the following:
• SPAN 5716 - Structure of Modern Spanish: Pragmatics (3.0 cr)
• SPAN 5714 - Theoretical Foundations of Spanish Syntax (3.0 cr)
• LING 5201 - Syntactic Theory I (3.0 cr)
• LING 5206 - Linguistic Pragmatics (3.0 cr)

Plan Options

Plan A
Electives
Take exactly 12 credit(s) from the following:
• SPAN 5701 - History of Ibero-Romance (3.0 cr)
• SPAN 5717 - Spanish Sociolinguistics (3.0 cr)
• SPAN 5718 - Spanish Language Contact (3.0 cr)
• SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)
• SPAN 5991 - The Acquisition of Spanish as a First and Second Language (3.0 cr)

Thesis Credits
Take exactly 10 credit(s) from the following:
• SPAN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
• PORT 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Electives
Take 12 or more credit(s) from the following:
• SPAN 5701 - History of Ibero-Romance (3.0 cr)
• SPAN 5711 - The Structure of Modern Spanish: Phonology (3.0 cr)
• SPAN 5714 - Theoretical Foundations of Spanish Syntax (3.0 cr)
• SPAN 5716 - Structure of Modern Spanish: Pragmatics (3.0 cr)
• SPAN 5717 - Spanish Sociolinguistics (3.0 cr)
• SPAN 5718 - Spanish Language Contact (3.0 cr)
• SPAN 5721 - Spanish Laboratory Phonology (3.0 cr)
• SPAN 5930 - Topics in Ibero-Romance Linguistics (3.0 cr)
• SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)

Outside Coursework
Take 2 courses outside the major, for a total of at least 6 credits.

Lusophone Literatures and Cultures
This track prepares students in Portuguese studies, understood as an interdisciplinary critical formation through which the cultures and literatures of Portugal, Brazil, and Lusophone Africa are approached. Students are trained in the main historical periods, cultural movements, and social issues pertaining to the Portuguese-speaking world, both nationally and transnationally, within relevant comparative frameworks.
Required Courses

Lusophone Literatures and Culture
Take 12 or more credit(s) from the following:
• PORT 5520 - Portuguese Literary and Cultural Studies (3.0 cr)
• PORT 5530 - Brazilian Literary and Cultural Studies (3.0 cr)
• PORT 5540 - Literatures and Cultures of Lusophone Africa (3.0 cr)
• PORT 5910 - Topics in Lusophone Cultures and Literatures (3.0 cr)
  or PORT 5930 - Topics in Brazilian Literature (3.0 cr)

Spanish Peninsular or Spanish-American Literatures & Cultures
Take 12 or more credit(s) from the following:
• SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
• SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
• SPAN 5180 - Don Quixote (3.0 cr)
• SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)
• SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
• SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
• SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
• SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
• SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
• SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)

Plan Options

Plan A
Two of the listed courses (6 credits) may be replaced by:
• SPAN 5930 - Topics in Ibero-Romance Linguistics (3.0 cr)
• SPAN 8900 - Spanish Seminar (3.0 cr)

Thesis Credits
Take exactly 10 credit(s) from the following:
• SPAN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
• PORT 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

  -OR-

Plan B
Outside Coursework
Take 2 courses outside the major, for a total of at least 6 credits.
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics Minor
Spanish & Portuguese Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street SE, Minneapolis, Minnesota, 55455 (612-625-5858; fax: 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 18
- Length of program in credits (Doctorate): 18
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in Hispanic and Lusophone literatures, cultures, and linguistics allows students in related fields to pursue research with graduate faculty in the department. Faculty have specialties in a variety of fields such as cultural studies, linguistics, political science, law, textual analysis, etc., and research contacts and visibility in Latin America and Europe.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor field coursework is determined in consultation with the Hispanic and Lusophone Literatures, Cultures, and Linguistics director of Graduate Studies.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
Course List
Take 18 or more credit(s) from the following:
• SPAN 5xxx
• SPAN 8xxx
• PORT 5xxx
• PORT 8xxx

Doctoral
Course List
Take 18 or more credit(s) from the following:
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics Ph.D.
Spanish & Portuguese Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN, 55455 (612-625-5858; fax 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 78 to 87
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in Hispanic and Lusophone literatures, cultures, and linguistics is a four-year program (post MA) that provides students with a focused and rigorous formation in the literatures, languages, and cultures of Spain and Latin America. PhD students choose one of four areas of emphasis: Iberian (peninsular), Latin America, Lusophone literatures and cultures, and Hispanic linguistics.

In addition to establishing a specialization in one or more areas of Hispanic studies, the program allows and encourages students to pursue comparative or interdisciplinary work. Students complement their work in the department with coursework in other disciplines such as history; cultural studies and comparative literature; gender, women, and sexuality studies; medieval and early modern studies; and linguistics, among others. In addition to the requirements for the MA degree, PhD students must complete additional coursework.

The department's faculty is committed to preparing students and giving them the tools to become scholars and teachers of the highest quality. The department has a strong tradition of fostering socio-historical perspectives on literatures, languages, and cultures. The graduate faculty is committed to comparative and interdisciplinary research and engages a variety of contemporary theoretical approaches, with strengths in postcolonial theory, social justice and human rights, memory studies, critical race theory, diasporic studies, and gender and sexuality studies. Members of the Hispanic linguistics faculty are specialists in the fields of sociolinguistics, second language acquisition, syntax, pragmatics, and phonology.

The department offers students in the program faculty mentoring, a seminar, and workshops on professional development, including publishing, teaching, and interviewing. In addition, graduate student workshops in both literatures and cultures and in linguistics foster student-faculty relations and allow graduate students to ready themselves for conference participation. Travel funds are available through the department to allow students to present their papers at conferences in the US or abroad.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must first apply to, or hold, a master of arts degree (or its equivalent) before applying to the PhD program. A graduate GPA of 3.50 is preferred.

Other requirements to be completed before admission:
Prospective students generally have completed an undergraduate degree or substantial coursework in the fields of Hispanic literatures and cultures, Lusophone literatures and cultures, or Hispanic linguistics, although individuals with other backgrounds may be admitted.

The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.

Special Application Requirements:
Students admitted to the program are required to be fluent in Spanish or Portuguese. The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.

All application materials must be submitted electronically through the ApplyYourself application system by December 15. Applicants are accepted for admission for fall semester only. Please refer to the Application Checklist for important details. The following is required for the application: the Departmental Application; a personal statement; a writing sample representative of the applicant's level of scholarly development; three letters of recommendation; a five-minute voice sample; a Curriculum Vitae; GRE or TOEFL test scores; and transcripts. For more information see the Department of Spanish and Portuguese Studies Apply page: http://spanport.umn.edu/grad/applying.html.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

42 to 51 credits are required in the major.

12 credits are required outside the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

**Language Requirement:** Fluency in Spanish and/or Portuguese.

A minimum GPA of 3.50 is required for students to remain in good standing.

Students entering the program with an MA from other institutions must take a minimum of 7 graduate courses (21 credits) in this department.

**Required Coursework**

All students must take the following 3-credit course:

**SPPT 5999 - The Teaching of College-Level Spanish: Theory and Practice (3.0 cr)**

**Outside Coursework**

Take 12 credits, selected in consultation with the advisor, from outside the major.

**Thesis Credits**

Take exactly 24 credit(s) from the following:

**SPAN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**

**Emphasis Options**

**Hispanic Literatures & Cultures**

**Spanish Peninsular Literature Electives**

Take exactly 12 credit(s) from the following:

- **SPAN 5110 - Discursive Formations at the Threshold of 20th-Century Spain (3.0 cr)**
- **SPAN 5150 - Contemporary Spanish Literature (3.0 cr)**
- **SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)**
• SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
• SPAN 5180 - Don Quixote (3.0 cr)
• SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)

**Spanish American Literature**
Take exactly 12 credit(s) from the following:
• SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
• SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
• SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
• SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
• SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)

**Portuguese Literature**
Take exactly 6 credit(s) from the following:
• PORT 5530 - Brazilian Literary and Cultural Studies (3.0 cr)
• PORT 5540 - Literatures and Cultures of Lusophone Africa (3.0 cr)
• PORT 5910 - Topics in Lusophone Cultures and Literatures (3.0 cr)
• PORT 5520 - Portuguese Literary and Cultural Studies (3.0 cr)

**Major Electives**
Select at least 9 elective credits from the following list. Coursework listed above, not used to meet other requirements, can be taken as an elective.
Take 9 or more credit(s) from the following:
• SPAN 5316 - Spanish Picaresque Narratives (3.0 cr)
• SPAN 5531 - Hispanic Literature of the United States (3.0 cr)
• SPAN 5920 - Topics in Spanish-American Studies (3.0 cr)
• SPAN 8100 - Research in Sociohistorical Approaches to Spanish Literature (3.0 cr)
• SPAN 8200 - Spanish Literary Texts: Theories of Formal Structures (3.0 cr)
• SPAN 8212 - Spanish Theater of the 16th Century: Drama up to Lope (3.0 cr)
• SPAN 8223 - The Poetry of the Spanish Golden Age (3.0 cr)
• SPAN 8300 - The Construction of Spanish Literary History (3.0 cr)
• SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
• SPAN 8960 - Workshop: Research in Hispanic Cultural Issues (3.0 cr)
• SPAN 8990 - Advanced Comparative Research of Caribbean Genres (3.0 cr)
• SPAN 5930 - Topics in Ibero-Romance Linguistics (3.0 cr)

-OR-

**Lusophone Literatures & Cultures**

**Portuguese and Lusophone Literature**
Take exactly 12 credit(s) from the following:
• PORT 5520 - Portuguese Literary and Cultural Studies (3.0 cr)
• PORT 5530 - Brazilian Literary and Cultural Studies (3.0 cr)
• PORT 5540 - Literatures and Cultures of Lusophone Africa (3.0 cr)
• PORT 5910 - Topics in Lusophone Cultures and Literatures (3.0 cr)

**Spanish Peninsular OR Spanish-American Literatures & Cultures**
Students can petition out of one of the four required Spanish courses if the advisor and student consider it appropriate in accordance to the student’s intellectual needs with regard to his/her dissertation project.
Take exactly 12 credit(s) from the following:
• SPAN 5160 - Medieval Iberian Literatures and Cultures (3.0 cr)
• SPAN 5170 - The Literature of the Spanish Empire and Its Decline (3.0 cr)
• SPAN 5180 - Don Quixote (3.0 cr)
• SPAN 5190 - The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism (3.0 cr)
• SPAN 5110 - Discursive Formations at the Threshold of 20th-Century Spain (3.0 cr)
• SPAN 5150 - Contemporary Spanish Literature (3.0 cr)
• SPAN 5550 - Caribbean Literature: An Integral Approach (3.0 cr)
• SPAN 5560 - Global Colonial Studies in the Hispanic World (3.0 cr)
• SPAN 5570 - Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse (3.0 cr)
• SPAN 5580 - Latin American Cultural Integration in the Neocolonial Order (3.0 cr)
• SPAN 5590 - The Impact of Globalization in Latin American Discourses (3.0 cr)

**Electives**
Select at least 18 elective credits from the following list. Coursework listed above, not used to meet other requirements, can be taken as an elective.
Take exactly 18 credit(s) from the following:
• PORT 5930 - Topics in Brazilian Literature (3.0 cr)
• SPAN 5316 - Spanish Picaresque Narratives (3.0 cr)
• SPAN 5531 - Hispanic Literature of the United States (3.0 cr)
• SPAN 5920 - Topics in Spanish-American Studies (3.0 cr)
• SPAN 8100 - Research in Sociohistorical Approaches to Spanish Literature (3.0 cr)
• SPAN 8200 - Spanish Literary Texts: Theories of Formal Structures (3.0 cr)
• SPAN 8212 - Spanish Theater of the 16th Century: Drama up to Lope (3.0 cr)
• SPAN 8223 - The Poetry of the Spanish Golden Age (3.0 cr)
• SPAN 8300 - The Construction of Spanish Literary History (3.0 cr)
• SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
• SPAN 8960 - Workshop: Research in Hispanic Cultural Issues (3.0 cr)
• SPAN 8990 - Advanced Comparative Research of Caribbean Genres (3.0 cr)

-OR-

Hispanic Linguistics
Required Coursework
Take the following courses for a total of 9 credits:
LING 5302 - Phonological Theory I (3.0 cr)
SPAN 5991 - The Acquisition of Spanish as a First and Second Language (3.0 cr)
SPAN 5701 - History of Ibero-Romance (3.0 cr)

Linguistic Core Areas
Take at least one course from each of the three core areas, for a total of 9 credits. The remaining 12 core credits required for the 21-credit minimum are selected in consultation with the advisor.
Take exactly 21 credit(s) from the following:

Phonology
Take 3 or more credit(s) from the following:
• SPAN 5711 - The Structure of Modern Spanish: Phonology (3.0 cr)
• SPAN 5721 - Spanish Laboratory Phonology (3.0 cr)

Syntax/Pragmatics
Take 3 or more credit(s) from the following:
• SPAN 5713
• SPAN 5714 - Theoretical Foundations of Spanish Syntax (3.0 cr)
• SPAN 5716 - Structure of Modern Spanish: Pragmatics (3.0 cr)

Language Variation
Take 3 or more credit(s) from the following:
• SPAN 5718 - Spanish Language Contact (3.0 cr)
• SPAN 5717 - Spanish Sociolinguistics (3.0 cr)
• SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)

Linguistics Electives
Select at least 9 elective credits from the following list. SPAN and PORT courses that focus on linguistics can be chosen with the approval of the advisor, as can coursework listed above that is not used to meet other requirements.
Take exactly 9 credit(s) from the following:
• LING 5xxx
• LING 6xxx
• SPAN 5xxx
• SPAN 6xxx
• PORT 5xxx
• PORT 8xxx

Spanish & Portuguese Electives
Take 9 or more credit(s) from the following:
• SPAN 5xxx
• SPAN 6xxx
• PORT 5xxx
• PORT 8xxx
Twin Cities Campus

History M.A.
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Email: histdgs@umn.edu
Website: http://www.hist.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Department of History does not currently admit students to the master's degree; however, PhD students often earn their MA on the way to the doctoral degree. The MA is normally completed by the end of the second year of the PhD program.

Areas of concentration include Africa; ancient history; East and South Asia; late antiquity and the middle ages; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, Institute for Advanced Study, and Consortium for the Study of the Premodern World.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
The Department of History does not currently admit master's students; however, PhD students often earn their MA on the way to the doctoral degree.

Special Application Requirements:
GRE scores above the 90% percentile in verbal (usually over 600) are preferred.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project requires students to substitute three expanded seminar papers for the thesis.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies by area of concentration (see below).

A minimum GPA of 3.00 is required for students to remain in good standing.

Students are only admitted to the PhD program. They may complete an MA while studying for the PhD.

Reading proficiency in one language other than English is required. Some areas of concentration require more than one. In some cases, competence in quantitative methods may replace one of the foreign languages.

**Plan Options**

**Plan A**

- **Major History Credits**
  
  Take 15 or more credit(s) from the following:
  Courses in the department of history, or those offered by another department related to historical or thematic area of study. Courses are chosen in consultation with the student’s advisor.

- **Outside Coursework**
  Take 6 additional credits of coursework outside the major.

- **Thesis Credits**
  Take 10 or more credit(s) from the following:
  - **HIST 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)**

- **OR**

**Plan B**

- **Major History Credits**
  Take 24 or more credit(s) from the following:
  Courses in the department of history, or those offered by another department related to historical or thematic area of study. Courses are chosen in consultation with the student’s advisor.

- **Outside Coursework**
  Take 6 additional credits of coursework outside the major.
Twin Cities Campus

History Minor
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840); fax: (612-624-7096)
Email: histdgs@umn.edu
Website: http://www.grad.hist.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of concentration in the history minor include Africa; ancient history; East and South Asia; late antiquity and the middle ages; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, Institute for Advanced Study, and Consortium for the Study of the Premodern World.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Master's Minor Requirements
Courses are determined in consultation with the History director of graduate studies.
Take 6 or more credit(s) from the following:
• HIST 5xxx
• HIST 8xxx

Doctoral
Doctoral Minor Requirements
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)
Courses are determined in consultation with the History director of graduate studies.
Take 9 or more credit(s) from the following:
• HIST 5xxx
• HIST 8xxx
Twin Cities Campus
History Ph.D.
History Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840; fax: 612-624-7096)
Email: histdgs@umn.edu
Website: http://www.grad.hist.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 66
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of concentration include Africa; ancient history; East and South Asia; late antiquity and the middle ages; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, Institute for Advanced Study, and Consortium for the Study of the Premodern World.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
About half of incoming students have master's degrees.

Special Application Requirements:
The average GPA of incoming students is approximately A-/B+, with more weight placed on history classes, where students are expected to have earned mostly A or A- grades.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 600

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies by area of concentration (see below).

A minimum GPA of 3.50 is required for students to remain in good standing.

Reading proficiency in one language other than English is required. Some areas of concentration may require more than one. The language requirement is required before admission to the preliminary oral examination. In some cases, competence in quantitative methods may replace one of the foreign languages.

Courses used to satisfy MA requirements can be counted in these totals.

History Courses
First Year Requirement
HIST 8015 - Scope and Methods of Historical Studies (3.0 cr)

Major Electives
Take 21 or more credit(s) from the following:
• HIST 5xxx
• HIST 8xxx

Comparative Area
Take 6 or more credit(s) from the following:
Courses are chosen in consultation with the student's advisor.
• HIST 5xxx
• HIST 8xxx

Outside Coursework
Take 12 course credits outside the major.

Thesis Credits
Take 24 or more credit(s) from the following:
• HIST 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Human Rights Minor
Global Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute for Global Studies, 232 Social Sciences Building, 267 19th Ave S, Minneapolis, MN 55455 (612-626-1879; fax: 612-626-2242)
Email: hrminor@umn.edu
Website: http://www.hrp.cla.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The human rights minor, available to master's, doctoral, and law students, provides an interdisciplinary foundation in human rights studies and practical experience in human rights work. To satisfy the core requirements, students must complete two of the four core courses, each of which is 3 credits (GLOS 5403/LAW 6058 - Human Rights Advocacy; LAW 6886 - International Human Rights Law; POL 5485 - Human Rights and Democracy in the World; SOC 8090 - Topics: Cross-Disciplinary Perspectives on Human Rights), and one 200-hour internship (no coursework is associated with the internship). Master's students must complete one additional elective course (3 credits), while doctoral and law students select at least two additional elective courses (totaling 6 credits) outside their major field from a designated course list. Other courses may be taken with the approval of the program director. Qualifying courses taken prior to approval of the minor will be applied retroactively.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Admission to the minor is limited to enrolled graduate or professional students with a minimum GPA of 3.0. Doctoral students must declare their minor before taking their preliminary oral examination.

Other requirements to be completed before admission:
Students should submit a letter of application describing their background and motivation for applying to the minor program to the director of Graduate Studies. The director may request further information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

In addition to the required course credits, all students pursuing the human rights minor must complete one six-week internship that is approved by the program director.

Core Courses
Take 6 or more credit(s) from the following:
- LAW 6886 - International Human Rights Law (3.0 cr)
- POL 5485 - Human Rights Policy: Issues and Actors (3.0 cr)
- LAW 6058 - Human Rights Advocacy (3.0 cr)
- or GLOS 5403 - Human Rights Advocacy (3.0 cr)
• SOC 8090 - Topics in Sociology (1.5 - 3.0 cr)
  - Take with the topic: "Topics in Sociology: Cross-Disciplinary Perspectives on Human Rights"

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
Electives
Take 3 or more credits from the following:
AFEE 5361 - World Development Problems (3.0 cr)
AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
AMIN 5890 - Problems in American Indian History (3.0 cr)
ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
BTHX 5220 - Standards for Research with Human Participants (1.0 cr)
CHIC 5374 - Migrant Farmworkers in the U.S.: Families, Work, and Advocacy [CIV] (4.0 cr)
CHIC 5374 - Migrant Farmworkers in the U.S.: Families, Work, and Advocacy [CIV] (4.0 cr)
CSPH 5403 - Human Rights Advocacy (3.0 cr)
CSPH 5483 - Human Rights Advocacy (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
LAW 6030 - Contemporary Problems in Freedom of Speech and Press (3.0 cr)
LAW 6046 - Human Trafficking (2.0 cr)
LAW 6058 - Human Rights Advocacy (3.0 cr)
LAW 6602 - International Law (3.0 cr)
LAW 6621 - Civil Rights: Citizenship and Human Rights (3.0 cr)
LAW 6827 - Women's International Human Rights (2.0 cr)
LAW 6889 - Laws of War (3.0 cr)
LAW 7400 - CL: Human Rights Litigation and International Legal Advocacy (4.0 cr)
LAW 7842 - CL: Immigration and Human Rights (4.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 8121 - Doctoral Seminar: Comparative and International Development Education (1.0 - 6.0 cr)
PA 5412 - Managing Global Crises: Humanitarian & Human Rights Challenges for Policy Makers & Practitioners (3.0 cr)
PA 5485 - Human Rights Policy: Issues and Actors (3.0 cr)
PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
PUBH 6085 - Human Rights Policy: Issues and Actors (3.0 cr)
PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)
PUBH 6801 - Health and Human Rights (3.0 cr)
PUBH 6807 - Global Health Relief, Development, and Religious and Non-Religious NGOs (3.0 cr)
SOCL 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
SW 8505 - Advanced Community Organization and Advocacy (3.0 cr)
SW 8525 - Global Perspectives on Social Welfare, Peace, and Justice (3.0 cr)

Doctoral

Electives

Take 6 or more credit(s) from the following:

- AFEE 5361 - World Development Problems (3.0 cr)
- AFRO 5866 - The Civil Rights and Black Power Movement, 1954-1984 (3.0 cr)
- AFRO 8502 - Seminar: Intellectual History of Race (3.0 cr)
- AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
- AMIN 5890 - Problems in American Indian History (3.0 cr)
- ANTH 8810 - Topics in Sociocultural Anthropology (3.0 cr)
- BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
- BTHX 5220 - Standards for Research with Human Participants: A Lecture Series for Researchers (1.0 cr)
- CHIC 5374 - Migrant Farmworkers in the U.S.: Families, Work, and Advocacy [CIV] (4.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5211 - Peacemaking and Spirituality: A Journey Toward Healing and Strength (2.0 - 3.0 cr)
- EPSY 5135 - Human Relations Workshop (4.0 cr)
- ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
- GLOS 5403 - Human Rights Advocacy (3.0 cr)
- HRIR 5252 - Employment and Labor Law for the HRIR Professional (2.0 cr)
- KIN 5371 - Sport and Society (3.0 cr)
- LAW 6030 - Contemporary Problems in Freedom of Speech and Press (3.0 cr)
- LAW 6046 - Human Trafficking (2.0 cr)
- LAW 6058 - Human Rights Advocacy (3.0 cr)
- LAW 6602 - International Law (3.0 cr)
- LAW 6621 - Civil Rights: Citizenship and Human Rights (3.0 cr)
- LAW 6827 - Women's International Human Rights (2.0 cr)
- LAW 6889 - Laws of War (3.0 cr)
- LAW 7400 - CL: Human Rights Litigation and International Legal Advocacy (4.0 cr)
- LAW 7842 - CL: Immigration and Human Rights (4.0 cr)
- OLDP 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLDP 8121 - Doctoral Seminar: Comparative and International Development Education (1.0 - 6.0 cr)
- PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
- PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
- PA 5414 - Child Human Rights: Work and Education (3.0 cr)
- PA 5421 - Racial Inequality and Public Policy (3.0 cr)
- PA 5451 - Immigration, Health and Public Policy (3.0 - 4.0 cr)
- PA 5452 - Immigration and Public Policy (3.0 cr)
- PA 5490 - Topics in Social Policy (1.0 - 4.0 cr)
- PA 5601 - Global Survey of Gender and Public Policy (3.0 cr)
- PA 5698 - Topics in Women and Public Policy (1.0 - 3.0 cr)
- PA 5801 - Global Public Policy (3.0 cr)
- PA 5823 - Managing Global Crises: Humanitarian & Human Rights Challenges for Policy Makers & Practitioners (3.0 cr)
- PA 5885 - Human Rights Policy: Issues and Actors (3.0 cr)
- PA 5890 - Topics in Foreign Policy and International Affairs (1.0 - 5.0 cr)
- POL 5485 - Human Rights Policy: Issues and Actors (3.0 cr)
- POL 8260 - Topics in Political Theory (3.0 cr)
- POL 8403 - International Norms and Institutions (3.0 cr)
- POL 8460 - Topics in International Relations (3.0 cr)
- PSY 8210 - Law, Race, and Social Psychology (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6201 - Immigrant Health Issues (3.0 - 4.0 cr)
- PUBH 6634 - Children and Families: Public Health Policy and Advocacy (2.0 cr)
- PUBH 6801 - Health and Human Rights (3.0 cr)
- PUBH 6807 - Global Health Relief, Development, and Religious and Non-Religious NGOs (3.0 cr)
- SOC 8190 - Topics in Law, Crime, and Deviance (3.0 cr)
- SW 8505 - Advanced Community Organization and Advocacy (3.0 cr)
- SW 8525 - Global Perspectives on Social Welfare, Peace, and Justice (3.0 cr)
Twin Cities Campus
Italian Studies Minor
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 260 Folwell Hall, 9 Pleasant Street SE, Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Website: http://frit.umn.edu/grad/italianminor.php

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

A minor in Italian studies is available for University students enrolled in master's and doctoral programs in such relevant fields as art history, architecture, French, comparative literature, history, English, and music. The graduate minor in Italian studies is under the general direction of the graduate faculty in Italian studies, all of whom hold membership in other fields of study within the University of Minnesota. The minor program is shaped to suit the particular research needs and interests of the student. Courses are selected in consultation with the director of Graduate Studies from a list of existing 4xxx and 5xxx courses, as well as appropriate 8xxx courses. Students may also elect to do a directed readings course with faculty affiliated with Italian studies to satisfy minor program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Other requirements to be completed before admission:
Admission to the Italian studies graduate minor is contingent on enrollment in good standing in a relevant University master's or doctoral degree-granting program. Interested students should consult with the director of Graduate Studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

With the approval of the director of Graduate Studies, one of the courses used to meet minor field requirements may be a 4xxx course, and one may be a directed readings course. Coursework from the major field may not be applied to satisfy minor field requirements.

Certification of proficiency in Italian language is required. Proficiency can be demonstrated in one of the following ways: by successfully completing an undergraduate literature/culture course in Italian, by having an undergraduate major or minor in Italian, or through a translation examination devised, administered, and assessed by the director of Graduate Studies. The proficiency requirement will be monitored by the director of Graduate Studies.

FRIT 5999 cannot be applied toward the minor field requirement.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Master's**

**Required Courses**
Take 6 or more credit(s) from the following:
- ITAL 5xxx
- ITAL 8xxx
- FFRIT 5xxx
- FFRIT 8xxx

**Doctoral**

**Required Courses**
Take 12 or more credit(s) from the following:
- ITAL 5xxx
- ITAL 8xxx
- FFRIT 5xxx
- FFRIT 8xxx
Twin Cities Campus
Linguistics M.A.
Linguistics, Institute of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331; fax: 612-624-4579)
Email: ling@umn.edu
Website: http://www.linguistics.umn.edu/grad/index.htm

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 32 to 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, and semantics/pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
There are no specific prerequisites for admission. Students admitted normally have a broad undergraduate background that includes some linguistics courses.

Special Application Requirements:
Applicants must submit the following application materials by December 15 of the preceding academic year:

(i) University of Minnesota Application form;
(ii) a statement of purpose;
(iii) a writing sample;
(iv) three letters of recommendation;
(v) a supplementary questionnaire;
(vi) transcripts from each college or university attended;
(vii) GRE scores;
(viii) English Language Proficiency Scores (TOEFL, MELAB or IELTS) are required of international applicants.

Entry is for fall semester but may be permitted in other semesters in exceptional cases.

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS
• MELAB

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 20 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 26 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is an original paper usually a revision of a course project.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See other requirements (below)

Students must demonstrate competence (the equivalent of two or more years of study) in one language other than their native language.

Required Courses

LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5202 - Syntactic Theory II (3.0 cr)
LING 5205 - Semantics (3.0 cr)
LING 5302 - Phonological Theory I (3.0 cr)
LING 8105 - Field Methods in Linguistics I (4.0 cr)

Outside Coursework

Take 6 credits outside the major.

Plan Options

Plan A

Thesis Credits
Take 10 or more credit(s) from the following:
• LING 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
LING 8005 - Research Paper Workshop (3.0 cr)

Linguistics Electives
Take 3 or more credit(s) from the following:
• LING 5xx
• LING 8xx
Twin Cities Campus
Linguistics Minor
Linguistics, Institute of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455  (612-624-3331; fax: 612-624-4579)
Email: ling@umn.edu
Website: http://www.linguistics.umn.edu/grad/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 10
- Length of program in credits (Doctorate): 16
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, and semantics/pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters Required Courses
LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
or LING 5302 - Phonological Theory I (3.0 cr)
One additional LING course (3.0 or more credits) approved by the director of graduate studies.
Take 3 or more credit(s) from the following:
- LING 5xxx
- LING 8xxx

Doctoral Required Courses
LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5302 - Phonological Theory I (3.0 cr)
Two additional LING courses (6.0 or more credits) approved by the director of graduate studies.
Take 6 or more credit(s) from the following:
• LING 5xxx
• LING 8xxx
Twin Cities Campus
Linguistics Ph.D.
Linguistics, Institute of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331; fax: 612-624-4579)
Email: ling@umn.edu
Website: http://www.linguistics.umn.edu/grad/

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 78
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, semantics, and pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other sub-fields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
There are no specific prerequisites for admission. Students admitted normally have a broad undergraduate background that includes some linguistics courses

Special Application Requirements:
Applicants must submit the following application materials by December 15 of the preceding academic year:
(i) University of Minnesota Application form;
(ii) a statement of purpose;
(iii) a writing sample;
(iv) three letters of recommendation;
(v) a supplementary questionnaire;
(vi) transcripts from each college or university attended;
(vii) GRE scores;
(viii) English Language Proficiency Scores (TOEFL, MELAB or IELTS) are required of international applicants.

Entry is for fall semester but may be permitted in other semesters in exceptional cases.

International applicants must submit score(s) from one of the following tests:
• TOEFL

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
42 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: See below.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must demonstrate competence (the equivalent of two or more years of study) in two languages other than their native language before the PhD can be awarded.

Upon completion of required coursework, students must pass a preliminary written exam. To pass the preliminary written exam, a student must complete (1) a paper judged to be of near publishable quality by the student's committee in the student's primary area of specialization; (2) a paper judged to be of near publishable quality by the student's committee in the student's chosen secondary area of specialization.

Students are required to pass the preliminary oral exam. The preliminary oral exam is a presentation and defense of a research-paper-length dissertation prospectus, which introduces and motivates the student's dissertation topic and provides a detailed plan for completion of the dissertation.

Students are required to complete a dissertation and pass the Final Oral Exam, which is a defense of the completed dissertation.

Required Courses
LING 5001 - Introduction to Linguistics [SOCS] (4.0 cr)
LING 5201 - Syntactic Theory I (3.0 cr)
LING 5202 - Syntactic Theory II (3.0 cr)
LING 5205 - Semantics (3.0 cr)
LING 5302 - Phonological Theory I (3.0 cr)
LING 5303 - Phonological Theory II (3.0 cr)
LING 8005 - Research Paper Workshop (3.0 cr)
LING 8105 - Field Methods in Linguistics I (4.0 cr)
LING 8106 - Field Methods in Linguistics II (4.0 cr)
LING 8210 - Seminar in Syntax (3.0 cr)

Linguistics Seminar Courses
Take 9 or more credit(s) from the following:
• LING 8200 - Topics in Syntax and Semantics (3.0 cr)
• LING 8210 - Seminar in Syntax (3.0 cr)
• LING 8300 - Topics in Phonetics and Phonology (3.0 cr)
• LING 8500 - Topics in Second Language Acquisition (3.0 cr)
• LING 8900 - Seminar: Topics in Linguistics (3.0 cr)
• LING 8920 - Topics in Language and Cognition (3.0 cr)
• LING 8991 - Independent Study (1.0 - 4.0 cr)

Supporting Program Courses
The required 12 credits of coursework from outside the major can be in the same field or in different fields. 6 credits of outside coursework from the M.A. may be used towards the PhD supporting program requirement.

Thesis Credits
Take 24 or more credit(s) from the following:
• LING 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
• LING 8888W - Thesis Credit Dissertation Seminar (1.0 - 3.0 cr)
Twin Cities Campus
Literacy and Rhetorical Studies Minor
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Writing, 10 Nicholson Hall, 216 Pillsbury Drive SE, Minneapolis, MN 55455 (612-626-7583; fax: 612-626-7580)
Email: writing@umn.edu
Website: http://writing.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The goal of the literacy and rhetorical studies (LRS) minor is to encourage students to contribute to interdisciplinary activity and to create a forum for them and several dozen faculty members at the University whose research and teaching emphasize various facets of writing and communication. By crafting an individualized program of study with the LRS director of graduate studies (http://writing.umn.edu/lrs/people.html), including theory, pedagogy, and research, often in a historical context, students can complement their disciplinary degree, and thereby open up new perspectives for their scholarship and teaching.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
For specific information about applying for the LRS minor, see: http://writing.umn.edu/lrs/admission.html

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All courses are chosen in consultation with the LRS director of graduate studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
To ensure the minor is interdisciplinary, no more than one of the three courses may be from the student's home department.

Students must write a substantial paper that emerges from one of the three courses.

Literacy Theory or Practice
Take 3 or more credit(s) from the following:
A course in literacy theory or practice, including pedagogy.
Research Methods and Practices
Take 3 or more credit(s) from the following:
A course in research methods and practices in one of the areas of the minor.

**Historical Topic**
Take 3 or more credit(s) from the following:
A course about a historical topic (e.g., history of the book), of rhetoric or of literacy.

**Doctoral**
To ensure the minor is interdisciplinary, no more than two of the four courses may be from the student's home department.

To complete the doctoral minor, students must submit a capstone writing project emerging from their studies in literacy and/or rhetoric, such as a seminar paper or a completed dissertation chapter.

**Literacy Theory or Practice**
Take 3 or more credit(s) from the following:
A course in literacy theory or practice, including pedagogy.

**Research Methods and Practices**
Take 3 or more credit(s) from the following:
A course in research methods and practices in one of the areas of the minor.

**Historical Topic**
Take 3 or more credit(s) from the following:
A course about a historical topic (e.g., history of the book), of rhetoric or of literacy.

**Additional Coursework**
Take at least 3 credits to meet the 12-credit minimum for the doctoral minor, chosen in consultation with the LRS director of graduate studies.
Twin Cities Campus
Mass Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-625-9824; fax: 612-625-9525)
Email: sjmcgrad@umn.edu
Website: http://sjmc.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 35
- This program does not require summer semesters for timely completion
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's degree in mass communication emphasizes the theoretical study of mass communication and analysis of media systems and effects. The degree is intended for those who wish to pursue PhD degrees or teaching and research careers, as well as those who seek communication-related positions. The general master's program is not designed to provide professional skills training in journalism. Individuals with a bachelor's degree in journalism and mass communication or with strong social science or liberal arts backgrounds in areas such as political science, psychology, sociology, history, and English are encouraged to apply. Individuals with extensive professional experience in mass communication are also welcome. The program is suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students whose native language is not English are required to submit scores from the TOEFL or IELTS (academic). In addition, such students seeking teaching assistantships are required to pass the SPEAK test of spoken-English proficiency prior to appointment. Admission is considered for fall semester only; the priority application deadline is January 15, with a rolling deadline of March 1.

The mass communication MA and PhD programs offer a joint degree with the Law School. Applicants to either joint degree--either the MA/JD or the PhD/JD--are reviewed separately by the Law School and the mass communication programs for admission, but are asked to identify themselves as seeking the joint degree option in their statement of intent for the mass communication application. For more information, contact sjmcgrad@umn.edu.

Special Application Requirements:
Applicants must submit a department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; a resume or curriculum vita; and scores from the General Test of the GRE.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
- MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
Program Requirements

Plan A: Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All coursework must be taken A-F, except for JOUR 8009, which is taken S/N.

Required Mass Communication Core

JOUR 8001 - Studies and Theories of Mass Communication (3.0 cr)
JOUR 8009 - Pre-seminar in Mass Communication (1.0 cr)
One additional theory course inside or outside SJMC, chosen in consultation with the student's adviser (3.0 cr)

Required Methodology Core

JOUR 8501 - Seminar: The Process of Quantitative Mass Communication Research (3.0 cr)
JOUR 8503 - Seminar: Qualitative Methods in Mass Communication Research (3.0 cr)

Electives
Take 6 or more credit(s) from the following:
- JOUR 5xxx
- JOUR 8xxx
 courses are chosen in consultation with the advisor.

Outside Coursework
Take 6 credits outside the major.

Thesis Credits
Take exactly 10 credit(s) from the following:
- JOUR 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Joint- or Dual-degree Coursework: MA in Mass Communication and JD in Law (dual degree) Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Mass Communication Minor
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN  55455 (612-625-9824; fax: 612-625-9525).
Email: sjmcgrad@umn.edu
Website: http://sjmc.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mass communication program emphasizes the theoretical study of mass communication and analysis of media systems and effects. The program is not designed to provide professional skills training in journalism.

Areas of specialization include media processes, influences, and effects (including health communication, advertising, and political communication); media law, ethics, history; and media management. All programs are suffused with the study of new communication technologies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor programs are planned in consultation with the director of graduate studies or another member of the mass communication graduate faculty. The master's minor consists of a minimum of 9 credits in a coherent area, with at least 6 credits at 8xxx. A PhD minor program consists of a minimum of 14 credits in a coherent disciplinary area.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Take 9 or more credit(s) from the following:
At least 6 credits must be taken at the 8xxx level:
• JOUR 5xxx
  or JOUR 8xxx

Doctoral
Required Courses
Take 14 or more credit(s) from the following:

• JOUR 5xxx
• JOUR 8xxx
Twin Cities Campus
Mass Communication Ph.D.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN  55455 (612-625-9824; fax: 612-625-9525)
Email: sjmccgrad@umn.edu
Website: http://sjmc.umn.edu/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD offers training for academic careers primarily in communication instruction, research, or policy. Areas of specialization include media processes, influences, and effects (including health communication, advertising, and political communication); media law, ethics, history; and media management. The program is suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students whose native language is not English are required to submit scores from the TOEFL or IELTS (academic). In addition, such students seeking teaching assistantships are required to pass the SPEAK test of spoken-English proficiency prior to appointment. Admission is considered for fall semester only; the application deadline is January 15.

The mass communication MA and PhD programs offer a joint degree with the Law School. Applicants to either joint degree--either the MA/JD or the PhD/JD--are reviewed separately by the Law School and the mass communication programs for admission, but are asked to identify themselves as seeking the joint degree option in their statement of intent for the mass communication application. For more information, contact sjmccgrad@umn.edu.

Special Application Requirements:
Applicants must submit a department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; a resume or curriculum vita; and scores from the General Test of the GRE.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
- MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
34 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

A minimum of 46 course credits and 24 thesis credits are required. Coursework must include 16 credits in required core courses, and at least 30 other graduate credits. Of these credits, at least 18 credits must come from SJMC courses and at least 12 credits from outside the SJMC. All courses included on the PhD graduate degree plan must be taken A-F, except for JOUR 8009, which is taken S/N.

Required Mass Communication Core
- JOUR 8001 - Studies and Theories of Mass Communication (3.0 cr)
- JOUR 8009 - Pro-seminar in Mass Communication (1.0 cr)
- One additional theory course either inside of outside the SJMC, chosen in consultation with the student's adviser (3.0 cr)

Required Methodology Core
- JOUR 8501 - Seminar: The Process of Quantitative Mass Communication Research (3.0 cr)
- JOUR 8503 - Seminar: Qualitative Methods in Mass Communication Research (3.0 cr)
- One additional methods course outside of the SJMC, chosen in consultation with the student's adviser (3.0 cr)

Electives
Take 18 or more credit(s) from the following:
- JOUR 5xxx
- JOUR 8xxx

Outside the Major in a Supporting Program
Take 12 credits outside the major in a minor or supporting program.

Thesis Credits
Take exactly 24 credit(s) from the following:
- JOUR 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Joint- or Dual-degree Coursework:JD/ Mass Communications PhD
Twin Cities Campus

Medieval Studies Minor

Medieval Studies, Center for
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Center for Medieval Studies, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-626-0805).
Email: cmedst@umn.edu
Website: http://cmedst.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The medieval studies minor is available to master's and doctoral students. The Center for Medieval Studies (CMS) encourages collegial interaction and scholarly collaboration among faculty and students in all areas of medieval studies. CMS seeks to provide an opportunity for scholars of all disciplines and at all levels to focus intensively on historical, literary, anthropological, social, economic, religious, artistic, cultural, and methodological inquiries into the medieval period, which may fall within the chronology of roughly 300 to 1,500 A.D. The program emphasizes an interdisciplinary and cross-cultural approach to medieval culture including the study of medieval texts in original languages. Departments associated with the minor include: history; art history; theatre arts; music; English; French and Italian; German, Scandinavian, and Dutch; Spanish and Portuguese studies; Classical and Near Eastern studies; Asian languages and literatures; and others.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Use of 4xxx courses toward program requirements is permitted only with the permission of the CMS director.

The master's minor requires 6 graduate credits: two courses in medieval studies outside the student's major department, including a course which demonstrates command of Latin texts, normally LATN 51xx or higher or other Latin course by permission of the director of graduate studies, and one additional course in MEST or on a medieval topic.

The doctoral minor requires 12 graduate credits: four courses in medieval studies outside the student's major department, including a course which demonstrates command of Latin texts, normally LATN 51xx or higher or other Latin course by permission of the DGS; a second Latin course 51xx or above, or a course 5xxx or above in Arabic, Greek, Hebrew, classical Chinese, or a medieval vernacular; and two additional courses in MEST or on medieval topics.

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Latin Course
Take 3 or more credit(s) from the following:
- LAT 5xxx
- LAT 8xxx

Medieval Studies or Medieval Topics Course
Course must be outside of the student’s major field.

Consult with the Medieval Studies director of graduate studies for other courses that may fulfill this requirement.

Take 3 or more credit(s) from the following:
- MEST 4610 - Intermediate Topics in Medieval Studies (3.0 - 4.0 cr)
- MEST 5610 - Advanced Topics in Medieval Studies (3.0 - 4.0 cr)
- MEST 5993 - Directed Studies in Medieval Studies (1.0 - 3.0 cr)
- MEST 8010 - Medieval Studies Colloquium (3.0 cr)
- MEST 8110 - Seminar in Medieval Studies (3.0 - 4.0 cr)
- MEST 8xxx

- MEST 8xxx :
  - ANTH 5442 - Archaeology of the British Isles (3.0 cr)
  - ARCH 5423 - Gothic Architecture (3.0 cr)
  - ARTH 5188 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
  - CNES 5188 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
  - ARTH 5323 - Art of the Italian Renaissance: 14th-16th Centuries (3.0 cr)
  - ARTH 5324 - 15th-Century Painting (3.0 cr)
  - ARTH 5765 - Early Chinese Art (3.0 cr)
  - ARTH 5777 - The Diversity of Traditions: Indian Art 1200 to Present (3.0 cr)
  - ARTH 5786 - Theorizing City and Space in the Mediterranean and Western Asia (3.0 cr)
  - CNES 5786 - Theorizing City and Space in the Mediterranean and Western Asia (3.0 cr)
  - ARTH 8200 - Seminar: Medieval Art (3.0 cr)
  - ENGL 4612 - Old English I (3.0 cr)
  - ENGL 4613 - Old English II (3.0 cr)
  - ENGL 5110 - Medieval Literatures and Cultures: Intro to Medieval Studies (3.0 cr)
  - ENGL 8110 - Seminar: Medieval Literature and Culture (3.0 cr)
  - GER 5711 - History of the German Language I (3.0 cr)
  - GER 5721 - Introduction to Middle High German (3.0 cr)
  - GER 5722 - Middle High German: Advanced Readings (3.0 cr)
  - GER 5734 - Old Saxon (3.0 cr)
  - GER 5740 - Topics in Germanic Medieval Studies (3.0 cr)
  - GER 8200 - Seminar in Medieval German Literature and Culture (3.0 cr)
  - GER 8751 - Paleography: Medieval Manuscript Readings (3.0 cr)
  - GER 8752 - Medieval Text Editing (3.0 cr)
  - HIST 5111 - Proseminar in the History of Medieval Europe (3.0 cr)
  - HIST 5115 - Medieval Latin Historians (3.0 cr)
  - HIST 5271 - The Viking World: Story, History, and Archaeology (3.0 cr)
  - HIST 5281 - European Intellectual History: The Early Modern Period, Antiquity to 1750 (3.0 cr)
  - HIST 5469 - Historiographies of China, 1000-1700 (3.0 cr)
  - HIST 5611 - New Directions in the Middle Ages, ca. 300-1100 (3.0 cr)
  - HIST 5612 - New Directions in the Middle Ages, ca. 1100-1500 (3.0 cr)
  - HIST 5614 - The Medieval Church (3.0 cr)
  - HIST 5900 - Topics in European/Medieval History (1.0 - 4.0 cr)
  - HIST 5962 - Bell Library Research Seminar in Comparative World History, ca. 1000-1800 CE (3.0 cr)
  - HIST 8110 - Medieval History: Research Seminar (3.0 cr)
  - HIST 8905 - Topics in European Medieval History (1.0 - 4.0 cr)
  - ITAL 5401 - Mondo di Dante (4.0 cr)
  - ITAL 5609 - World of Dante (4.0 cr)
  - LAT 5200 - Advanced Reading in Later Latin (3.0 cr)
  - LAT 8263 - Survey of Latin Literature II (3.0 cr)
  - LAT 8267 - Graduate Survey of Latin Literature of Late Antiquity (3.0 cr)
  - MUS 8631 - Seminar: Music in Medieval Europe (3.0 cr)
  - PHIL 8080 - Seminar: History of Ancient and Medieval Philosophy (3.0 cr)
  - POL 8251 - Ancient and Medieval Political Thought (3.0 cr)
  - RELS 8252 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
  - RELS 8326 - Art of the Inka and their Ancestors (3.0 cr)
  - SCAN 5502 - The Icelandic Saga (3.0 cr)
  - SCAN 5701 - Old Norse Language and Literature (3.0 cr)
• SCAN 5703 - Old Norse Poetry (3.0 cr)
• SCAN 5710 - Topics in Old Norse Literature (3.0 cr)
• SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)
• SPAN 5701 - History of Ibero-Romance (3.0 cr)
• SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
• TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)
• TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)

• Old English I
  • MEST 4612 - Old English I (3.0 cr)
  or
  • ENGL 4612 - Old English I (3.0 cr)

• Old English II
  • MEST 4613 - Old English II (3.0 cr)
  or
  • ENGL 4613 - Old English II (3.0 cr)

**Doctoral**

Student can only take Old English I (MEST/ENGL 4612) and Old English II (MEST/ENGL 4613) to fulfill either the medieval vernacular course requirement OR the medieval studies/medieval topics course requirement, not both.

**Latin Course**

Take 3 or more credit(s) from the following:
• LAT 5xxx
• LAT 8xxx

**Medieval Vernacular Course**

Take 3 or more credit(s) from the following:
• ARAB 5xxx
• ARAB 8xxx
• COPT 5xxx
• GRK 5xxx
• GRK 8xxx
• HEBR 5xxx
• HEBR 8xxx
• LAT 5xxx
• LAT 8xxx

• Old English I
  • MEST 4612 - Old English I (3.0 cr)
  or
  • ENGL 4612 - Old English I (3.0 cr)

• Old English II
  • MEST 4613 - Old English II (3.0 cr)
  or
  • ENGL 4613 - Old English II (3.0 cr)

• Introductory Classical Chinese I
  • CHN 5211 - Introductory Classical Chinese I (3.0 cr)
  or
  • JPN 5211 - Introductory Classical Chinese I (3.0 cr)
  or
  • KOR 5211 - Introductory Classical Chinese I (3.0 cr)

• Introductory Classical Chinese II
  • CHN 5212 - Introductory Classical Chinese II (3.0 cr)
  or
  • JPN 5212 - Introductory Classical Chinese II (3.0 cr)
  or
  • KOR 5212 - Introductory Classical Chinese II (3.0 cr)

**Medieval Studies or Medieval Topics Course**

Course must be outside of the student's major field.

Consult with the Medieval Studies director of graduate studies for other courses that may fulfill this requirement.

Take 6 or more credit(s) from the following:
• MEST 4610 - Intermediate Topics in Medieval Studies (3.0 - 4.0 cr)
• MEST 5610 - Advanced Topics in Medieval Studies (3.0 - 4.0 cr)
• MEST 5993 - Directed Studies in Medieval Studies (1.0 - 3.0 cr)
• MEST 8010 - Medieval Studies Colloquium (3.0 cr)
• MEST 8110 - Seminar in Medieval Studies (3.0 - 4.0 cr)
• MEST 8xxx
• MEST 8xxx
• ANTH 5442 - Archaeology of the British Isles (3.0 cr)
• ARCH 5423 - Gothic Architecture (3.0 cr)
• ARTH 5188 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
• CNES 5188 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
• ARTH 5323 - Art of the Italian Renaissance: 14th-16th Centuries (3.0 cr)
• ARTH 5324 - 15th-Century Painting (3.0 cr)
• ARTH 5765 - Early Chinese Art (3.0 cr)
• ARTH 5777 - The Diversity of Traditions: Indian Art 1200 to Present (3.0 cr)
• ARTH 5786 - Theorizing City and Space in the Mediterranean and Western Asia (3.0 cr)
• ARTH 5787 - Visual Cultures in Contact: Cross-Cultural Interaction in the Ancient and Early Medieval Worlds (3.0 cr)

• ARTH 8200 - Seminar: Medieval Art (3.0 cr)
• ENGL 4612 - Old English I (3.0 cr)
• ENGL 4613 - Old English II (3.0 cr)
• ENGL 5110 - Medieval Literatures and Cultures: Intro to Medieval Studies (3.0 cr)
• ENGL 8110 - Seminar: Medieval Literature and Culture (3.0 cr)
• GER 5711 - History of the German Language I (3.0 cr)
• GER 5721 - Introduction to Middle High German (3.0 cr)
• GER 5722 - Middle High German: Advanced Readings (3.0 cr)
• GER 5734 - Old Saxon (3.0 cr)
• GER 5740 - Topics in Germanic Medieval Studies (3.0 cr)
• GER 5720 - Seminar: Medieval Literature and Culture (3.0 cr)
• GER 8751 - Paleography: Medieval Manuscript Readings (3.0 cr)
• GER 8752 - Medieval Text Editing (3.0 cr)
• HIST 5111 - Proseminar in the History of Medieval Europe (3.0 cr)
• HIST 5115 - Medieval Latin Historians (3.0 cr)
• HIST 5271 - The Viking World: Story, History, and Archaeology (3.0 cr)
• HIST 5281 - European Intellectual History: The Early Modern Period, Antiquity to 1750 (3.0 cr)
• HIST 5469 - Historiographies of China, 1000-1700 (3.0 cr)
• HIST 5611 - New Directions in the Middle Ages, ca. 300-1100 (3.0 cr)
• HIST 5612 - New Directions in the Middle Ages, ca. 1100-1500 (3.0 cr)
• HIST 5614 - The Medieval Church (3.0 cr)
• HIST 5900 - Topics in European/Medieval History (1.0 - 4.0 cr)
• HIST 5962 - Bell Library Research Seminar in Comparative World History, ca. 1000-1800 CE (3.0 cr)
• HIST 8110 - Medieval History: Research Seminar (3.0 cr)
• HIST 8905 - Topics in European Medieval History (1.0 - 4.0 cr)
• ITAL 5401 - Mondo di Dante (4.0 cr)
• ITAL 5609 - World of Dante (4.0 cr)
• LAT 5200 - Advanced Reading in Later Latin (3.0 cr)
• LAT 8263 - Survey of Latin Literature II (3.0 cr)
• LAT 8267 - Graduate Survey of Latin Literature of Late Antiquity (3.0 cr)
• MUS 8200 - Seminar: Music in Medieval Europe (3.0 cr)
• PHIL 8080 - Seminar: History of Ancient and Medieval Philosophy (3.0 cr)
• POL 8251 - Ancient and Medieval Political Thought (3.0 cr)
• RELS 5252 - Art and Archaeology of Early Christianity and the Late Roman Empire (3.0 cr)
• RELS 5326 - Art of the Inka and their Ancestors (3.0 cr)
• SCAN 5502 - The Icelandic Saga (3.0 cr)
• SCAN 5701 - Old Norse Language and Literature (3.0 cr)
• SCAN 5703 - Old Norse Poetry (3.0 cr)
• SCAN 5710 - Topics in Old Norse Literature (3.0 cr)
• SCAN 8500 - Seminar in Medieval Scandinavian Languages and Literature (3.0 cr)
• SPAN 8312 - Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina] (3.0 cr)
• TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)
• TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)

Old English I
• MEST 4612 - Old English I (3.0 cr)
  or ENGL 4612 - Old English I (3.0 cr)

Old English II
• MEST 4613 - Old English II (3.0 cr)
  or ENGL 4613 - Old English II (3.0 cr)
Moving Image Studies Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Contact Information:
Department of Cultural Studies and Comparative Literature, 216 Pillsbury Dr SE, 235 Nicholson Hall, Minneapolis, MN 55455 (612-624-8099)
Email: csclgrad@umn.edu
Website: http://movingimage.umn.edu/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The moving image increasingly permeates the fabric of contemporary culture and society. From cinema theaters and home televisions to installation art, portable electronic devices, medical technologies, and science laboratories, and in public spaces from airport terminals to building façades, the moving image is nearly ubiquitous.

The graduate minor in moving image studies trains students from a variety of disciplinary fields in the critical analysis of the moving image in its disparate yet interrelated forms. Drawing from the faculty's extensive research interests and expertise, the curriculum brings together discourses ranging from film theory to media studies, from the philosophy of the image to the history of technology, and beyond.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Admission to the minor is by request, with the approval of the student's adviser and the director of Graduate Studies of the minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The PhD minor (minimum 15 credits) requires two core courses (6 credits): MIMS 8001 - Theories of the Moving Image (3 credits), and MIMS 8003 - Historiography of the Moving Image (3 credits). The PhD minor also requires three electives (minimum 9 credits): one 8xxx Topics Course (3 credits) chosen from a list of courses offered in a given year by film/media faculty in various departments, and two additional 5xxx or 8xxx courses (6 credits) chosen from a list of courses offered in a given year by film/media faculty in various departments, including, as a recommended option, a production-based course. The master's minor (minimum 9 credits) requires two core courses (6 credits): MIMS 8001 - Theories of the Moving Image (3 credits), and MIMS 8003 - Historiography of the Moving Image (3 credits). The master's minor also requires one additional 5xxx or 8xxx course (3 credits) chosen from a list of courses offered by film/media faculty in various departments.

Students are advised to check the program website indicated above for updated information.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's

Required Courses
- MIMS 8001 - Theories of the Moving Image (3.0 cr)
- MIMS 8003 - Historiography of the Moving Image (3.0 cr)

Electives
Take 3 or more credit(s) from the following:
- 5xxx or 8xxx courses (3.0 cr) chosen from a list of courses offered in a given year by film/media faculty in various departments.

Doctoral

Required
- MIMS 8001 - Theories of the Moving Image (3.0 cr)
- MIMS 8003 - Historiography of the Moving Image (3.0 cr)

Electives
Take 9 or more credit(s) from the following:
- 8xxx - Topics Course (3.0 cr) chosen from a list of courses offered in a given year by film/media faculty in various departments.
- 5xxx or 8xxx courses (6.0 cr) chosen from a list of courses offered in a given year by film/media faculty in various departments, including, as a recommended option, a production-based course.
Twin Cities Campus
Music D.M.A.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 85 to 90
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Musical Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Other requirements to be completed before admission:
Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy.

The performance degree (D.M.A.) requires an audition for admission.

The conducting degree (D.M.A.) requires a preliminary DVD, an audition, and interview for admission.

Special Application Requirements:
For some areas of performance, a preliminary DVD may be required prior to scheduling an audition.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 21
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements
74 to 79 credits are required in the major.
9 credits are required outside the major.
4 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The doctor of musical arts offers and emphases in piano, organ, voice, guitar, collaborative piano/coaching, conducting, and instrumental performance (violin, viola, cello, flute, oboe, clarinet, saxophone, bassoon, trumpet, trombone, and percussion).
Twin Cities Campus
Music M.A.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 35
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.) with an emphasis in Composition, Music Therapy, Musicology (Ethnomusicology), and Theory.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Applicants must hold a bachelor’s degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music therapy.

Special Application Requirements:
The M.A.’s theory emphasis requires submission of original papers (one tonal and one post-tonal analysis) for admission.
The composition emphasis requires submissions of original scores and recordings (2-4 scores of varying genres) for admission.
The musicology/ethnomusicology emphasis requires the submission of original papers for admission.
The music therapy emphasis requires documentation of at least 3,500 hours of clinical experience. An interview is also required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Language requirements: A reading knowledge of French, German, or Italian is required for all M.A. degree emphases except therapy. For the emphasis in composition, reading knowledge of a foreign language or, with approval, an equivalent research tool.

The master of arts in music offers emphases in musicology/ethnomusicology (Plan A and Plan B), theory (Plan B only), composition (Plan B only).

The M.A. in music with emphasis in musicology/ethnomusicology requires 35 credits (25 course credits and 10 thesis credits) for Plan A and 31 course credits for Plan B; the emphasis in composition (Plan B only) requires 35 course credits, and the emphasis in music theory (Plan B only) requires 30 course credits. The credit totals for these emphases include 6 credits required for courses outside the major field. Final Exams: For the emphasis in musicology/ethnomusicology, the final exams are written and oral. For the emphases in theory and composition, the final exams are oral.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Music Education
This sub-plan is limited to students completing the program under Plan B.

The Music Education sub-plan is no longer accepting applications. Please refer to the School of Music's website at http://www.music.umn.edu for other options.
Twin Cities Campus
Music M.M.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Music

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Other requirements to be completed before admission:
Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy.

The collaborative piano/coaching M.M. requires an audition for admission.

The M.M. in choral conducting, orchestral conducting, and wind ensemble/band conducting degrees all required a preliminary DVD, audition, and interview for admission.

The performance M.M. requires an audition for admission.

Special Application Requirements:
For some areas of performance, a preliminary DVD may be required prior to scheduling an audition.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The master of music degree offers emphases in piano, organ, voice, violin, viola, cello, double bass, violin performance and Suzuki pedagogy, flute, oboe, clarinet, saxophone, bassoon, French horn, trumpet, trombone, euphonium, tuba, percussion, harp, guitar, collaborative piano/coaching, orchestral conducting, wind ensemble/band conducting, and choral conducting.

The M.M. requires credit distribution among the following for each emphasis: applied music, study directly related to the emphasis (literature, pedagogy, performance practice, conducting, secondary instrument, chamber music, etc.), ensemble, and musicology/ethnomusicology and theory/composition. One recital is required for all emphases except collaborative piano/coaching, which requires two.

The minimum credit requirement for each emphasis is as follows: 30 credits are required for piano, instrumental performance, guitar, piano pedagogy, orchestral conducting, wind ensemble/band conducting, and choral conducting; 33 credits for organ and voice; 37 credits for violin performance and Suzuki pedagogy; 39 credits for collaborative piano/coaching.

The M.M. in both Research requires 33 credits and the M.M. in Pedagogy requires 30 credits.
Twin Cities Campus
Music Minor
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th St S, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The music minor is open to non-music major graduate students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Applicants must be actively pursuing a graduate degree in a non-music field at the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The music minor requires a minimum of 12 credits (four 8xxx-level, 3-credit courses) in musicology/ethnomusicology or theory. One or more courses may be at the 5xxx-level, but only with prior approval of the student's advisor and the Music director of Graduate Studies. Prior to registering for any 5xxx- or 8xxx-level courses offered by the School of Music, students must complete any prerequisites or background-knowledge equivalents, or obtain instructor approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Required Courses
*Can substitute 5xxx-level or MUSA 83xx with director of Graduate Studies approval.
Take 12 or more credit(s) from the following:
ONLY MUS 85xx, 86xx, 88xx.
**Twin Cities Campus**

**Music Ph.D.**

*School of Music*

*College of Liberal Arts*

Link to a list of faculty for this program.

**Contact Information:**
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: [http://www.music.umn.edu](http://www.music.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 87 to 92
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree’s program requirements.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study. For the Ph.D. in music education/therapy, applicants must also have documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience.

**Special Application Requirements:**
The theory Ph.D. requires original papers (one tonal and one post-tonal analysis) for admission.
The composition Ph.D. requires original scores and recordings (2-4 scores of varying genre) for admission.
The musicology/ethnomusicology Ph.D. requires original papers for admission.
The music education/music therapy Ph.D. requires original papers (e.g. research or professional papers) and documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience. An interview is also required.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

51 to 56 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The language requirement for musicology and ethnomusicology includes two languages chosen from French, German, and Italian.
Substitution may be made when a different language is needed for the thesis.

For composition, the language requirement includes reading knowledge of two foreign languages; with approval, an equivalent research tool may be substituted for a foreign language.

For theory, the language requirement includes German and either French or Italian. Substitution may be made when a different language is needed for the thesis; with approval, the second language may also be replaced by a collateral field of knowledge or a special research technique.

There is no language requirement for the education/therapy degree.
Twin Cities Campus
Philosophy M.A.
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-625-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students are primarily admitted to the PhD program, while admission to the MA is intended for those with professional goals in other fields, and is limited (0-2 candidates per year).

Philosophy is noteworthy for its emphasis on the individual student's research interests. With the help of an advisor, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor. The minor or supporting program, drawn at least in part from a department or departments other than philosophy, complements the student's research focus. Students gain a broad base of knowledge through required coursework. Terminal MA students are required to take two history courses; one in ancient philosophy and one in modern.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Recognizing that evidence of ability to pursue graduate study in philosophy is diverse, the department does not specify prerequisites for admission. Normally, those admitted have a broad undergraduate background that includes some courses in philosophy.

Special Application Requirements:
Students must apply to both the University and the Department of Philosophy. The department application for admission and aid is available from the Admissions and Aid Committee at the address listed above, or may be downloaded from the philosophy website at www.philosophy.umn.edu. All application materials may be uploaded to Apply Yourself. Department materials required include a completed application form, personal statement, transcripts, scores from the GRE General Test, three letters of recommendation, and a writing sample. Students interested in DOVE or ICGC Fellowship (Interdisciplinary Center for Global Change) should include a statement expressing their interest. Students interested in the ICGC Fellowship should also contact the Interdisciplinary Center for the Study of Global Change. Applications, together with all supporting materials, must be received by December 31. The philosophy department reviews applications once a year, and admits students for entry in the fall semester only.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
- Total Score: 6.5
  • MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The project is three Plan B papers. For details see Philosophy Department Degree Program: MA, available as a PDF on the philosophy website at www.philosophy.umn.edu.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Use of 4xxx level courses toward program requirements is permitted under certain conditions with advisor approval. For graduate credit, students must enroll in the appropriate 8xxx level (1 credit) accompanying workshop.

Courses from outside the Philosophy department, in consultation with the director of graduate studies, may be applied towards the major credit requirement in certain circumstances.

Required Philosophy Courses

Philosophy coursework should show that consideration has been paid to the diversity and variety of areas of philosophy, as well as to the student's specialized interest. The department recommends that students consult with their advisors and the director of graduate studies when choosing coursework.

Take 14 or more credit(s) from the following:

• PHIL 5xxx
• PHIL 8xxx

Outside Courses -- Related Fields

Take 6 credits outside the major in related fields or a minor.

Plan Options

Plan A

Thesis Credits

Take 10 or more credit(s) from the following:

• PHIL 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B

Take 10 or more credit(s) from the following:

• PHIL 5xxx
• PHIL 8xxx
Twin Cities Campus
Philosophy Minor
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-625-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

A master's minor requires 6 course credits in philosophy approved by the director of graduate studies in Philosophy. Programs are tailored to meet the interests and needs of the student. A doctoral minor requires 12 course credits in philosophy approved by the director of graduate studies in philosophy. Programs are tailored to meet the interests and needs of the student.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students majoring in other fields who wish to pursue an Master's or Doctoral minor in philosophy should contact the director of graduate studies to set up an appointment to discuss their goals and objectives.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The philosophy minor coursework is tailored to meet the interests and needs of the student.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Take 6 or more credit(s) from the following:
• PHIL 5xxx
• PHIL 8xxx

Doctoral
Required Courses
Take 12 or more credit(s) from the following:
• PHIL 5xxx
Twin Cities Campus
Philosophy Ph.D.
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-624-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 62 to 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Philosophy offers both PhD and MA degrees. Students are primarily admitted to the PhD program, while admission to the MA is intended for those with professional goals in other fields and disciplines. The stand-alone MA program is not considered a laddering program into the PhD program at the University of Minnesota or any other institution. Students admitted to the Ph.D. program usually choose to complete an MA Plan B en route to the PhD unless they already hold a master's degree in philosophy from another institution.

Philosophy is noteworthy for its emphasis on the individual student's research interests. With the help of an adviser, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor. The minor or supporting program, drawn at least in part from a department or departments other than philosophy, complements the student's research focus. Students gain a broad base of knowledge through required coursework. PhD students take courses in four main areas: history of philosophy, logic, ELMS (epistemology, philosophy of language, metaphysics, philosophy of science), moral and political philosophy, and value theory. These areas provide a firm foundation for research and teaching beyond the PhD program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Recognizing that evidence of ability to pursue graduate study in philosophy is diverse, the department does not specify prerequisites for admission. Normally, those admitted have a broad undergraduate background that includes some courses in philosophy.

Special Application Requirements:
Students must apply to both the University and the Department of Philosophy. The department application for admissions and aid is available from the Admissions and Aid Committee at the address listed above or may be downloaded from the philosophy website at www.philosophy.umn.edu. All application materials may be uploaded to Apply Yourself. Department materials required include a completed application form, personal statement, transcripts, scores from the GRE general test, three academic letters of recommendation, and a philosophical writing sample that does not exceed 25 pages. Students interested in DOVE or ICGC Fellowship (Interdisciplinary Center for Global Change) should include a statement expressing their interest. Students interested in the ICGC Fellowship should also contact the Interdisciplinary Center for the Study of Global Change. Applications, together with all supporting materials, must be received by December 31 for full consideration. The philosophy department reviews applications once a year, and only admits students for fall semester.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  • IELTS
  - Total Score: 6.5
  • MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
26 to 28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Use of 4xxx level courses toward program requirements is permitted under certain conditions with adviser approval. For graduate credit, students must enroll in the appropriate 8xxx level (1 credit) accompanying workshop.

Successful second-year department review includes completion of coursework with specified requirements, which constitutes passing the preliminary written examination. Successful third-year department review includes passing a three-paper examination. Students then write and defend a dissertation proposal and later defend a dissertation at the final oral examination. For details, see the Philosophy Department degree program policy, which is available as a PDF on the philosophy website: www.philosophy.umn.edu.

**Required Philosophy Courses**
The courses taken in philosophy should show that consideration has been paid to the diversity and variety of areas of philosophy as well as to the student's specialized interest. The department recommends that students consult with their advisor and the director of graduate studies (DGS) when choosing coursework. Some courses outside the department of philosophy may be used in certain circumstances towards major requirements, with permission from the DGS.

Take 26 - 28 credit(s) from the following:
  • PHIL 5xxx
  • PHIL 8xxx

**Outside the Major in a Supporting Field**
Take 12 credits outside the major in a supporting field or minor.

**Thesis Credits**
Take 24 or more credit(s) from the following:
  • PHIL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Political Psychology Minor
School of Journalism & Mass Communication, Political Science Department, Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455-0410 (612-626-7489; fax: 612-626-7599)
Email: ppcenter@umn.edu
Website: http://www.polisci.umn.edu/cspp/minor.php

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 22
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This minor is available to doctoral students only.

Political psychology is a rapidly advancing field of scientific inquiry concerned with psychological aspects of political behavior. It encompasses a variety of interdisciplinary research perspectives, drawing on the theories and methods of core disciplines such as psychology, political science, law, and sociology, as well as interdisciplinary fields such as mass communication and decision sciences. The minor's structured curriculum provides a foundation in basic areas of political psychology: social attitudes and cognition, judgment and decision making, group relations, personality and leadership, mass communication, public opinion, mass political behavior, and political socialization. In addition to providing a background in political psychology, the program trains students in the theory and methods useful to this field, such as content analysis, survey analysis, and experimental design. The faculty is drawn from across the University.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
1) Political Psychology Proseminar Requirement
Take at least two semesters of the proseminar.
POL 8307 - Proseminar in Political Psychology I (2.0 cr)
or POL 8308 - Proseminar in Political Psychology II (2.0 cr)
PSY 8211 - Proseminar in Political Psychology I (1.0 cr)
PSY 8212 - Proseminar in Political Psychology II (1.0 cr)

2) Political Psychology Course Requirement
POL 8311 - Political Psychology and Socialization (3.0 cr)

3) Social Cognition Course Requirement
PSY 8201 - Social Cognition (3.0 cr)

4) Methodology Requirement
Take 6 to 8 methodology course credits. Courses from political science or other departments may also be acceptable in addition to the course options listed below. Consult with the Political Psychology director of graduate studies prior to enrolling in a course to confirm it satisfies this requirement.
EPSY 5262 - Assessment and Instructional Design for Students with Developmental Disabilities (3.0 cr)
or POL 8106 - Quantitative Political Science I (3.0 cr)
POL 8107 - Quantitative Political Science II (3.0 cr)
or PSY 8814 - Analysis of Psychological Data (4.0 cr)
PSY 8815 - Analysis of Psychological Data (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)

5) Elective Coursework
Take at least 6 credits from the following list, or contact the Political Psychology director of graduate studies.

** Students with sufficient background and previous courses experience equivalent to one or more courses within the curriculum may apply for a waiver of the appropriate requirements and replace waived courses with additional electives to meet the 6-credit minimum.

Take 6 or more credits from the following:
- AFRO 8202 - Seminar: Intellectual History of Race (3.0 cr)
- AFRO 8554 - Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora (3.0 cr)
- COMM 5221 - Media, Race, and Identity (3.0 cr)
- COMM 5401 - Advanced Theories of Communication (3.0 cr)
- COMM 5402 - Advanced Interpersonal Communication (3.0 cr)
- COMM 5411 - Small Group Communication Research (3.0 cr)
- COMM 5431 - The Process of Persuasion (3.0 cr)
- COMM 5441 - Communication in Human Organizations (3.0 cr)
- COMM 5617 - History and Criticism of U.S. Public Discourse: 1630-1865 (3.0 cr)
- COMM 8402 - Seminar: Interpersonal Communication (3.0 cr)
- COMM 8403 - Seminar: Emotion and Communication (3.0 cr)
- EPSY 8113 - The Psychology of Scientific Reasoning (3.0 cr)
- EPSY 8132 - Personality Development and Socialization (3.0 cr)
- IDSC 8721 - Behavioral Decision Theory (3.0 cr)
- IDSC 8722 - Heuristic Decision Making (2.0 cr)
- JOUR 5251 - Strategic Communication Theory (3.0 cr)
- JOUR 5501 - Communication, Public Opinion, and Social Media (3.0 cr)
- JOUR 8650 - Seminar: Psychology of Media Effects (3.0 cr)
- JOUR 8651 - Seminar: Mass Communication, Audiences, and Society (3.0 cr)
- JOUR 8661 - Seminar: Mediated Political Communication in the Digital Age (3.0 cr)
- JOUR 8681 - Seminar: International Media Perspectives (3.0 cr)
- LAW 6831 - Law, Race, and Social Psychology (3.0 cr)
- NSCI 5101 - Introduction to Neuroscience for Graduate Students (3.0 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)
- PA 5106 - Government, Ethics and the Public Will (1.0 - 3.0 cr)
- PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
- PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
- PA 5421 - Racial Inequality and Public Policy (3.0 cr)
- PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
- PA 5801 - Global Public Policy (3.0 cr)
- PA 8821 - National Security Policy (3.0 cr)
- POL 8302 - Public Opinion and Political Behavior (3.0 cr)
- POL 8402 - International Security (3.0 cr)
- POL 8641 - Comparative Mass Political Behavior (3.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5101 - Personality Psychology (3.0 cr)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5205 - Applied Social Psychology (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
- PSY 8203 - Impression Management (3.0 cr)
- PSY 8204 - Social Psychology of Prejudice and Intergroup Relations (3.0 cr)
- EPSY 5261 - Principles of Social Psychology (3.0 cr)
- PSY 8205 - Social Psychology: The Self (3.0 cr)
- PSY 8210 - Law, Race, and Social Psychology (3.0 cr)
Twin Cities Campus
Political Science M.A.
Political Science Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4144; fax: 612-626-7599)
Email: polisci@umn.edu
Website: http://www.polisci.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The political science program only admits students into the PhD program. However, students admitted to the PhD program may earn a master's degree (Plan B) while pursuing their doctorate.

The political science curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 27 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Three research papers, usually written in connection with coursework, are required.
Emphases
Choose two core courses from the emphases listed below. Take 6 or more credit(s) from the following:

**Political Theory**
- POL 8201 - Understanding Political Theory (3.0 cr)
- American Politics
  - POL 8301 - American Politics (3.0 cr)
- International Relations
  - POL 8401 - International Relations (3.0 cr)
- Comparative Politics
  - POL 8601 - Introduction to Comparative Politics (3.0 cr)
- Political Models and Methodology
  - POL 8120 - Core Course in Political Methodology: Modeling Political Processes (3.0 cr)

Electives
Select two emphases from the above list, and take 9 elective credits to fulfill requirements for each. The additional elective credits can be chosen from any emphasis.

**Emphasis 1**
Take 9 or more credit(s) from the following:
- POL 8xxx

**Emphasis 2**
Take 9 or more credit(s) from the following:
- POL 8xxx

**Floating Elective**
Take 3 or more credit(s) from the following:
- POL 8xxx

Outside Coursework
Take at least 6 credits outside the major.
Twin Cities Campus
Political Science Ph.D.
Political Science Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4144; fax: 612-626-7599)
Email: polisci@umn.edu
Website: http://cla.umn.edu/polisci/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The political science curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
All students are admitted directly into the Ph.D. program. To apply, submit the following through the University's graduate online application (Apply Yourself): Unofficial transcripts, research and diversity statements, GRE scores, three letters of recommendation, curriculum vitae or resume, writing sample, TOEFL or IELTS for non-native English speakers.

The application deadline is December 15. For more information, see the Political Science Admissions website.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
6 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.30 is required for students to remain in good standing.

Research methodology requirement: students must demonstrate one of the following: a) high proficiency in one foreign language; b) high proficiency in research methodology; c) low proficiency in two foreign languages; d) low proficiency in one foreign language and low proficiency in research methodology.

Field Emphases
Choose two of the core courses from the fields below:
Take 6 or more credit(s) from the following:
Political Theory
• POL 8201 - Understanding Political Theory (3.0 cr)
• American Politics
  • POL 8301 - American Politics (3.0 cr)
• International Relations
  • POL 8401 - International Relations (3.0 cr)
• Comparative Politics
  • POL 8601 - Introduction to Comparative Politics (3.0 cr)
• Political Models and Methodology
  • POL 8120 - Core Course in Political Methodology: Modeling Political Processes (3.0 cr)

Electives
Students select 2 emphases from above for which to fulfill their electives below:

Emphasis 1
Take 9 or more credit(s) from the following:
• POL 8xxx

Emphasis 2
Take 9 or more credit(s) from the following:
• POL 8xxx

Floating Elective
Take 3 or more credit(s) from the following:
• POL 8xxx

Professional Development Courses
Take 3 or more credit(s) from the following:

Taken during Spring of first year:
• POL 8104 - Professional Development I (2.0 cr)

Taken during Fall of Third year:
• POL 8105 - Professional Development II (1.0 cr)

Outside the Major in a Supporting Program
Take 6 graduate credits outside the department of political science in a minor or supporting program.

Thesis Credits
Take 24 or more credit(s) from the following:
• POL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Population Studies Minor
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences, 267 19th Ave S, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: popminor@umn.edu
Website: https://pop.umn.edu/gradstudent-training/popminor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Population studies is a multidisciplinary research area at the intersection of the mathematical sciences, the health and social sciences, and public policy. The curriculum provides solid grounding in the theories and methods of demography, with additional specialized training across five interdisciplinary subject areas: historical demography, population geography, economic demography, public health demography, and family and life course demography.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All courses should be from the same subject area and may not be in the student’s major field. Courses must be taken A-F.

SOC 8590 (Topics in Life Course Sociology; 3 credits) can be applied as an elective only if the topic is one of the following:

- Sociology of Time: Age, Work and the Gendered Life Course
- Work Health and Well Being

Required Courses
PA 5301 - Population Methods & Issues for the United States & Global South (3.0 cr)
or SOC 5511 - World Population Problems (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Electives
Take 3 or more credit(s) from the following:
- APEC 8701 - International Economic Development, Growth, and Trade (3.0 cr)
- FW 5051 - Analysis of Populations (4.0 cr)
• GERO 5103 - Aging and Society (2.0 cr)
• HIST 5797 - Methods of Population History (3.0 cr)
• HIST 5970 - Advanced Research in Quantitative History (4.0 cr)
• HIST 8970 - Advanced Research in Quantitative History (4.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)
• PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
• PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)
• PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
• PA 5451 - Immigration, Health and Public Policy (3.0 - 4.0 cr)
• PA 8312 - Analysis of Discrimination (4.0 cr)
• PA 8331 - Economic Demography (3.0 cr)
• PA 8461 - Global and U.S. Perspectives on Health and Mortality (3.0 cr)
• PUBH 5099 - Topics: Epidemiology and Community Health (1.0 - 4.0 cr)
• PUBH 6281 - Immigrant Health Issues (3.0 - 4.0 cr)
• PUBH 6370 - Social Epidemiology (2.0 cr)
• PUBH 6605 - Reproductive and Perinatal Health (2.0 cr)
• PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
• PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
• PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
• PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
• SOC 8551 - Social Structure and the Life Course (3.0 cr)
• SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
• SOC 8590 (Topics in Life Course Sociology; 3 credits) can be applied as an elective only if the topic is one of the following:
  • SOC 8590 - Topics in Life Course Sociology (3.0 cr)
  - Sociology of Time: Age, Work and the Gendered Life Course
  - Work Health and Well Being

Doctoral
Electives
Take 9 or more credit(s) from the following:
• APEC 8701 - International Economic Development, Growth, and Trade (3.0 cr)
• FW 5051 - Analysis of Populations (4.0 cr)
• GERO 5103 - Aging and Society (2.0 cr)
• HIST 5797 - Methods of Population History (3.0 cr)
• HIST 5970 - Advanced Research in Quantitative History (4.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)
• PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
• PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)
• PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
• PA 5451 - Immigration, Health and Public Policy (3.0 - 4.0 cr)
• PA 8312 - Analysis of Discrimination (4.0 cr)
• PA 8331 - Economic Demography (3.0 cr)
• PA 8461 - Global and U.S. Perspectives on Health and Mortality (3.0 cr)
• PUBH 5099 - Topics: Epidemiology and Community Health (1.0 - 4.0 cr)
• PUBH 6281 - Immigrant Health Issues (3.0 - 4.0 cr)
• PUBH 6370 - Social Epidemiology (2.0 cr)
• PUBH 6605 - Reproductive and Perinatal Health (2.0 cr)
• PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
• PUBH 6627 - Sexuality Education: Criteria, Curricula, and Controversy (1.0 cr)
• PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
• PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
• SOC 8551 - Social Structure and the Life Course (3.0 cr)
• SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
• SOC 8590 (Topics in Life Course Sociology; 3 credits) can be applied as an elective only if the topic is one of the following:
  • SOC 8590 - Topics in Life Course Sociology (3.0 cr)
    - Sociology of Time: Age, Work and the Gendered Life Course
    - Work Health and Well Being
Twin Cities Campus
Psychology M.A.
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax: 612-626-2079)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only for the PhD degree.

Doctoral program specialties are offered in biological psychopathology; clinical science and psychopathology research; cognitive and brain sciences; counseling psychology; industrial/organizational psychology; personality, individual differences, and behavior genetics; quantitative/psychometric methods; and social psychology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
   - Internet Based - Total Score: 79
   - Internet Based - Writing Score: 21
   - Internet Based - Reading Score: 19
   - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.
Capstone Project: Plan B requires one to three review papers in lieu of a thesis.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses
Take 14 or more credit(s) from the following:
• PSY 5xxx
• PSY 8xxx

Outside the Major in a Supporting Program
Students are required to take 6 credits outside the major in a minor or supporting program.

Plan Options

Plan A
Thesis Credits
Take 10 or more credit(s) from the following:
• PSY 8777 - Thesis Credits: Master’s (1.0 - 18.0 cr)
- OR -

Plan B
Take 10 or more credit(s) from the following:
• PSY 5xxx
• PSY 8xxx
Twin Cities Campus
Psychology Minor
Communication Studies, Political Science Department, Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax: 612-626-2079)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in psychology is only available to doctoral students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students must obtain the approval of the Psychology director of Graduate Studies to pursue the minor.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The student must also obtain the approval of the Psychology director of Graduate Studies to use 4xxx courses for the minor.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Doctoral Minor Requirements
Take 12 or more credit(s) from the following:
- PSY 5xxx
- PSY 8xxx
Twin Cities Campus
Psychology Ph.D.
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S246 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax: 612-626-2079)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60 to 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students are admitted only for the Ph.D. degree. Doctoral program specialties are offered in biological psychopathology; clinical science and psychopathology research; cognitive and brain sciences; counseling psychology; industrial/organizational psychology; personality, individual differences, and behavior genetics; quantitative/psychometric methods; school psychology; and social psychology.

Accreditation
This program is accredited by Committee on Accreditation of the Amer. Psychological Assoc (for Clinical & Counseling specialties)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Although there are no specific minimums for GPA and GRE scores, previous admissions statistics are available from the psychology website at psych.umn.edu.

Other requirements to be completed before admission:
Recommended academic preparation includes a minimum of 12 credits (three to four courses) of psychology coursework beyond introductory psychology, including one course in statistics or psychological measurement. Applicants to the clinical science program must have completed a course in abnormal psychology. An undergraduate major in psychology is desirable, but not required.

Special Application Requirements:
Applications are accepted for fall admission only; the deadline is December 1. A department application; a statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with the applicant’s scholarship and research potential; and scores from the GRE General Test are required. The GRE Subject Test in psychology is not required, but highly recommended. Applicants whose native language is not English must submit the results of the TOEFL iBT. Applications are submitted electronically through the ApplyYourself application system. For more information about the application procedures, see the psychology website at psych.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 6.5
- MELAB
  - Speaking test score: 8
The preferred English language test is Test of English as Foreign Language Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 to 36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must satisfy the general area distribution requirement using selected courses in four areas outside their specialization. There are no other general departmental course requirements. Each student's program is individually planned in consultation with an adviser to meet both the individual's goals and the specialty requirements. The specializations in clinical psychology and counseling psychology include specific requirements for applied coursework and practicum and internship experience. Each specialization also requires completion of a series of Ph.D. seminars covering scholarship and research skills. Students also complete a minimum of 12 credits in a minor or supporting program. Students are admitted into one specialty area when they apply. Please go to the Psychology website at www.psych.umn.edu to learn more about our specialty areas. Applicants are allowed to apply to only one specialty area.

Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

School Psychology
Twin Cities Campus
Public Art Minor
Art Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Public Art Program, Weisman Art Museum, University of Minnesota, 333 East River Road, Minneapolis, MN 55455 (612-625-9686; fax: 612-625-9630)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Art minor is inactive at this time. The graduate minor in public art (PArt) is an interdisciplinary program designed to expose students to the history of public art, contemporary issues, and current practices. The minor provides students the opportunity to work with instructors and other students with backgrounds in studio arts, design, architecture, landscape architecture, urban design, and public policy to learn collaborative methods essential to public art making and public art administration. Specifically, the minor provides students with a theoretical basis to both understand and produce public art projects. The minor includes a set of core courses in public art history, current issues and criticisms, and public engagement.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
This graduate minor is available to master's and doctoral students. Preference will be given to students with backgrounds in art, architecture, landscape architecture, urban design, and public policy. The PArt Admissions Committee screens applications and determines admission. Admission is limited to 25 students annually.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Master's and doctoral students take Issues and Ideas in Contemporary Public Art and History of Public Art as well as a practicum in Public Engagement. Doctoral students must also complete an internship.
Twin Cities Campus

Religious Studies Minor
Classical & Near Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Religious Studies Program, 245 Nicholson Hall, 216 Pillsbury Avenue S.E., Minneapolis, MN 55455 (612-625-6393)
Email: rels@umn.edu
Website: http://religiousstudies.umn.edu/grad/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in religious studies is available to master's and doctoral students in relevant fields such as American studies, anthropology, art history, classics, English, history, journalism, philosophy, and sociology, and is under the general direction of members of the graduate faculty who represent a broad spectrum of disciplines.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission is contingent on prior admission to a master's or doctoral degree-granting program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

All students pursuing the minor must complete RELS 5001. Remaining coursework is chosen in consultation with the Religious Studies director of Graduate Studies.

Required Course
RELS 5001 - Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Religious Studies Electives
Take 6 or more credit(s) from the following:
- RELS 5xxx
- RELS 8xxx

Doctoral
Religious Studies Electives
Take 9 or more credit(s) from the following:
• RELS 5xxx
• RELS 8xxx
Twin Cities Campus
Rhetoric, Scientific and Technical Communication M.A.
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive, SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MA in rhetoric and scientific and technical communication prepares students to address complex issues in language, science, and technology. This program prepares students for doctoral-level research through courses and seminars in research methods, rhetoric, writing studies, pedagogy, and technical communication, technology and culture. Those are complemented with other courses so that you develop expertise in a specialty area as well as a related field of courses outside the department. In addition, you will write a research paper on a limited topic and present it at an oral examination.

Required courses include classical and modern rhetoric, research methods, and courses in writing studies and pedagogy, technical communication, and technology and culture. Students take at least 6 credits outside the department as a masters minor or supporting field. They also write a plan "B" paper in the context of a directed research course.

All MA applicants must meet the admission requirements of the University. MA applicants should have a strong interest in language and rhetorical theory or communication theory. A background in a science, Internet studies, environmental studies, or pedagogy and technology is helpful.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Undergraduate degree in a related discipline.

Special Application Requirements:
Scores from the General Test of the GRE that are less than five years old are required of students with baccalaureate degrees from U.S. institutions. International students are encouraged to take the General Test of the GRE. Nonnative speakers of English are required to take an appropriate test with satisfactory scores. All applicants must submit three letters of recommendation, two writing samples, and a professional objective statement. All M.A. and Ph.D. applicants begin in the fall semester and should apply by the January 1 application deadline.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 27 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

**Research Core**
- WRIT 8011 - Research Methods in Writing Studies and Technical Communication (3.0 cr)
- WRIT 8012 - Applied Research Methods in Writing Studies and Technical Communication (3.0 cr)

**Rhetoric Core**
- WRIT 5775 - The Rhetorical Tradition: Classical Period (3.0 cr)
- WRIT 5776 - The Rhetorical Tradition: Modern Era (3.0 cr)

**Writing Studies and Pedagogy**
- WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
  or WRIT 8560 - Seminar in Writing Studies (3.0 cr)
  or WRIT 5531 - Introduction to Writing Theory and Pedagogy (3.0 cr)

**Technical Communication and Composition Pedagogies**
- WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
  or WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)

**Plan B Project Credits**
- Take 3 or more credit(s) from the following:
  - WRIT 8794 - Directed Research (1.0 - 4.0 cr)

**Specialty Area/Concentration**
- Students are required to take 6 credits for this area, of which 3 credits must be taken in the Department of Writing Studies. The student's area of concentration will be developed chiefly through seminars in writing studies, and through consultation with the advisor.

**Outside Coursework**
- Take at least 6 credits outside the Department of Writing Studies. Students often pursue a formal minor related to their research interests, chosen in conjunction with their advisor.
Twin Cities Campus
Rhetoric, Scientific and Technical Communication Minor
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate minor in Rhetoric, Scientific and Technical Communication.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students must be admitted into a master's or doctoral program at the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For master's degree students, the minor requires 6 credits in 5xxx and 8xxx WRIT courses. The minor for PhD students requires 12 credits of 5xxx and 8xxx WRIT courses, with one course being in rhetorical theory and criticism. Students may choose the remaining courses from any of writing studies graduate courses.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
Coursework
Take 6 or more credit(s) from the following:
• WRIT 5xxx
• WRIT 8xxx

Doctoral
Rhetorical Theory and History
Take 3 or more credit(s) from the following:
• WRIT 8510 - Seminar in Rhetoric (3.0 cr)
• WRIT 5775 - The Rhetorical Tradition: Classical Period (3.0 cr)
• WRIT 5776 - The Rhetorical Tradition: Modern Era (3.0 cr)

Electives
Take 9 or more credit(s) from the following:
• WRIT 5xxx
Twin Cities Campus

Rhetoric, Scientific and Technical Communication Ph.D.

Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive, SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://cla.umn.edu/writing-studies

Program Type: Doctorate
Requirements for this program are current for Fall 2016
Length of program in credits: 66
This program does not require summer semesters for timely completion.
Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The primary purpose of the PhD program is to prepare graduate students to do research in areas related to writing, broadly construed, and to publish the results of that research.

Working in collaboration with faculty mentors, other students, and material resources, such as the library and the internet, graduate students will become expert in a specialized field of knowledge, developing the scholarly and research skills needed to make a new and original contribution to research in rhetoric, composition, writing studies, literacy, or technical/scientific communication. Graduate students build their expertise and skills in the core areas of rhetoric, theory and history, writing studies and pedagogy, and technical communication and technology and culture. They also develop and refine knowledge and skills through departmental seminars and a supporting program of courses outside the department. The dissertation—an original, systematic, and significant program of research—will allow graduate students to join scholarly conversations and contribute to knowledge and theory within the field. This project, and the mentoring students receive as they complete the project, will stand students in good stead to continue to make important research contributions in their academic careers as they unfold.

Preparing graduate students to teach first-year writing, scientific and technical communication, and other courses related to their expertise is an important part of the program because the expectation is that graduates will teach at the college level. While most of graduate students have entered college teaching, a few have preferred to work in industry in scientific and technical communication.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Masters in a related discipline, e.g., rhetoric, technical and professional communication, English, communication studies.

Other requirements to be completed before admission:
Applicants for the PhD must have completed a master's degree, or have plans to complete the master's before the start of the PhD program. Applicants will be asked to discuss their interests, explain their master's program and how the PhD will build upon it.

Special Application Requirements:
Scores from the General Test of the GRE that are less than five years old are required of students with baccalaureate degrees from U.S. institutions. International students are encouraged to take the General Test of the GRE and to have those results forwarded to the University. Nonnative speakers of English are required to take an appropriate test with satisfactory scores. All applicants must submit three letters of recommendation, two writing samples, and a professional objective statement. All M.A. and Ph.D. applicants begin in the fall semester and should apply by the January 5th application deadline.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Research Core
Take the following 6 credits of research core coursework:
- WRIT 8011 - Research Methods in Writing Studies and Technical Communication (3.0 cr)
- WRIT 8012 - Applied Research Methods in Writing Studies and Technical Communication (3.0 cr)

Required Core Areas
Take at least 3 credits from each of the following core areas, and an additional 6 credits from any of these categories, for a total of 15 credits.

Take 15 or more credit(s) from the following:

Rhetoric Theory and History
Take at least 3 credits from the following:
• WRIT 8510 - Seminar in Rhetoric (3.0 cr)
  or WRIT 5775 - The Rhetorical Tradition: Classical Period (3.0 cr)
  or WRIT 5776 - The Rhetorical Tradition: Modern Era (3.0 cr)

• Writing Studies and Pedagogy
  Take at least 3 credits from the following:
  • WRIT 8540 - Seminar in Technical Communication and Composition Pedagogies (3.0 cr)
  or WRIT 8560 - Seminar in Writing Studies (3.0 cr)
  or WRIT 5531 - Introduction to Writing Theory and Pedagogy (3.0 cr)

• Technical Communication and Composition Pedagogies
  Take at least 3 credits from the following:
  • WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)
  or WRIT 8550 - Seminar in Technology, Culture, and Communication (3.0 cr)

Writing Studies Specialty Area/Concentration
Specialties include areas such as digital literacies, internet studies, professional and technical communication, theories of writing, writing pedagogies, rhetorics of science, medicine, or law, and rhetorical theory.

Writing Studies Courses
Take 6 or more credit(s) from the following:
• WRIT 5xxx

• Non-Writing Studies Course
  Take at least 3 credits.
  Coursework is chosen in consultation with the advisor, and must be outside the writing studies department but within the specialty area/concentration theme.

Outside Coursework
Take 12 credits of coursework outside the major.

Thesis Credits
Take 24 or more credit(s) from the following:
• WRIT 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Scientific and Technical Communication M.S.
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 Nolte Center, 315 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://cla.umn.edu/writing-studies

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's of science in scientific and technical communication focuses on applying basic theory and research to the practice of scientific and technical communication in the workplace.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 21 major credits and 9 credits outside the major. There is no final exam. A capstone project is required.
Capstone Project: The capstone course (WRIT 8505), this is the final course necessary to complete the degree requirements. The course is primarily for students seeking the MS in scientific and technical communication, but is also suitable for graduate students in any program who want structured support to write an extended project report. Classes are conducted in a "writers' workshop" format, during which each student receives feedback and support for his or her individual research report writing.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Courses
Take the following courses for a total of 18 credits:
WRIT 5001 - Introduction to Graduate Studies in Scientific and Technical Communication (3.0 cr)
WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
WRIT 8505 - Professional Practice (3.0 cr)
WRIT 5671 - Visual Rhetoric (3.0 cr)
WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)

Electives
Take at least 3 credits of electives, in consultation with the advisor.
WRIT 4573W - Writing Proposals and Grant Management [WI] (3.0 cr)
or WRIT 4664W - Science Writing for Popular Audiences [WI] (3.0 cr)

Related Field Competency Area
Take at least 9 credits outside the Department of Writing Studies, in consultation with the director of graduate studies.
Possible areas of study include, but are not limited to:
  Health sciences
  International technical communication
  Food science and nutrition
  Technical communication and software engineering
  Technical communication and environmental science
  Technical communication and law
Twin Cities Campus
Scientific and Technical Communication Minor
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Dr SE, Minneapolis, MN 55455; (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: https://cla.umn.edu/writing-studies

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Writing Studies graduate minor in scientific and technical communication is available for students enrolled in other University graduate programs. The minor offers writing studies courses, many of which are online, in areas such as editing and style, writing with digital technologies, information design, and international professional communication.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters Required
- Take 6 or more credit(s) from the following:
  - WRIT 5xxx
  - WRIT 8xxx
Twin Cities Campus

Sociology M.A.

Sociology

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://cla.umn.edu/sociology/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The sociology program only admits students into the PhD program. However, students admitted to the PhD may earn a master's degree while pursuing their doctorate. See the PhD for admissions information.

Sociology is concerned with the study of human societies, groups, and social life. The program offers substantive training in seven areas of specialization:

1. Demography and population studies
2. Global, Transnational, & Comparative Sociology
3. Inequalities and identities: race, gender, sexuality, class, religion, and nation
4. Law, crime, punishment, and human rights
5. Life course: Family, education, and well-being
6. Networks, organizations, and work
7. Theory, knowledge, and culture

Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
The sociology program only admits students into the Ph.D. program. However, students admitted to the Ph.D. may earn a master's degree while pursuing their doctorate. See the Ph.D. for admissions information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 17 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.

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Information current as of December 20, 2016
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Core Courses**

Take 17 credits:

- SOC 8701 - Sociological Theory (4.0 cr)
- SOC 8801 - Sociological Research Methods (4.0 cr)
- SOC 8811 - Advanced Social Statistics (4.0 cr)

Take exactly 3 credit(s) from the following:

- SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)

Take exactly 2 credit(s) from the following:

- SOC 8001 - Sociology as a Profession (1.0 cr)

**Outside Coursework**

Take 6 credits outside the major.

**Plan Options**

**Plan A**

Thesis Credits

Take exactly 10 credit(s) from the following:

- SOC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B**

Take exactly 7 credit(s) from the following:

- SOC 8xxx
Twin Cities Campus
Sociology Minor
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Ave S, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://cla.umn.edu/sociology/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sociology is concerned with the study of human societies, groups, and social life. The program offers substantive training in seven areas of specialization:

1. Demography and population studies
2. Global, transnational, and comparative sociology
3. Inequalities and identities: race, gender, sexuality, class, religion, and nation
4. Law, crime, punishment, and human rights
5. Life course: family, education, and well-being
6. Networks, organizations, and work
7. Theory, knowledge, and culture

Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students already enrolled in a University of Minnesota graduate program should contact the Sociology Department's graduate program associate as the first step toward applying for a graduate minor in sociology.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Course choices are subject to the approval of the Sociology director of Graduate Studies.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Courses
Take exactly 6 credit(s) from the following:
• SOC 5xxx
• SOC 8xxx

Doctoral Courses
Take exactly 12 credit(s) from the following:
• SOC 8xxx
Twin Cities Campus
Sociology Ph.D.
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://cla.umn.edu/sociology/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 65
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sociology is concerned with the study of human societies, groups, and social life. The program offers substantive training in seven areas of specialization:

1. Demography and population studies
2. Global, transnational, and comparative sociology
3. Inequalities and identities: Race, gender, sexualit, class, religion, and nation
4. Law, crime, punishment, and human rights
5. Life course: Family, education, and well-being
6. Networks, organizations, and work
7. Theory, knowledge, and culture

Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research. The doctoral program is for students planning to do research or teach.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Students are not required to have earned a graduate or professional degree prior to entering the program.

It is recommended that applicants have a background in basic sociology, usually consisting of the equivalent of 18 credits in undergraduate work (including 9 credits of social science statistical methods), or an MA degree in sociology or a closely related field. Individuals without sociology coursework are generally required to complete background coursework in theory and statistics during their first year of residence.

Special Application Requirements:
Applicants are evaluated on their academic potential, commitment to the field, creativity, and potential for contribution to the field. In addition to the University application form, and its required documents, applicants must submit the following: GRE scores; a sample of written work, usually a term paper, written in English; three letters of recommendation; and a personal statement of professional objectives. Non-native English speakers are required to take the TOEFL test, this includes students who have studied in the U.S. The department accepts new students for fall admission only. The application deadline is December 15.

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Listening Score: 22
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Internet Based - Speaking Score: 27
- Paper Based - Total Score: 587

The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
29 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Required Core Courses
Take 17 credits total:

SOC 8701 - Sociological Theory (4.0 cr)
SOC 8801 - Sociological Research Methods (4.0 cr)
SOC 8811 - Advanced Social Statistics (4.0 cr)

Take exactly 3 credit(s) from the following:

- SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)

Take exactly 2 credit(s) from the following:

- SOC 8001 - Sociology as a Profession (1.0 cr)

Required Sociology Electives
Take exactly 12 credit(s) from the following:

- SOC 8xxx

Outside Coursework
Take 12 credits outside the major.

Thesis Credits
Take exactly 24 credit(s) from the following:

- SOC 8888 - Thesis Credits: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Speech-Language-Hearing Science M.A.
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing-Sciences, 115 Shevlin Hall, 164 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhsgrad@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36 to 60
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Speech-Language-Hearing Sciences offers an MA with three tracks: speech-language pathology, audiology, and speech-language-hearing sciences; however, the department only accepts MA applications for the speech-language pathology track. The speech-language pathology path offers programs that meet standards for certification as a speech-language pathologist by the American Speech-Language-Hearing Association. It emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development.

Individuals interested in pursuing an advanced degree in audiology should apply directly to the audiology AuD program. Students admitted to the AuD are eligible to apply for the MA with an audiology track.

The Speech-Language Pathology MA program is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association, 2200 Research Blvd, Rockville, MD 20850, Telephone: 800-638-8255

Accreditation
This program is accredited by American Speech-Language-Hearing Association (ASHA).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Prerequisite coursework includes undergraduate transcript credit in physical science, biological science, social/behavioral science, and statistics.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 44 to 50 major credits, 0 to 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 30 to 60 major credits and 0 to 6 credits outside the major. The final exam is written and oral.

Plan C: Plan C requires 48 to 54 major credits and 0 to 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

Related Fields

Take 6 or more credit(s) from the following:

- ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CPSY 4302 - Infant Development (3.0 cr)
- CPSY 4329 - Biological Foundations of Development (3.0 cr)
- CPSY 4341 - Perceptual Development (3.0 cr)
- CPSY 4343 - Cognitive Development (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- EPSY 5101 - Intelligence and Creativity (3.0 cr)
- EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
- EPSY 5135 - Human Relations Workshop (4.0 cr)
- EPSY 5400 - Special Topics in Counseling Psychology (1.0 - 4.0 cr)
- EPSY 5415 - Child and Adolescent Development and Counseling (4.0 cr)
- EPSY 5451 - College Students Today (3.0 cr)
- EPSY 5461 - Cross-Cultural Counseling (3.0 cr)
- EPSY 5609 - Family-centered Services (2.0 cr)
- EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5641 - Foundations of Education for Individuals Who Are Deaf/Hard of Hearing (2.0 cr)
- EPSY 5642 - Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing (3.0 cr)
- EPSY 5644 - Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing (3.0 cr)
- EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
- EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorders (3.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
- GER 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
- GER 5110 - Biology of Aging (3.0 cr)
- GER 5115 - Introduction to Geriatrics (2.0 cr)
- GER 5125 - Gerontology Service Learning (3.0 cr)
- HINF 5501 - US Health Care System: Information Challenges in Clinical Care (1.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- LING 8920 - Topics in Language and Cognition (3.0 cr)
- NSCI 5101 - Introduction to Neuroscience for Graduate Students (3.0 cr)
- NSCI 5111 - Medical Neuroscience for Graduate Students (5.0 cr)
- OTOL 8234 - Anatomy of the Head and Neck and Temporal Bone Dissection (2.0 cr)
- OTOL 8247 - Anatomy and Physiology of Hearing and Balance (3.0 cr)
- PHAR 5201 - Applied Health Sciences Terminology (2.0 cr)
- PHAR 5207 - Applied Leadership in Health Care (3.0 cr)
- PSY 4036 - Perceptual Issues in Visual Impairment (3.0 cr)
- PSY 4960 - Seminar in Psychology (1.0 - 4.0 cr)
Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Speech-Language Pathology
This sub-plan is limited to students completing the program under Plan A or Plan C.

The speech-language pathology program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development. This sub-plan is accredited by the American Speech-Language-Hearing Association for certification in speech-language pathology.

Students in this sub-plan may elect the Plan A option (60-credit minimum) or the Plan C option (54-credit minimum).

Speech Language Pathology: Required Courses
- SLHS 5401 - Counseling and Professional Issues (3.0 cr)
- SLHS 5502 - Voice and Cleft Palate (3.0 cr)
- SLHS 5503 - Fluency and Motor Speech Disorders (3.0 cr)
- SLHS 5504 - Evaluation and Management of Dysphagia (2.0 cr)
- SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
- SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
- SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
- SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
- SLHS 5608 - Clinical Issues in Bilingualism and Cultural Diversity (3.0 cr)

Clinical Education in Speech-Language Pathology
Take exactly 17 credit(s) from the following:
- SLHS 8720 - Clinical Education in Speech-Language Pathology (1.0 - 8.0 cr)

Clinical Education in Audiology
Take exactly 1 credit(s) from the following:
- SLHS 8820 - Clinical Education in Audiology (1.0 - 8.0 cr)

Plans Options for Speech-Language Pathology Track

Plan A
Take exactly 10 credit(s) from the following:
- SLHS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan C
Take exactly 4 credit(s) from the following:
- SLHS 8994 - Directed Research (1.0 - 12.0 cr)

Audiology
This sub-plan is limited to students completing the program under Plan B.

The audiology program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and
incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development.

The audiology sub-plan requires a total of 60 credits, and a Plan B comprehensive written exam and a final oral examination.

**Audiology Track: Required Courses**
- SLHS 5401 - Counseling and Professional Issues (3.0 cr)
- SLHS 5801 - Advanced Audiologic Assessment (3.0 cr)
- SLHS 5802 - Hearing Aids I (3.0 cr)
- SLHS 5803 - Pediatric Audiology (3.0 cr)
- SLHS 5804 - Cochlear Implants (3.0 cr)
- SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
- SLHS 5806 - Auditory Processing Disorders (3.0 cr)
- SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
- SLHS 5808 - Pathophysiologys of Hearing Disorders (3.0 cr)
- SLHS 8801 - Electrophysiologys Assessment of Auditory Function (3.0 cr)
- SLHS 8802 - Hearing Aids II (3.0 cr)
- SLHS 8803 - Signals and Systems in Audiology (3.0 cr)
- SLHS 8805 - Hearing Science Foundations of Audiology (3.0 cr)
- SLHS 8807 - Balance Assessment (3.0 cr)

**Laboratory Module in Audiology**
- Take exactly 2 credit(s) from the following:
  - •SLHS 5810 - Laboratory Module in Audiology (1.0 - 2.0 cr)

**Clinical Research and Practice: Grand Rounds**
- Take exactly 4 credit(s) from the following:
  - •SLHS 5820 - Clinical Research and Practice: Grand Rounds (1.0 - 6.0 cr)

**Clinical Foundations in Audiology**
- Take exactly 2 credit(s) from the following:
  - •SLHS 5830 - Clinical Foundations in Audiology (1.0 - 8.0 cr)

**Plan B Audiology Track**

**Directed Research**
- Take exactly 4 credit(s) from the following:
  - •SLHS 8994 - Directed Research (1.0 - 12.0 cr)

**Speech-Language-Hearing Sciences (SLHS)**
This sub-plan is limited to students completing the program under Plan B.

**Speech-Language-Hearing Sciences Track: Required Courses**
- SLHS 5401 - Counseling and Professional Issues (3.0 cr)
- SLHS 5502 - Voice and Cleft Palate (3.0 cr)
- SLHS 5503 - Fluency and Motor Speech Disorders (3.0 cr)
- SLHS 5504 - Evaluation and Management of Dysphagia (2.0 cr)
- SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
- SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
- SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
- SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
- SLHS 5608 - Clinical Issues in Bilingualism and Cultural Diversity (3.0 cr)

**Plan B Speech-Language-Hearing Sciences Track**

**Directed Research**
- Take exactly 4 credit(s) from the following:
  - •SLHS 8994 - Directed Research (1.0 - 12.0 cr)
Twin Cities Campus
Speech-Language-Hearing Sciences Minor
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhs@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphasis in the graduate program is speech-language pathology and audiology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The approval of the SLHS director of graduate studies is required prior to registration for any 4xxx-level minor field coursework.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Masters Focus Areas
Speech Language Pathology Focus
Take 12 or more credit(s) from the following:
- SLHS 5502 - Voice and Cleft Palate (3.0 cr)
- SLHS 5503 - Fluency and Motor Speech Disorders (3.0 cr)
- SLHS 5504 - Evaluation and Management of Dysphagia (2.0 cr)
- SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
- SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
- SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
- SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
- SLHS 5608 - Clinical Issues in Bilingualism and Cultural Diversity (3.0 cr)
Audiology Focus
Take 12 or more course(s) from the following:
- SLHS 4801 - Hearing Measurement and Disorders (3.0 cr)
- SLHS 4802 - Rehabilitative Audiology (3.0 cr)
- SLHS 5801 - Advanced Audiologic Assessment (3.0 cr)
- SLHS 5802 - Hearing Aids I (3.0 cr)
- SLHS 5803 - Pediatric Audiology (3.0 cr)
- SLHS 5804 - Cochlear Implants (3.0 cr)
- SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
- SLHS 5806 - Auditory Processing Disorders (3.0 cr)
- SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
- SLHS 5808 - Pathophysiology of Hearing Disorders (3.0 cr)
- SLHS 5810 - Laboratory Module in Audiology (1.0 - 2.0 cr)
- SLHS 5820 - Clinical Research and Practice: Grand Rounds (1.0 - 6.0 cr)
- SLHS 5830 - Clinical Foundations in Audiology (1.0 - 8.0 cr)
- SLHS 8801 - Electrophysiologic Assessment of Auditory Function (3.0 cr)
- SLHS 8802 - Hearing Aids II (3.0 cr)
- SLHS 8803 - Signals and Systems in Audiology (3.0 cr)
- SLHS 8805 - Hearing Science Foundations of Audiology (3.0 cr)
- SLHS 8807 - Balance Assessment (3.0 cr)

OR-

Combined Speech Language Pathology and Audiology Focus
Take 12 or more credit(s) from the following:
- SLHS 4301 - Introduction to the Neuroscience of Human Communication (3.0 cr)
- SLHS 4402 - Assessment and Treatment in Speech-Language Pathology (3.0 cr)
- SLHS 5401 - Counseling and Professional Issues (3.0 cr)
- SLHS 5900 - Topic in Speech-Language-Hearing Sciences (3.0 cr)
- SLHS 5993 - Directed Study (1.0 - 12.0 cr)
- SLHS 8410 - Seminar: Research (3.0 cr)
- SLHS 8420 - Seminar: Teaching (3.0 cr)
- SLHS 8530 - Seminar: Speech (3.0 cr)

Doctoral

Doctoral Focus Areas

Speech Language Pathology Focus
Take 12 or more credit(s) from the following:
- SLHS 5502 - Voice and Cleft Palate (3.0 cr)
- SLHS 5503 - Fluency and Motor Speech Disorders (3.0 cr)
- SLHS 5504 - Evaluation and Management of Dysphagia (2.0 cr)
- SLHS 5602 - Speech Sound Disorders: Assessment and Treatment across Languages (3.0 cr)
- SLHS 5603 - Assessment and Intervention of Language Disorders in Children (3.0 cr)
- SLHS 5605 - Language and Cognitive Disorders in Adults (3.0 cr)
- SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
- SLHS 5608 - Clinical Issues in Bilingualism and Cultural Diversity (3.0 cr)

OR-

Audiology Focus
Take 12 or more course(s) from the following:
- SLHS 4801 - Hearing Measurement and Disorders (3.0 cr)
- SLHS 4802 - Rehabilitative Audiology (3.0 cr)
- SLHS 5801 - Advanced Audiologic Assessment (3.0 cr)
- SLHS 5802 - Hearing Aids I (3.0 cr)
- SLHS 5803 - Pediatric Audiology (3.0 cr)
- SLHS 5804 - Cochlear Implants (3.0 cr)
- SLHS 5805 - Advanced Rehabilitative Audiology (3.0 cr)
- SLHS 5806 - Auditory Processing Disorders (3.0 cr)
- SLHS 5807 - Noise and Hearing Conservation (3.0 cr)
- SLHS 5808 - Pathophysiology of Hearing Disorders (3.0 cr)
- SLHS 5810 - Laboratory Module in Audiology (1.0 - 2.0 cr)
- SLHS 5820 - Clinical Research and Practice: Grand Rounds (1.0 - 6.0 cr)
• SLHS 5830 - Clinical Foundations in Audiology (1.0 - 8.0 cr)
• SLHS 8801 - Electrophysiologic Assessment of Auditory Function (3.0 cr)
• SLHS 8802 - Hearing Aids II (3.0 cr)
• SLHS 8803 - Signals and Systems in Audiology (3.0 cr)
• SLHS 8805 - Hearing Science Foundations of Audiology (3.0 cr)
• SLHS 8807 - Balance Assessment (3.0 cr)

-OR-

Combined Speech Language Pathology and Audiology Focus
Take 12 or more credit(s) from the following:
• SLHS 4301 - Introduction to the Neuroscience of Human Communication (3.0 cr)
• SLHS 4402 - Assessment and Treatment in Speech-Language Pathology (3.0 cr)
• SLHS 5401 - Counseling and Professional Issues (3.0 cr)
• SLHS 5900 - Topic in Speech-Language-Hearing Sciences (3.0 cr)
• SLHS 5993 - Directed Study (1.0 - 12.0 cr)
• SLHS 8410 - Seminar: Research (3.0 cr)
• SLHS 8420 - Seminar: Teaching (3.0 cr)
• SLHS 8530 - Seminar: Speech (3.0 cr)
Twin Cities Campus
Speech-Language-Hearing Sciences Ph.D.
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Dr SE, Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhsgrad@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 65
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases in the PhD program are speech-language pathology, audiology, speech science, language science, or hearing science. The program prepares students for careers in research, teaching, and advanced clinical applications. Most students entering the program have a master's degree in speech-language pathology, audiology, or a related area. The PhD degree usually requires three or more years of work beyond the master's degree. In general, a student's program is designed by the student in consultation with the advisor to satisfy the particular objectives of the student and program requirements.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
29 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The PhD degree usually requires three years of work beyond the master's degree. In general, a student's program is designed by the student in consultation with the advisor to satisfy the particular objectives of the student, but there are also some department and University requirements that must be satisfied. These include coursework, research activities, teaching experience, and preliminary and final exams.

A minimum of 12 course credits in a minor or supporting program and registration for 24 thesis credits are required. Also required is a statistics sequence, for which students typically register during their first two years. The written and oral preliminary exams are taken at the end of the second year.

Each student completes a seminar (SLHS 8430) and a minimum of 4 credits of teaching experience that provide an opportunity for the student to develop and teach sections of department courses. Students also complete a seminar (SLHS 8410) and a minimum of 4 credits of research under the direction of one or more faculty members in the department other than the advisor.

### Required Courses

#### Seminar Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLHS 8410</td>
<td>Seminar: Research (3.0 cr)</td>
</tr>
<tr>
<td>SLHS 8420</td>
<td>Seminar: Teaching (3.0 cr)</td>
</tr>
<tr>
<td>or GRAD 8101</td>
<td>Teaching in Higher Education (3.0 cr)</td>
</tr>
</tbody>
</table>

Take 6 or more credit(s) from the following:

- SLHS 8430 - Proseminar in Speech-Language-Hearing Sciences (1.0 - 6.0 cr)

#### Directed Research Requirement

Take 4 or more credit(s) from the following:

- SLHS 8994 - Directed Research (1.0 - 12.0 cr)

#### Directed Teaching Requirement

Take 4 or more credit(s) from the following:

- SLHS 5993 - Directed Study (1.0 - 12.0 cr)

#### Statistics

- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- or EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- or EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- or EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- or EPSY 8252 - Statistical Methods in Education II (3.0 cr)

#### Statistics Electives

Take 3 or more credit(s) from the following:

- EPSY 8269 - Matrix Algebra for Statistical Modeling (2.0 cr)
- EPSY 8281 - Advanced Statistical Computing and Data Analysis (3.0 cr)
- EPSY 8220 - Special Topics: Seminar in Quantitative Methods (1.0 - 6.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8265 - Factor Analysis (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8272 - Nonparametric Statistics in Education (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
- EPSY 8224 - Performance Assessment Design and Analysis (3.0 cr)
- EPSY 8225 - Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating (3.0 cr)
- EPSY 8226 - Item Response Models: Theory and Applications (3.0 cr)
- STAT 4101 - Theory of Statistics I (4.0 cr)
- STAT 4102 - Theory of Statistics II (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5031 - Statistical Methods for Quality Improvement (4.0 cr)
- STAT 5101 - Theory of Statistics I (4.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5302 - Applied Regression Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5601 - Nonparametric Methods (3.0 cr)
• STAT 5701 - Statistical Computing (3.0 cr)
• STAT 5931 - Topics in Statistics (3.0 cr)
• STAT 5993 - Tutorial (1.0 - 6.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed Effects Modeling (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• STAT 8102 - Theory of Statistics 2 (3.0 cr)
• STAT 8111 - Mathematical Statistics I (3.0 cr)
• STAT 8112 - Mathematical Statistics II (3.0 cr)
• STAT 8311 - Linear Models (4.0 cr)
• STAT 8801 - Statistical Consulting (3.0 cr)
• STAT 8913 - Literature Seminar (1.0 cr)
• STAT 8931 - Advanced Topics in Statistics (3.0 cr)
• STAT 8932 - Advanced Topics in Statistics (3.0 cr)
• STAT 4893W - Consultation and Communication for Statisticians [WI] (3.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
SLHS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Electives in Related Fields
Take 12 or more credit(s) from the following:
• ADDS 5021 - Introduction to Evidence Based Practices and the Helping Relationship (3.0 cr)
• CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
• CPSY 4302 - Infant Development (3.0 cr)
• CPSY 4329 - Biological Foundations of Development (3.0 cr)
• CPSY 4341 - Perceptual Development (3.0 cr)
• CPSY 4343 - Cognitive Development (3.0 cr)
• CPSY 5101 - Introduction to Integrative Healing Practices (3.0 cr)
• CPSY 5111 - Ways of Thinking about Health (2.0 cr)
• EPSY 5101 - Intelligence and Creativity (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5135 - Human Relations Workshop (4.0 cr)
• EPSY 5400 - Special Topics in Counseling Psychology (1.0 - 4.0 cr)
• EPSY 5415 - Child and Adolescent Development and Counseling (4.0 cr)
• EPSY 5451 - College Students Today (3.0 cr)
• EPSY 5461 - Cross-Cultural Counseling (3.0 cr)
• EPSY 5609 - Family-centered Services (2.0 cr)
• EPSY 5616 - Classroom Management and Behavior Analytic Problem Solving (3.0 cr)
• EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
• EPSY 5641 - Foundations of Education for Individuals Who Are Deaf/Hard of Hearing (2.0 cr)
• EPSY 5642 - Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing (3.0 cr)
• EPSY 5644 - Early Childhood Language and Literacy Development and Practices: Deaf and Hard of Hearing (3.0 cr)
• EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
• EPSY 5663 - Assessment and Intervention for Individuals with Autism Spectrum Disorders (3.0 cr)
• EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
• GER 8105 - Multidisciplinary Perspectives on Aging (3.0 cr)
• GER 8110 - Biology of Aging (3.0 cr)
• GER 5115 - Introduction to Geriatrics (2.0 cr)
• GER 5125 - Gerontology Service Learning (3.0 cr)
• HINF 5501 - US Health Care System: Information Challenges in Clinical Care (1.0 cr)
• KIN 8211 - Seminar: Perception and Action (3.0 cr)
• LING 8920 - Topics in Language and Cognition (3.0 cr)
• NSCI 5101 - Introduction to Neuroscience for Graduate Students (3.0 cr)
• NSCI 5111 - Medical Neuroscience for Graduate Students (5.0 cr)
• OTOL 8234 - Anatomy of the Head and Neck and Temporal Bone Dissection (2.0 cr)
• OTOL 8247 - Anatomy and Physiology of Hearing and Balance (3.0 cr)
• PHAR 5201 - Applied Health Sciences Terminology (2.0 cr)
• PHAR 5207 - Applied Leadership in Health Care (3.0 cr)
• PSY 4036 - Perceptual Issues in Visual Impairment (3.0 cr)
• PSY 4960 - Seminar in Psychology (1.0 - 4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5037 - Psychology of Hearing (3.0 cr)
• PSY 5054 - Psychology of Language (3.0 cr)
• PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
• PSY 5205 - Applied Social Psychology (3.0 cr)
• PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
• PSY 8037 - Psychophysics and Audition (3.0 cr)
• PUBH 6370 - Social Epidemiology (2.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
• SPAN 5985 - Sociolinguistic Perspectives on Spanish in the United States (3.0 cr)
• SLHS 5900 - Topic in Speech-Language-Hearing Sciences (3.0 cr)
• SLHS 8530 - Seminar: Speech (3.0 cr)
Twin Cities Campus
Statistics M.S.
Statistics, School of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Statistics, 313 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-624-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.stat.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Courses
### Core Courses
- STAT 8101 - Theory of Statistics 1 (3.0 cr)
- STAT 8102 - Theory of Statistics 2 (3.0 cr)
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
- STAT 8801 - Statistical Consulting (3.0 cr)
- STAT 5701 - Statistical Computing (3.0 cr)

### Statistics Electives
Take 6 or more credits from the following:
- STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
- STAT 5401 - Applied Multivariate Methods (3.0 cr)
- STAT 5421 - Analysis of Categorical Data (3.0 cr)
- STAT 5601 - Nonparametric Methods (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- STAT 8111 - Mathematical Statistics I (3.0 cr)
- STAT 8112 - Mathematical Statistics II (3.0 cr)
- STAT 8931 - Advanced Topics in Statistics (3.0 cr)
- STAT 8932 - Advanced Topics in Statistics (3.0 cr)

### Outside Coursework
Take 6 credits outside the major.
Twin Cities Campus
Statistics Minor
Statistics, School of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Statistics, 313 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-625-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g164.html

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 14
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Theory Requirement
Take the following courses for 8 credits:
STAT 4101 - Theory of Statistics I (4.0 cr)
STAT 4102 - Theory of Statistics II (4.0 cr)

Statistics Electives
Take a statistics elective, in consultation with the statistics director of graduate studies.
Take 1 or more credit(s) from the following:
• STAT 4xxx
• STAT 5xxx
• STAT 6xxx

Doctoral
Required Courses
Theory Requirement
Take one of the following statistics theory sequences for a total of 8 credits:
STAT 4101 - Theory of Statistics I (4.0 cr)
STAT 4102 - Theory of Statistics II (4.0 cr)
or STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)

Statistics Electives
Take at least 6 statistics electives, chosen in consultation with the statistics director of graduate studies.
STAT 5xxx
STAT 8xxx
Twin Cities Campus
Statistics Ph.D.
Statistics, School of
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Statistics, 313 Ford Hall, 224 Church Street SE, Minneapolis, MN 55455 (612-625-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.stat.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
* TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
* IELTS
  - Total Score: 6.5
* MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
34 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 3.00 is required for students to remain in good standing.
At least 2 semesters must be completed before filing a Degree Program Form.
Required Courses

Core Courses
- STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
- STAT 8052 - Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling (3.0 cr)
- STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
- STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
- STAT 8111 - Mathematical Statistics I (3.0 cr)
- STAT 8112 - Mathematical Statistics II (3.0 cr)
- STAT 8801 - Statistical Consulting (3.0 cr)
- STAT 8913 - Literature Seminar (1.0 cr)

Statistics Electives
- Courses from other departments with heavy statistical content, and some 5xxx-level statistics courses may be used as electives.
- Students choose courses in consultation with the director of graduate studies.
- Take 12 or more credit(s) from the following:
  - STAT 8xxx

Outside Coursework
- Take MATH 8651 (3 cr) and MATH 8652 (3 cr). Coursework comparable to MATH 8651 and 8652 may be substituted with approval of the director of Graduate Studies.
- MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
- MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)

Electives
- Take at least 6 additional credits to complete the 12-credit outside coursework requirement.

Thesis Credits
- Take 24 or more credit(s) from the following:
  - STAT 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Strategic Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-625-4054; fax: 612-626-8251)
Email: sjmcgrad@umn.edu
Website: http://sjmc.umn.edu/grad/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MA in strategic communication is designed to serve working communications professionals in advertising, public relations, corporate communications, nonprofit organizations, and government. The 33-credit program is conceptually and structurally distinct from the existing academic master's degree in mass communication in that it focuses on advanced professional study of communications strategy, media, planning, evaluation, and creative management.

The University of Minnesota is one of only a handful of institutions to offer a professional master's program in strategic communication designed for the busy working professional.

The MA in strategic communication curriculum is tailored to provide the best foundation for future communications leaders, recognizing that the communication industry is changing rapidly and is more volatile than ever. With Internet use moving well beyond its infancy, and massive organizational and global forces reshaping the U.S. economy, communications leaders face significant challenges and can prepare themselves through in-depth study of strategic process management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
The minimum requirement for admission is a B.A. or equivalent. Professionals in strategic communication--currently employed in advertising, public relations, or marketing firms, or in a communications function within a corporation or nonprofit organization--must have a baccalaureate degree from an accredited U.S. institution or its foreign equivalent and at least two years professional experience. This professional experience should be in any of the following areas: account planning, account management, advertising management, media planning or buying, media sales, promotion marketing, corporate communications, public affairs, public relations, investor relations, direct marketing, sales management, marketing management, brand management, broadcast or print journalism, market research, content creation, or event management.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Program Requirements

Plan C: Plan C requires 33 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The MA in strategic communication is designed to be completed within 24 calendar months.

Students must maintain a GPA of at least 3.00 and achieve a grade of B or better on their final 6-credit individual project. The project is a sequence of two capstone courses (Jour 8206) designed to support completion of individual strategic communication campaign projects that demonstrate mastery of the MA curriculum.

Student progress is evaluated by the academic director, program coordinator, and program faculty. Students must progress each semester to continue in the program, though a student who must temporarily leave the program unexpectedly can return to the program at a later date and resume their studies at the point of departure. All coursework must be taken A-F.

Required Courses

- JOUR 8200 - Strategic Communication Research Methods (3.0 cr)
- JOUR 8201 - Factors Affecting Communication Strategy (3.0 cr)
- JOUR 8202 - Generation and Selection of Communication Strategies (3.0 cr)
- JOUR 8203 - Integration of Communication Strategies Across Media (3.0 cr)
- JOUR 8205 - Cases in Strategic Communication (3.0 cr)

Electives

Take at least 6 credits outside the School of Journalism and Mass Communication. The remaining 3 credits of the 9-credit elective requirement can be taken from the following list:

- JOUR 5251 - Strategic Communication Theory (3.0 cr)
- or JOUR 5xxx
- or JOUR 8xxx

Individual Project

Take JOUR 8206 two times (May session and summer session).

Take 6 or more credit(s) from the following:

- JOUR 8206 - Directed Study: Development of an Integrated Strategic Communication Campaign (3.0 cr)
Twin Cities Campus
Studies in Africa and African Diaspora Minor
African-Amer & African Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of African American and African Studies, 810 Social Sciences Building, 267 19th Ave S, Minneapolis, MN 55455 (612-624-9847; fax: 612-624-8383)
Email: www.aaas.umn.edu
Website: http://www.aaas.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary graduate minor is administered through the Department of African American & African Studies. The minor program gives students from a variety of disciplines a structured graduate curriculum that offers a systematic understanding of the contemporary and historical experiences of peoples of Africa and of the African diaspora. It is organized around a group of core seminars and focuses on two broad areas: the humanities and the arts, and the social and behavioral sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Admission is contingent upon prior admission to a master's or doctoral degree-granting program.

Special Application Requirements:
Students must complete an application form by the end of spring semester to be considered for acceptance for the following academic year. It is expected that no more than 15 students will be admitted to this minor each year. An undergraduate major or minor in African American and/or African studies is not required for admission to the program, but students are expected to have had sufficient background to begin graduate level study.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students develop their program in consultation with the director of Graduate Studies in studies in Africa and the African diaspora and in their major. All courses must be outside the student's major field of study.

The master's minor requires a minimum of 9 graduate credits, including the seminar AFRO 5101 - Studies in Africa and the African Diaspora. Remaining courses are selected from one of the following two areas: humanities and the arts or behavioral and social sciences.

The doctoral minor requires a minimum of 15 graduate credits, including the seminar AFRO 5101 - Studies in Africa and the African Diaspora. Students take one additional seminar that focuses on the study of Africa and peoples of African descent. Remaining courses are selected from one of the two areas listed above.
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
**Required Course**
- AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)

**Course Electives**
All courses must be outside the student's major field of study.
Take 6 or more credit(s) from the following:
- AFRO 5xxx
- AFRO 8xxx

Doctoral
**Required Course**
- AFRO 5101 - Seminar: Introduction to Africa and the African Diaspora (3.0 cr)

**Course Electives**
All courses must be outside the student's major field of study.
Take 12 or more credit(s) from the following:
- AFRO 5xxx
- AFRO 8xxx
Twin Cities Campus
Studies of Science and Technology Minor
Philosophy Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Studies of Science and Technology, 746 Heller Hall, 271 19th Ave S, Minneapolis, MN 55455; (612-625-6635; fax: 612-626-8380)
Email: mcps@umn.edu
Website: http://www.mcps.umn.edu/grad/program.html

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 7
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Studies of science and technology (SST) deals with a rapidly expanding field that seeks to understand the conceptual foundations, historical development, and social dimensions and context of science and technology. SST faculty are drawn from a number of research and teaching units dedicated in whole or in part to the history, philosophy, and social studies of science and technology.

The graduate SST minor is for students from any major who want to gain a deeper understanding of the nature and development of science and technology. It can be particularly valuable for students who are planning teaching careers in science or engineering, or those majoring in philosophy or history of science and technology. Students admitted to the SST minor will develop individual programs of study in consultation with the faculty and the director of Graduate Studies. Adjustments in program requirements can be made for students with relevant previous course experience.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Admission is contingent upon prior admission to a University of Minnesota master's or doctoral degree-granting program, and is by permission of the director of Graduate Studies in SST.

Special Application Requirements:
Prospective students should contact director of Graduate Studies in SST.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

History Course
All students pursuing the minor take one of the following two courses:
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
or HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)

Philosophy Course
All students pursuing the minor take one of the following three courses:
PHIL 8670 - Seminar: Philosophy of Science (3.0 cr)
or PHIL 8610 - Seminar: History of Modern Physical Sciences (3.0 cr)
or PHIL 8620 - Seminar: Philosophy of the Biological Sciences (3.0 cr)
Colloquium
Master's students pursuing the minor take the following course once. Doctoral students take the following course twice.
SST 8000 - Colloquium (1.5 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
Master's students pursuing the minor complete the 7.5 credits noted above.

Doctoral
Additional Requirements for the Doctoral Minor
In addition to the 7.5 credits required for the master's minor, doctoral students must take another 1.5 credits of SST 8000, and at least 3 more SST credits.
SST 8000 - Colloquium (1.5 cr)
SST 8100 - Seminar: Models, Theories, and Reality (3.0 cr)
  or SST 8200 - Seminar: Philosophy of the Physical Sciences (3.0 cr)
  or SST 8300 - Seminar: The Biological and Biomedical Sciences (3.0 cr)
  or SST 8400 - Seminar: Science, Technology, and Society (3.0 cr)
  or SST 8420 - Seminar: Social and Cultural Studies of Science (3.0 cr)
Twin Cities Campus
Technical Communication Postbaccalaureate Certificate
Writing Studies Department
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive SE, Minneapolis, MN 55455; (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: https://cla.umn.edu/writing-studies

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Technical Communication PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Certificate courses are taught by graduate faculty who themselves have active research agendas. The program, whenever possible, provides opportunities for students to apply knowledge to solve community and industry problems within the field of technical communication through authentic learning opportunities in the program's courses.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Fall Term Courses
WRIT 5001 - Introduction to Graduate Studies in Scientific and Technical Communication (3.0 cr)
WRIT 4662W - Writing With Digital Technologies [WI] (3.0 cr)

Spring Term Courses
WRIT 4562 - International Professional Communication (3.0 cr)
WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
Summer Term Course
WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)
Twin Cities Campus
Theatre Arts M.A.
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Ave S, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30 to 40
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department's work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 24 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.
The MA degree emphasizes academic pursuits and is considered a prerequisite for the PhD. The areas of study for the MA are devised in collaboration with a faculty advisor, and demand original and challenging research in the fields of theatre historiography or performance criticism.

There is an 8 credit limit on practical/performance courses for program credit.

### Field Seminars
Take 6 or more credit(s) from the following:
- TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)
- TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)
- TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)
- TH 8114 - Theatre: Performance and Political Modernity (3.0 cr)
- TH 8115 - History and Theory of Western Theatre: 20th Century Through World War II (3.0 cr)
- TH 8116 - History and Theory of Western Theatre: 20th Century From 1945 to the Present (3.0 cr)

### Signature Seminars
Take 6 or more credit(s) from the following:
- TH 8120 - Seminar (3.0 cr)
- TH 5117 - Performance and Social Change (3.0 cr)

### Historiography Seminars
Take 3 or more credit(s) from the following:
- TH 8102 - Theatre Historiography (3.0 cr)

### Professionalization
Take 3 or more credit(s) from the following:
- TH 8590 - Theatre Technology Practicum (1.0 - 3.0 cr)

### Electives
Take 6 credits in elective coursework either in our outside the department.

### Outside Coursework
Take 6 credits outside the major.

### Plan Options

#### Plan A
**Thesis Credits**
Take 10 or more credit(s) from the following:
- TH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

#### Plan B
Consult with the advisor and director of Graduate Studies regarding the required Plan B paper(s).
Twin Cities Campus  
Theatre Arts M.F.A.  
Theatre Arts & Dance Dept  
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:  
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)  
Email: theatre@umn.edu  
Website: http://theatre.umn.edu

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 60  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MFA in theatre arts, which specialized in design and technical production, is awarded to students who, through the three-year course of study, explore challenges in the areas of scenery/properties, costuming, lighting, sound design, multimedia and technology with an emphasis in at least one of these areas. It is a rigorous program based on the belief that good designers must have a solid understanding of each area of design in order to be able to communicate and collaborate well with the other designers, technicians, and directors. Good designers must also have strong craft skills in order to understand how the design functions in execution. The department believes that technology is an integral tool of design and seeks to balance the education of the student in both areas.

Accreditation  
This program is accredited by National Association of Schools of Theatre (NAST)

Program Delivery  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission  
Special Application Requirements:  
Admission into the M.F.A. Theatre Arts program is dependent on a portfolio review by the Theatre Arts design/technology faculty.

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
- IELTS  
  - Total Score: 6.5  
- MELAB  
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 54 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: A realized design and technology project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The three-year, performance-oriented MFA degree specializes in design and technical production. All areas of design are studied to increase understanding in specialization areas, and technology is studied as an essential part of design. Students are expected to achieve proficiency in at least two areas of any combination of design and technology (scenery/properties, costuming, lighting, sound) and a level of expertise in at least one of these areas. Program faculty work with students to identify the final areas for the degree. The MFA degree is considered a terminal degree in these areas of theatre arts. Each program requires a final performance practicum and written record of it. For specific program requirements, contact the director of graduate studies.

Required Courses

- TH 5510 - Drawing, Rendering, and Painting for the Theatre Designer I (3.0 cr)
- TH 5520 - Scene Design (3.0 cr)
- TH 5530 - Costume Design (3.0 cr)
- TH 5540 - Lighting Design for the Theatre (3.0 cr)
- TH 5559 - Sound Design for Performance (3.0 cr)
- TH 5560 - Drawing, Rendering, and Painting for the Theatre Designer II (3.0 cr)

Repeat Primary Design Area

- TH 5520 - Scene Design (3.0 cr)
- or TH 5530 - Costume Design (3.0 cr)
- or TH 5540 - Lighting Design for the Theatre (3.0 cr)
- or TH 5559 - Sound Design for Performance (3.0 cr)

MFA Creative Thesis

- Take 3 or more credit(s) from the following:
  - TH 8990 - MFA Creative Thesis (3.0 - 4.0 cr)

Design/Technology Practicums

- Take 6 or more credit(s) from the following:
  - TH 5590 - Theatre Technology Practicum (1.0 - 3.0 cr)
  - or TH 8590 - Theatre Technology Practicum (1.0 - 3.0 cr)
  - Take 3 or more credit(s) from the following:
    - TH 5500 - Theatre Design Practicum (1.0 - 3.0 cr)
    - TH 8500 - Theatre Design Practicum (1.0 - 3.0 cr)

Electives in Related Fields

- Take 15 or more credit(s) from the following:
  - TH 5545 - Stage Lighting Technology (3.0 cr)
  - TH 5570 - Properties/Scenery Technology (1.0 - 3.0 cr)
  - TH 5580 - Costume Technology (3.0 cr)
  - TH 8980 - Internship (1.0 - 5.0 cr)

Professional Development Class

- Take once a year for 3 years.
- Take 3 or more credit(s) from the following:
  - TH 8950 - Topics in Theatre (1.0 - 4.0 cr)

Internship

- (May or may not be taken for credit to apply towards electives.) Confer with advisor regarding internship.
- Take 0 - 3 credit(s) from the following:
  - TH 8980 - Internship (1.0 - 5.0 cr)

History of Literature within the Major Field

Upon consultation with the advisor and program faculty, there may be a substitution for the specific courses listed below for this requirement if it is in the best interest of the student. New coursework must be in the history/literature area.

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Information current as of December 20, 2016
Take 6 or more credit(s) from the following:
- TH 4177W - Survey of Dramatic Literature I: Strategic Interpretation [WI] (3.0 cr)
- TH 4178W - Survey of Dramatic Literature II: Representation and its Effects [WI] (3.0 cr)

Outside Coursework
Take at least 6 credits outside the major.
Twin Cities Campus
Theatre Arts Minor
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Ave S, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department’s work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework is chosen in consultation with the Theatre Arts director of Graduate Studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Take 9 or more credit(s) from the following:
• THE 5xxx
• THE 8xxx

Doctoral
Required Courses
Take 12 or more credit(s) from the following:
• TH 5xxx
• TH 8xxx
Twin Cities Campus
Theatre Arts Ph.D.
Theatre Arts & Dance Dept
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Ave S, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 54
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department’s work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning-production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Accreditation
This program is accredited by National Association of Schools of Theatre (NAST).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
In order to be admitted to the M.A./Ph.D. program, you must have a working knowledge/reading proficiency of at least one foreign language (or a sign language).

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
18 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Proficiency in one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

A. Signature Seminars
Each member of the MA/PhD faculty will offer a “signature seminar” on a two-year rotation. These seminars focus on the faculty member's current primary area of research interest, with an emphasis on articulating the distinct research methodology that the faculty member brings to bear on his/her field. Each member of the MA/PhD faculty will offer a “field seminar” on a two-year rotation. These seminars are designed to give students a level of field expertise that will enable them to teach.

Take 6 or more credit(s) from the following:
- TH 8120 - Seminar (3.0 cr)
- TH 5117 - Performance and Social Change (3.0 cr)

B. Field Seminars
Each member of the MA/PhD faculty will offer a “field seminar” on a two-year rotation. These seminars are designed to give students a level of field expertise that will enable them to teach in the history, literature, and criticism of theatre studies, and each focuses on a distinct period, problematic, or performance tradition. The emphasis here is on mastery of a body of literature and theory pertaining to a specific field.

Take 6 or more credit(s) from the following:
- TH 8111 - History and Theory of Western Theatre: Ancient World and Early Medieval (3.0 cr)
- TH 8112 - History and Theory of Western Theatre: Medieval Through Renaissance (3.0 cr)
- TH 8113 - History and Theory of Western Theatre: National Theatres to the French Revolution (3.0 cr)
- TH 8114 - Theatre: Performance and Political Modernity (3.0 cr)
- TH 8115 - History and Theory of Western Theatre: 20th Century Through World War II (3.0 cr)
- TH 8116 - History and Theory of Western Theatre: 20th Century From 1945 to the Present (3.0 cr)

C. Professionalization
This seminar is taught every second year, over an entire year (meeting every second week, 3 cr). It introduces students to the academic profession through a series of focused workshops on pedagogy (ethics, politics, and practice), professional protocols (publishing, job search, conferences), and forms of professional writing (grants, abstracts, statements of teaching philosophy, etc.).

Take 3 or more credit(s) from the following:
- TH 8590 - Theatre Technology Practicum (1.0 - 3.0 cr)

D. Historiography Seminars
This seminar is taught every second year (3 cr). It focuses on the contested nature of historical (theatre/performance) knowledge, and introduces students to idea of historiography defined as an ethical exploration of the encounter with the Other (the past, the writing of history, the archive, the event, the fact, the object) that questions relations of knowledge and power, as well as the current apparatus of inquiry and interpretation.

Take 3 or more credit(s) from the following:
- TH 8102 - Theatre Historiography (3.0 cr)

Outside Coursework
Take 12 credits outside the major.

Thesis Credits
Take 24 or more credit(s) from the following:
- TH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Aerospace Engineering and Mechanics M.S.
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@umn.edu
Website: http://www.aem.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers M.S. and Ph.D. degrees. The graduate programs emphasize engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A four-year B.S. degree in an engineering, basic science, or mathematics program is required.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's undergraduate record and letters of recommendation.

Special Application Requirements:
GRE scores are not required but are strongly recommended for students applying for graduate fellowships. In all cases, these test scores are taken into account if provided. Students are admitted fall semester only. Only under unusual circumstances are students allowed to begin their studies at another time during the academic year.

The application deadline is December 15. Additional information is available at http://www.aem.umn.edu/teaching/graduate/Application_procedures.shtml

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 to 24 major credits and 6 to 16 credits outside the major. The final exam is oral.

Plan C: Plan C requires 14 to 24 major credits and 6 to 16 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

This program emphasizes coursework in engineering sciences that are basic to this field: fluid mechanics, aerospace systems, and solid mechanics. Options include coursework in aerodynamics and aerospace systems, dynamical systems, material properties, and fluid and solid behavior.

The M.S. in Aerospace Engineering and Mechanics requires 30 credits and is offered under Plan A (thesis), Plan B (project), and Plan C (coursework). All plans require a minimum of 14 major credits, of which 12 must be at the 5xxx or 8xxx level, and a minimum of 6 credits outside the major. In addition, Plan A requires 10 thesis credits, and Plan B requires 3 project credits (which may be counted toward the 14 major credits). The remaining course credits may be taken in the major field or in any related field. Two semesters of seminar (AEM 8000) attendance are required, but only one credit may be used towards the course credit requirements. No more than 8 credits of 4xxx courses and no more than 8 credits (6 for Plan A) taken as S/N are allowed.

Required Courses
Take one 2-course sequence in fluids, solids or dynamics

Fluids
- AEM 8201 - Fluid Mechanics I (3.0 cr)
- AEM 8202 - Fluid Mechanics II (3.0 cr)

Solids
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)

Dynamics
- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 8411 - Advanced Dynamics (3.0 cr)

Additional Major Credits
Take an additional 8 credits in AEM. The following sequences in controls or computational fluid mechanics may be used, or any other AEM courses chosen in consultation with adviser.

Controls
- AEM 5321 - Modern Feedback Control (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 8421 - Robust Multivariable Control Design (3.0 cr)

Computational Fluid Dynamics
- AEM 5253 - Computational Fluid Mechanics (3.0 cr)
- AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)

Seminar
1 credit of AEM 8000 may be used towards program credit requirements.
- AEM 8000 - Seminar: Aerospace Engineering and Mechanics (1.0 cr)

Minor or Related Field
For all plans, take a minimum of 6 credits in a minor or in related fields outside AEM

Plan A
Take a minimum of 10 thesis credits
- AEM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Take 3 credits of AEM 8880 and complete a final project
Twin Cities Campus

Aerospace Engineering and Mechanics Minor

Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

**Contact Information:**
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@umn.edu
Website: [http://www.aem.umn.edu](http://www.aem.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers M.S. and Ph.D. degrees in aerospace engineering and mechanics. The graduate programs emphasize engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
A four-year B.S. degree in an engineering, basic science, or mathematics program is required. Admission depends primarily on the applicant's undergraduate record and letters of recommendation.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

The minor in Aerospace Engineering and Mechanics requires 6 credits in AEM courses for the master's minor and 12 credits in AEM courses for the doctoral minor.

One course sequence in one of the following research areas must be included: fluids, solids, dynamics, controls, or computational fluid dynamics.

Courses cross listed with AEM courses must be registered for under the AEM course designation to be counted towards a minor.

**Required Courses**
One course sequence must be included for either a master's minor or a doctoral minor.

**Fluids**
- AEM 8201 - Fluid Mechanics I (3.0 cr)
- AEM 8202 - Fluid Mechanics II (3.0 cr)

**Solids**
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)

**Dynamics**
- AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 8411 - Advanced Dynamics (3.0 cr)
Controls
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)
Computational Fluid Dynamics
AEM 5253 - Computational Fluid Mechanics (3.0 cr)
AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's Minor
At least 6 credits in Aerospace Engineering and Mechanics are required, including one sequence of two 5xxx or 8xxx courses.

Doctoral Minor
At least 12 credits in Aerospace Engineering and Mechanics are required, including one sequence of two 5xxx or 8xxx courses.
Twin Cities Campus
Aerospace Engineering and Mechanics Ph.D.
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@umn.edu
Website: http://www.aem.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers a Ph.D. degree in aerospace engineering and mechanics. The Ph.D. program emphasizes engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A four-year B.S. degree in an engineering, basic science, or mathematics program is required.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's undergraduate record, personal statement, and letters of recommendation.

Special Application Requirements:
GRE scores are not required but are strongly recommended for students applying for graduate fellowships. In all cases, these test scores are taken into account if provided. Students are admitted fall semester only. Only under unusual circumstances are students allowed to begin their studies at another time during the academic year.

The application deadline is December 15. Additional information is available at http://www.aem.umn.edu/teaching/graduate/Application_procedures.shtml

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
12 to 30 credits are required in the major.
12 to 30 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

The Ph.D. program emphasizes coursework and research in engineering sciences that are basic to this field. Options include coursework and research in aerodynamics and aerospace systems, dynamical systems, material properties, and fluid and solid behavior.

The Ph.D. requires about two years of coursework, but the heart of the program is the student's thesis research. The first year of the Ph.D. program is similar to the master's program and most Ph.D. students receive the master's degree. The second year is devoted to more advanced courses and beginning research. Subsequent years include some coursework with increased focus on research. The time required to complete a research project varies, but most students finish the Ph.D. within five years after the bachelor's degree.

The program must include a minimum of 42 credits of approved courses; of these, a minimum of 12 credits must be in AEM courses at the 5xxx or 8xxx level and a minimum of 12 credits outside the major are required. Four semesters of seminar attendance are required (AEM 8000), but only one credit may be used towards the course credit requirements. The remaining 18 course credits may be taken in the major or in any supporting field. No more than 8 credits of 4xxx level courses and no more than 13 credits taken as S/N are allowed.

Required Courses
Take one 2-course sequence in fluids, solids or dynamics

**Fluids**
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)

**Solids**
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)

**Dynamics**
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 8411 - Advanced Dynamics (3.0 cr)

Additional Major Credits
Take an additional 6 credits in AEM at the 5xxx or 8xxx level. The following sequences in controls or computational fluid mechanics may be used, or any other AEM courses chosen in consultation with adviser.

**Controls**
AEM 5321 - Modern Feedback Control (3.0 cr)
AEM 5451 - Optimal Estimation (3.0 cr)
AEM 8421 - Robust Multivariable Control Design (3.0 cr)

**Computational Fluid Dynamics**
AEM 5253 - Computational Fluid Mechanics (3.0 cr)
AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)

Minor or Supporting Program
Take 12 credits in a minor or supporting program outside AEM

Seminar
1 credit of AEM 8000 may be used towards program credit requirements.
AEM 8000 - Seminar: Aerospace Engineering and Mechanics (1.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam
AEM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Astrophysics M.S.
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: grad-rec@astro.umn.edu
Website: http://www.astro.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The department conducts research in observational, theoretical, and computational astrophysics, as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

An undergraduate degree in astronomy or physics or the equivalent is required. Contact the Graduate Studies Committee for exceptions.

Other requirements to be completed before admission:
A statement of career goals, scores from the GRE General (Aptitude) Test and Subject (Advanced) Test in physics, and three letters of recommendation are required. Applications are due by January 10 in order to be considered for financial support. Students are admitted fall semester only. Additional application information is available at http://www.astro.umn.edu/grad/apply/

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 to 24 major credits and 6 to 16 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's degree requires a minimum of 30 credits and is offered under Plan A (thesis) or Plan B (project). Completion of the degree normally takes two years.

Required Coursework
All students are required to take the following course
PHYS 5011 - Classical Physics I (4.0 cr)

Plan A
Plan A requires 14 credits in astrophysics, 6 credits in a minor or in related fields outside AST, and 10 thesis credits
AST 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Plan B requires 14 credits in astrophysics and 6 credits in a minor or in related fields outside of AST. The remaining 10 credits may be taken in the major field or any supporting field. The Plan B also requires the completion of 1-3 papers written in connection with three courses taken in the program.
Twin Cities Campus

Astrophysics Minor
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: grad-req@astro.umn.edu
Website: http://www.astro.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The department conducts research in observational, theoretical, and computational astrophysics, as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
Current enrollment in a related University graduate program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

AST courses at the 5xxx-level or higher may be used for the minor with the exception of AST 8990 and 8200.

Courses at the 4xxx-level may be used with approval from the Director of Graduate Studies.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

- Masters
- Doctoral
**Twin Cities Campus**

**Astrophysics Ph.D.**

*Astrophysics, Minnesota Institute for Science and Engineering*

Link to a list of faculty for this program.

**Contact Information:**

Minnesota Institute for Astrophysics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)

Email: grad-reg@astro.umn.edu

Website: [http://www.astro.umn.edu](http://www.astro.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The department conducts research in observational, theoretical, and computational astrophysics, as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate astronomy, physics or equivalent degree required.

Other requirements to be completed before admission:

Coursework in analytical mechanics, electrodynamics, quantum mechanics, thermodynamics, and statistical physics.

**Special Application Requirements:**

A statement of career goals, scores from the GRE General (Aptitude) Test and Subject (Advanced) Test in physics, and three letters of recommendation are required. Applications are due by January 10 in order to be considered for financial support. Students are admitted fall semester only. Additional application information is available at [http://www.astro.umn.edu/grad/apply/](http://www.astro.umn.edu/grad/apply/)

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

The Ph.D. degree requires a minimum of 40 course credits, including 28 credits in the major, and 12 credits in a minor or supporting program; 24 thesis credits are also required.

The graduate written examination, typically held during the week prior to the start of fall semester, must be passed on the second “real” attempt (first-year students are given a free trial). A second-year project must be defended by the end of the fall semester of the third year. The preliminary oral exam must be passed by the end of the third year. Normally, the preliminary oral exam includes a presentation on the second-year project.

**Required Courses**
The following 2 courses are required for all students. The remaining 20 major credits are chosen in consultation with advisor.

- PHYS 5011 - Classical Physics I (4.0 cr)
- PHYS 5012 - Classical Physics II (4.0 cr)

**Supporting Program**
Students must take a minimum of 12 credits in coursework from related fields. Specific courses are chosen in consultation with advisor.

**Thesis Credits**
Take 24 credits after passing preliminary oral exam.

- AST 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Biomedical Engineering M.S.
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax 612-626-6583)
Email: bmengp@umn.edu
Website: http://bme.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant to the degree objectives.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A baccalaureate degree in engineering or in a physical or biological science is required.

Other requirements to be completed before admission:
Applicants with an engineering degree do not need to complete any specific coursework prior to applying. Applicants without an engineering degree must complete (1) math coursework through calculus I, calculus II, linear algebra, and differential equations; and (2) at least 1 year of college-level physics, preferably calculus-based.

There are no minimum GPA, GRE, or English language test score requirements. A GPA of at least 3.2 on a 4.0 scale is preferred, but not required. Applicants with a lower GPA may still apply, but they will have a much lower chance of admission.

Special Application Requirements:
The fall application deadline for M.S. applicants is March 31. Local applicants applying for the program as part-time students may, under certain circumstances, be considered for spring admission. The spring application deadline for part-time M.S. applicants is November 1. Full-time applicants cannot be considered for spring admission. See http://bme.umn.edu/grad/appinfo.html for additional application information. Students are not admitted for the summer term.

Students applying through the Combined B.Bm.E./M.S. Program (see below, under Program Sub-Plans) should refer to the application instructions and deadline information at http://bme.umn.edu/grad/appcombined.html.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 8 to 20 major credits, 0 to 12 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 10 to 30 major credits and 0 to 20 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B Project (BMEn 8820, minimum of 2 credits) should entail approximately 50-75 hours of work per credit, performed in collaboration with a faculty advisor. Students must submit a written report of approximately 10 double-spaced pages per credit to the advisor, who will assign a letter grade for BMEn 8820 based on the report. The report must then be defended before the student's committee.

Plan C: Plan C requires 8 to 30 major credits and 0 to 22 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

The M.S. program requires a minimum of 30 total credits in mathematics, biology, biomedical engineering, and relevant areas of science and engineering.

PLAN A
BMEn Core - 6 credits
BMEn Seminars - 2 credits
Biology Electives - 6 credits
Technical Electives - 6 credits
Thesis - 10 credits

PLAN B
BMEn Core - 6 credits
BMEn Seminars - 2 credits
Biology Electives - 6 credits
Technical Electives - 9 credits
Free Electives - 5 credits
Capstone Project - 2 credits

PLAN C
BMEn Core - 6 credits
BMEn Seminars - 2 credits
Biology Electives - 6 credits
Technical Electives - 9 credits
Free Electives - 7 credits

A single course may NOT be counted simultaneously toward more than one of the requirements listed above.

INCLUDED in the core/elective requirements must be a minimum of 3 credits designated as math/statistics intensive. These are not additional credits but will overlap with coursework already satisfying the BMEn core, technical elective, and/or free elective requirements.

Approved courses for each category are listed below. All coursework (excluding seminars and internships) must be taken for a letter grade (A-F). A minimum grade of B- is required for coursework to be counted toward degree requirements.

BMEn Core
Take 6 or more credit(s) from the following:

- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
- BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
- BMEN 8381 - Biomechanics (3.0 cr)
- BMEN 8421 - Biophotons (3.0 cr)
- BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
- BMEN 8502 - Physiological Control Systems (3.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

BME Seminar
Seminars are 1 credit per semester, repeatable for credit, and may be taken in any order.
Take 2 or more credit(s) from the following:

- BMEN 8601 - Biomedical Engineering Seminar (1.0 cr)
- BMEN 8602 - Biomedical Engineering Seminar (1.0 cr)

Biology Electives
Additional courses may be approved by the director of Graduate Studies.
Take 6 or more credit(s) from the following:

- BIOC 5216 - Current Topics in Signal Transduction (3.0 cr)
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- BMEN 5444 [Inactive] (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- CGSC 8041 - Cognitive Neuroscience (4.0 cr)
- CPNS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- EEB 5371 - Principles of Systematics (3.0 cr)
- GCD 5036 - Molecular Cell Biology (3.0 cr)
- GCD 8103 - Human Histology (5.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8151 - Cell Structure and Function (3.0 cr)
- GCD 8161 - Advanced Developmental Biology (3.0 cr)
- MEDC 8760 - Design of Peptidomimetics (2.0 cr)
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- MICA 8007 - Cell Biology and Biochemistry of the Extracellular Matrix (3.0 cr)
- MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
- NSC 5540 - Survey of Biomedical Neuroscience (2.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661W - Behavioral Neuroscience [WI] (3.0 cr)
- NSC 5667 - Neurobiology of Disease (2.0 - 3.0 cr)
- NSC 8211 - Developmental Neurobiology (3.0 cr)
- NSCI 5101 - Introduction to Neuroscience for Graduate Students (3.0 cr)
- OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
- PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
- PHSL 5115 - Clinical Physiology I (3.0 cr)
- PHSL 5116 - Clinical Physiology II (3.0 cr)
- PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
- PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)
- RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
- RSC 5281 - Scientific Foundations: Exercise Theory (3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)

Technical Electives
PLAN A students must take 6 or more technical elective credits. PLAN B and PLAN C students must take 9 or more technical elective credits. Additional courses may be approved by the director of Graduate Studies.

Take 6 or more credit(s) from the following:
- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
- AEM 8531 - Fracture Mechanics (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
- BMEN 5111 - Biomedical Ultrasound (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
- BMEN 5411 - Neural Engineering (3.0 cr)
- BMEN 5412 - Neuromodulation (3.0 cr)
- BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
- BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
- BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
- BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
- BMEN 8401 - New Product Design and Business Development (4.0 cr)
- BMEN 8421 - Biophotonics (3.0 cr)
- BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
- BMEN 8502 - Physiological Control Systems (3.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
- CHEM 8021 - Computational Chemistry (4.0 cr)
- CHEM 8031 - Chemical Engineering (3.0 cr)
- CHEM 8041 - Physical Chemistry (3.0 cr)
- CHEM 8051 - Systems Analysis of Biological Processes (3.0 cr)
- CHEM 8052 - Systems Analysis of Biological Processes (3.0 cr)
- CHEM 8754 - Systems Analysis of Biological Processes (3.0 cr)
- CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- EE 5141 - Introduction to Microsystem Technology (4.0 cr)
- EE 5171 - Microelectronic Fabrication (4.0 cr)
- EE 5251 - Optimal Filtering and Estimation (3.0 cr)
- EE 5323 - VLSI Design I (3.0 cr)
- EE 5333 - Analog Integrated Circuit Design (3.0 cr)
- EE 5393 - Circuits, Computation, and Biology (3.0 cr)
- EE 5531 - Probability and Stochastic Processes (3.0 cr)
- EE 5561 - Physical Optics (3.0 cr)
- HINF 5430 - Health Informatics I (3.0 cr)
- HINF 5431 - Health Informatics II (3.0 cr)
- HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
- IE 5111 - Systems Engineering I (2.0 cr)
- IE 5112 - Introduction to Operations Research (3.0 cr)
- IE 5113 - Systems Engineering II (4.0 cr)
- IE 5511 - Human Factors and Work Analysis (4.0 cr)
- IE 5522 - Quality Engineering and Reliability (4.0 cr)
• IE 5541 - Project Management (4.0 cr)
• IE 5545 - Decision Analysis (4.0 cr)
• IE 5553 - Simulation (4.0 cr)
• MATH 5248 - Cryptology and Number Theory (4.0 cr)
• MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
• MATH 5447 - Theoretical Neuroscience (4.0 cr)
• MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
• MATH 8202 - General Algebra (3.0 cr)
• MATH 8253 - Algebraic Geometry (3.0 cr)
• MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
• MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
• MATS 8003 - Electronic Properties (3.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• ME 5241 - Computer-Aided Engineering (4.0 cr)
• ME 5243 - Advanced Mechanism Design (4.0 cr)
• ME 5247 - Stress Analysis, Sensing, and Transducers (4.0 cr)
• ME 5281 - Analog and Digital Control (4.0 cr)
• ME 5286 - Robotics (4.0 cr)
• ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
• ME 5351 - Computational Heat Transfer (4.0 cr)
• ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
• MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
• NSG 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
• PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
• PHYS 5402 - Radiological Physics (4.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
• RSC 5200 - Introduction to Transcranial Magnetic Stimulation (3.0 cr)
• RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
• RSC 8135 - Advanced Kinesiology (3.0 cr)
• RSC 8235 - Human Kinetics (3.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)

Free Electives
PLANN A students are not required to take any free electives. PLAN B students must take at least 5 credits of free electives. PLAN C students must take at least 7 credits of free electives. Additional courses may be approved by the director of Graduate Studies.

Take 0 or more credit(s) from the following:
• BMEN 8402 - New Product Design and Business Development (4.0 cr)
• BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
• BTHX 5120 - Dying in Contemporary Medical Culture (2.0 cr)
• BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
• BTHX 5300 - Foundations of Bioethics (3.0 cr)
• BTHX 8120 - Dying in Contemporary Medical Culture (2.0 cr)
• MILI 5589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MOT 5001 - Technological Business Fundamentals (2.0 cr)
• MOT 5002 - Creating Technological Innovation (2.0 cr)
• MOT 5003 - Technological Business Planning Workshop (1.0 cr)
• PDES 5701 - Creativity, Idea Generation, and Innovation (3.0 cr)
• PDES 5702 - Concept Sketching and Rendering (3.0 cr)
• PDES 5704 - Computer-Aided Design Methods (3.0 cr)
• PHAR 5200 - Drugs and the U.S. Healthcare System (3.0 cr)
• PHYS 5401 - Physiological Physics (4.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)
• PUBH 6414 - Biostatistical Literacy (3.0 cr)
• PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
• RSC 5106 - Rehab Science: Past, Present, and Future (1.0 cr)
• Any course(s) from the BMEn Core, Biology Elective, and/or Technical Elective lists that are not being used toward another degree requirement.

Math-/Statistics-Intensive
Included in the core and/or elective coursework must be at least 3 credits designated as math/statistics intensive. These are not additional credits but will overlap with coursework already satisfying the BMEn core, technical elective, and/or free elective requirements. Additional courses may be approved by the director of Graduate Studies.

Take 3 or more credit(s) from the following:
• AEM 5451 - Optimal Estimation (3.0 cr)
• AEM 5501 - Continuum Mechanics (3.0 cr)
• AEM 5503 - Theory of Elasticity (3.0 cr)
• AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
• BMEN 5111 - Biomedical Ultrasound (3.0 cr)
• BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
• BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
• BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
• BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
• BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
• BMEN 8502 - Physiological Control Systems (3.0 cr)
• CHEN 8101 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
• CHEN 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
• CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
• CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
• EE 5251 - Optimal Filtering and Estimation (3.0 cr)
• EE 5531 - Probability and Stochastic Processes (3.0 cr)
• EE 5621 - Physical Optics (3.0 cr)
• IE 5522 - Quality Engineering and Reliability (4.0 cr)
• MATH 5248 - Cryptology and Number Theory (4.0 cr)
• MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
• MATH 5447 - Theoretical Neuroscience (4.0 cr)
• MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
• MATH 8202 - General Algebra (3.0 cr)
• MATH 8253 - Algebraic Geometry (3.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• ME 5351 - Computational Heat Transfer (4.0 cr)
• ME 8341 - Conduction (3.0 cr)
• ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
• PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)

Thesis/Project Requirements

PLAN A
Take 10 or more credit(s) from the following:
• BMEN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

PLAN B
Take 2 or more credit(s) from the following:
• BMEN 8820 - Plan B Project (2.0 - 3.0 cr)
Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Combined B.Bm.E./M.S.

The College Science & Engineering offers an early-admission opportunity for eligible University of Minnesota B.Bm.E. students also interested in completing the Biomedical Engineering M.S. degree (Plan A or Plan B only). The Early Admission sub-plan, also referred to as the Combined B.Bm.E./M.S. Biomedical Engineering program, enables B.Bm.E. majors to take 3-16 credits toward the M.S. requirements during their senior (fourth) year, in addition to the courses required for the B.Bm.E. degree. The M.S. degree may then be completed in the fifth year of study. Students are NOT permitted to count a single course toward both the undergraduate and graduate degrees; each course must be counted either toward the B.Bm.E. requirements or the M.S. requirements.

Interested B.Bm.E. students should visit the program website at http://bme.umn.edu/grad/appcombined.html for detailed application and admission information. The fall application deadline is June 1 after the junior (third) year. The spring application deadline is January 2 during the senior (fourth) year.

Students admitted to the Combined B.Bm.E./M.S. must maintain timely degree progress to ensure that all undergraduate degree requirements are completed by the end of their fourth year. They must also be able to take additional courses during their senior year, beyond those required by the B.Bm.E. curriculum, to be eligible for this program.
Twin Cities Campus

Biomedical Engineering Minor

Department of Biomedical Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax: 612-626-6583)
Email: bmengp@umn.edu
Website: http://bme.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

All courses for the Biomedical Engineering Minor must be completed for a letter grade (A-F). A minimum grade of B- is required for a course to count toward the minor.

Program Sub-plans

Students are required to complete one of the following sub-plans.

Master's

BMEn Core

Take 1 or more course(s) from the following:
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
- BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
• BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
• BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
• BMEN 8421 - Biophotonics (3.0 cr)
• BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
• BMEN 8502 - Physiological Control Systems (3.0 cr)
• BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

Additional BMEn Graduate Course(s)
Three additional graduate level BMEn credits are required. Coursework from the BMEn Core list can be applied toward the minor. The following courses cannot be used to satisfy this requirement: BMEn 8334, 8335, 8601, 8602, 8710, 8720, 8820, 8910.
Take 1 or more course(s) from the following:
- BMEN 5xxx
- BMEN 8xxx

Doctoral
The Ph.D. minor in BME requires two courses from the BMEn Core list, one course from the Biology Electives list, and one course from the Technical Electives list, for a minimum of 12 credits.

A single course may not be counted toward more than one requirement.

BMEn Core
Take 2 or more course(s) from the following:
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
- BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
- BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
- BMEN 8421 - Biophotonics (3.0 cr)
- BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
- BMEN 8502 - Physiological Control Systems (3.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

Biology Elective
Additional courses may be approved by the Director of Graduate Studies.
Take 1 or more course(s) from the following:
- BIOC 5216 - Current Topics in Signal Transduction (3.0 cr)
- BIOC 6021 - Biochemistry (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- BMEN 5444 (inactive)(3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- CGSC 8041 - Cognitive Neuroscience (4.0 cr)
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- EEB 5371 - Principles of Systematics (3.0 cr)
- GCD 5036 - Molecular Cell Biology (3.0 cr)
- GCD 8103 - Human Histology (5.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8151 - Cell Structure and Function (3.0 cr)
- GCD 8161 - Advanced Developmental Biology (3.0 cr)
- MEDC 8760 - Design of Peptidomimetics (2.0 cr)
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- MICA 8007 - Cell Biology and Biochemistry of the Extracellular Matrix (3.0 cr)
- MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
- NSC 5540 - Survey of Biomedical Neuroscience (2.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661W - Behavioral Neuroscience [WI] (3.0 cr)
• NSC 5667 - Neurobiology of Disease (2.0 - 3.0 cr)
• NSC 8211 - Developmental Neurobiology (3.0 cr)
• NSCI 5101 - Introduction to Neuroscience for Graduate Students (3.0 cr)
• OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
• PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
• PHSL 5115 - Clinical Physiology I (3.0 cr)
• PHSL 5116 - Clinical Physiology II (3.0 cr)
• PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
• PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• PSY 5062 - Cognitive Neuropsychology (3.0 cr)
• PSY 8041 - Proseminar in Perception (3.0 cr)
• RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
• RSC 5281 - Scientific Foundations: Exercise Theory (3.0 cr)
• RSC 8282 - Problems in Human Movement (4.0 cr)
• SCB 8181 - Stem Cell Biology (3.0 cr)

Technical Elective
Additional courses may be approved by the Director of Graduate Studies. Take 1 or more course(s) from the following:

• AEM 5401 - Intermediate Dynamics (3.0 cr)
• AEM 5451 - Optimal Estimation (3.0 cr)
• AEM 5501 - Continuum Mechanics (3.0 cr)
• AEM 5503 - Theory of Elasticity (3.0 cr)
• AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
• AEM 8531 - Fracture Mechanics (3.0 cr)
• BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
• BIOC 5526 - Spectroscopy and Kinetics (4.0 cr)
• BMEN 5001 - Advanced Biomaterials (3.0 cr)
• BMEN 5041 - Tissue Engineering (3.0 cr)
• BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
• BMEN 5111 - Biomedical Ultrasound (3.0 cr)
• BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
• BMEN 5201 - Advanced Biomechanics (3.0 cr)
• BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
• BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
• BMEN 5351 - Cell Engineering (3.0 cr)
• BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
• BMEN 5411 - Neural Engineering (3.0 cr)
• BMEN 5412 - Neuroimulation (3.0 cr)
• BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
• BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
• BMEN 8001 - Polymeric Biomaterials (3.0 cr)
• BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
• BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
• BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
• BMEN 8401 - New Product Design and Business Development (4.0 cr)
• BMEN 8421 - Biophotonics (3.0 cr)
• BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
• BMEN 8502 - Physiological Control Systems (3.0 cr)
• BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
• CHEM 8021 - Computational Chemistry (4.0 cr)
• CHEM 8101 - Chemical Engineering (3.0 cr)
• CHEM 8181 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
• CHEM 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
• CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
• CHEM 8301 - Physical Rate Processes I: Transport (3.0 cr)
• CHEM 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
• CHEM 8754 - Systems Analysis of Biological Processes (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5511 - Artificial Intelligence I (3.0 cr)
• EE 5141 - Introduction to Microsystem Technology (4.0 cr)
• EE 5171 - Microelectronic Fabrication (4.0 cr)
• EE 5251 - Optimal Filtering and Estimation (3.0 cr)
• EE 5323 - VLSI Design I (3.0 cr)
EE 5333 - Analog Integrated Circuit Design (3.0 cr)
EE 5393 - Circuits, Computation, and Biology (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5621 - Physical Optics (3.0 cr)
HINF 5490 - Health Informatics I (3.0 cr)
HINF 5431 - Health Informatics II (3.0 cr)
HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5112 - Introduction to Operations Research (3.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5511 - Human Factors and Work Analysis (4.0 cr)
IE 5522 - Quality Engineering and Reliability (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5545 - Decision Analysis (4.0 cr)
IE 5553 - Simulation (4.0 cr)
MATH 5248 - Cryptology and Number Theory (4.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
MATH 5447 - Theoretical Neuroscience (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8202 - General Algebra (3.0 cr)
MATH 8253 - Algebraic Geometry (3.0 cr)
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5241 - Computer-Aided Engineering (4.0 cr)
ME 5243 - Advanced Mechanism Design (4.0 cr)
ME 5247 - Stress Analysis, Sensing, and Transducers (4.0 cr)
ME 5281 - Analog and Digital Control (4.0 cr)
ME 5286 - Robotics (4.0 cr)
ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 8241 - Conduction (3.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
PHM 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5402 - Radiological Physics (4.0 cr)
PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
PUBH 6415 - Biostatistical Methods II (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
RSC 5200 - Introduction to Transcranial Magnetic Stimulation (3.0 cr)
RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
RSC 8135 - Advanced Kinesiology (3.0 cr)
RSC 8235 - Human Kinetics (3.0 cr)
STAT 5201 - Statistical Analysis (4.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 5302 - Applied Regression Analysis (4.0 cr)
STAT 5303 - Designing Experiments (4.0 cr)
Twin Cities Campus
Biomedical Engineering Ph.D.
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax: 612-626-6583)
Email: bmenpg@umn.edu
Website: http://bme.umn.edu/grad

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 54
• This program requires summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A baccalaureate degree in engineering or in a physical or biological science is required.

Other requirements to be completed before admission:
Applicants with an engineering degree do not need to complete any specific coursework prior to applying. Applicants without an engineering degree must complete (1) math coursework through Calculus I, Calculus II, Linear Algebra, and Differential Equations; and (2) at least one year of college-level physics, preferably calculus-based.

There are no minimum required GPA, GRE, or English language test scores. A GPA of at least 3.5 on a 4.0 scale is preferred, but not required. Applicants with a lower GPA may still apply, but they will have a much lower chance of admission.

Special Application Requirements:
Fall application deadline is December 31. PhD applications are not accepted for the spring or summer terms. See http://bme.umn.edu/grad/appinfo.html for additional application information.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
9 to 30 credits are required in the major.
0 to 21 credits are required outside the major.
24 thesis credits are required.

Plan A: Plan A requires 8 to 20 major credits, 0 to 12 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 10 to 30 major credits and 0 to 20 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B Project (BMEn 8820, minimum of 2 credits) should entail approximately 50-75 hours of work per credit, performed in collaboration with a faculty adviser. Students must submit a written report of approximately 10 double-spaced pages per credit to the adviser, who will assign a letter grade for BMEn 8820 based on the report. The report must then be defended before the student's committee.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. program requires 30 credits of coursework in mathematics, biology, biomedical engineering, and relevant areas of science and engineering.

BMEn Core - 6 credits
BMEn Seminars - 3 credits
Biology Electives - 6 credits
Technical Electives - 9 credits
Free Electives - 6 credits

A single course may NOT be counted simultaneously toward more than one of the requirements listed above.

INCLUDED in the Core/Elective requirements listed above must be a minimum of 6 credits designated as Math-/Statistics-Intensive. These are not additional credits but will overlap with coursework already satisfying the BMEn Core, Technical Elective, and/or Free Elective requirements.

Approved courses for each category are listed below. All coursework (excluding seminars and internships) must be taken for a letter grade (A-F). A minimum grade of B- is required for coursework to be counted toward degree requirements.

In addition to the 30 credits of coursework, 24 thesis credits (BMEn 8888) are required.

BMEn 8000-Level Core
Take 6 or more credit(s) from the following:
- •BMEN 8001 - Polymeric Biomaterials (3.0 cr)
- •BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
- •BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- •BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
- •BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
- •BMEN 8421 - Biophotonics (3.0 cr)
- •BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
- •BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
- •BMEN 8502 - Physiological Control Systems (3.0 cr)
- •BMEN 8511 - Systems and Synthetic Biology (3.0 cr)

BMEn Seminars
Seminars are 1 credit per semester, repeatable for credit, and may be taken in any order. Another department/program graduate seminar may be substituted for 1 credit of this requirement, with prior approval from the Director of Graduate Studies.
Take 3 or more credit(s) from the following:
- •BMEN 8601 - Biomedical Engineering Seminar (1.0 cr)
- •BMEN 8602 - Biomedical Engineering Seminar (1.0 cr)
Biology Electives
Additional courses may be approved by the Director of Graduate Studies.
Take 6 or more credit(s) from the following:
- BIOC 5216 - Current Topics in Signal Transduction (3.0 cr)
- BIOC 5021 - Biochemistry (3.0 cr)
- BIOC 5002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- BMEN 5444 [Inactive] (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- CGSC 8041 - Cognitive Neuroscience (4.0 cr)
- CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
- EEB 5371 - Principles of Systematics (3.0 cr)
- GCD 5036 - Molecular Cell Biology (3.0 cr)
- GCD 8103 - Human Histology (5.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8151 - Cell Structure and Function (3.0 cr)
- GCD 8161 - Advanced Developmental Biology (3.0 cr)
- MEDC 8760 - Design of Peptidomimetics (2.0 cr)
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- MICA 8003 - Immunology and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- MICA 8007 - Cell Biology and Biochemistry of the Extracellular Matrix (3.0 cr)
- MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
- NSC 5540 - Survey of Biomedical Neuroscience (2.0 cr)
- NSC 5561 - Systems Neuroscience (4.0 cr)
- NSC 5661W - Behavioral Neuroscience [WI] (3.0 cr)
- NSC 5667 - Neurobiology of Disease (2.0 - 3.0 cr)
- NSC 8211 - Developmental Neurobiology (3.0 cr)
- OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
- PSHL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
- PHSI 5115 - Clinical Physiology I (3.0 cr)
- PHSI 5116 - Clinical Physiology II (3.0 cr)
- PHSI 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
- PHSI 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)
- RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
- RSC 5281 - Scientific Foundations: Exercise Theory (3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)

Technical Electives
Additional courses may be approved by the Director of Graduate Studies.
Take 9 or more credit(s) from the following:
- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 5451 - Optimal Estimation (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
- AEM 8531 - Fracture Mechanics (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5101 - Advanced Biotechnology and Instrumentation (3.0 cr)
- BMEN 5111 - Biomedical Ultrasound (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
• BMEN 5411 - Neural Engineering (3.0 cr)
• BMEN 5412 - Neuromodulation (3.0 cr)
• BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
• BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
• BMEN 8001 - Polymeric Biomaterials (3.0 cr)
• BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
• BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
• BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
• BMEN 8401 - New Product Design and Business Development (4.0 cr)
• BMEN 8421 - Biophotonics (3.0 cr)
• BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
• BMEN 8502 - Physiological Control Systems (3.0 cr)
• BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
• CHEM 8021 - Computational Chemistry (4.0 cr)
• CHEM 8101 - Biomedical Engineering (3.0 cr)
• CHEM 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
• CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
• CHEM 8301 - Physical Rate Processes I: Transport (3.0 cr)
• CHEM 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
• CHEM 8754 - Systems Analysis of Biological Processes (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5511 - Artificial Intelligence I (3.0 cr)
• EE 5141 - Introduction to Microsystem Technology (4.0 cr)
• EE 5171 - Microelectronic Fabrication (4.0 cr)
• EE 5251 - Optimal Filtering and Estimation (3.0 cr)
• EE 5323 - VLSI Design I (3.0 cr)
• EE 5333 - Analog Integrated Circuit Design (3.0 cr)
• EE 5393 - Circuits, Computation, and Biology (3.0 cr)
• EE 5511 - Probability and Stochastic Processes (3.0 cr)
• EE 5621 - Physical Optics (3.0 cr)
• HINF 5430 - Health Informatics I (3.0 cr)
• HINF 5431 - Health Informatics II (3.0 cr)
• HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
• IE 5111 - Systems Engineering I (2.0 cr)
• IE 5112 - Introduction to Operations Research (3.0 cr)
• IE 5113 - Systems Engineering II (4.0 cr)
• IE 5511 - Human Factors and Work Analysis (4.0 cr)
• IE 5522 - Quality Engineering and Reliability (4.0 cr)
• IE 5541 - Project Management (4.0 cr)
• IE 5545 - Decision Analysis (4.0 cr)
• IE 5553 - Simulation (4.0 cr)
• MATH 5248 - Cryptology and Number Theory (4.0 cr)
• MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
• MATH 5447 - Theoretical Neuroscience (4.0 cr)
• MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
• MATH 8202 - General Algebra (3.0 cr)
• MATH 8253 - Algebraic Geometry (3.0 cr)
• MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
• MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
• MATS 8003 - Electronic Properties (3.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• ME 5241 - Computer-Aided Engineering (4.0 cr)
• ME 5243 - Advanced Mechanism Design (4.0 cr)
• ME 5247 - Stress Analysis, Sensing, and Transducers (4.0 cr)
• ME 5281 - Analog and Digital Control (4.0 cr)
• ME 5286 - Robotics (4.0 cr)
• ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
• ME 5351 - Computational Heat Transfer (4.0 cr)
• ME 8341 - Conduction (3.0 cr)
• ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
• MPHY 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
• NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
• PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
• PHYS 5402 - Radiological Physics (4.0 cr)
• PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
• RSC 5200 - Introduction to Transcranial Magnetic Stimulation (3.0 cr)
• RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
• RSC 8135 - Advanced Kinesiology (3.0 cr)
• RSC 8235 - Human Kinetics (3.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)

Free Electives
Additional courses may be approved by the DGS.
Take 6 or more credit(s) from the following:
• BMEN 8402 - New Product Design and Business Development (4.0 cr)
• BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
• BTHX 5120 - Dying in Contemporary Medical Culture (2.0 cr)
• BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
• BTHX 5300 - Foundations of Bioethics (3.0 cr)
• BTHX 8120 - Dying in Contemporary Medical Culture (2.0 cr)
• MILI 5589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MOT 5001 - Technological Business Fundamentals (2.0 cr)
• MOT 5002 - Creating Technological Innovation (2.0 cr)
• MOT 5003 - Technological Business Planning Workshop (1.0 cr)
• PDES 5701 - Creativity, Idea Generation, and Innovation (3.0 cr)
• PDES 5702 - Concept Sketching and Rendering (3.0 cr)
• PDES 5704 - Computer-Aided Design Methods (3.0 cr)
• PUBH 5200 - Drugs and the U.S. Healthcare System (3.0 cr)
• PHYS 5401 - Physiological Physics (4.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)
• PUBH 6414 - Biostatistical Literacy (3.0 cr)
• PUBH 7415 - Introduction to Clinical Trials (3.0 cr)
• RSC 5106 - Rehab Science: Past, Present, and Future (1.0 cr)
• Any course(s) from the BMEn Core, Biology Elective, and/or Technical Elective lists that are not being used toward another degree requirement.

Math-/Statistics-Intensive
Included in the Core and/or Elective coursework must be at least 6 credits designated as Math-/Statistics-Intensive. These are not additional credits but will overlap with coursework already satisfying the BMEn Core, Technical Elective, and/or Free Elective requirements.
Take 6 or more credit(s) from the following:
• AEM 5451 - Optimal Estimation (3.0 cr)
• AEM 5501 - Continuum Mechanics (3.0 cr)
• AEM 5503 - Theory of Elasticity (3.0 cr)
• AEM 8511 - Advanced Topics in Continuum Mechanics (3.0 cr)
• BMEN 5111 - Biomedical Ultrasound (3.0 cr)
• BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
• BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
• BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
• BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
• BMEN 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
• BMEN 8502 - Physiological Control Systems (3.0 cr)
• CHEN 8101 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
• CHEN 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
• CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
• CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
• EE 5251 - Optimal Filtering and Estimation (3.0 cr)
• EE 5531 - Probability and Stochastic Processes (3.0 cr)
• EE 5621 - Physical Optics (3.0 cr)
• IE 5522 - Quality Engineering and Reliability (4.0 cr)
• MATH 5248 - Cryptology and Number Theory (4.0 cr)
• MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
• MATH 5447 - Theoretical Neuroscience (4.0 cr)
• MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
• MATH 8202 - General Algebra (3.0 cr)
• MATH 8253 - Algebraic Geometry (3.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• ME 5351 - Computational Heat Transfer (4.0 cr)
• ME 8341 - Conduction (3.0 cr)
• ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
• PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam
BMEN 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Chemical Engineering M.Ch.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Chemical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

The master of chemical engineering (M.Ch.E.), also known as the professional master's, is designed for working professionals who are interested in obtaining a master's degree part-time. This degree requires a design project. Part-time students may also choose the M.S.Ch.E. Plan C, which is coursework only.

The CEMS department focuses on the PhD, and does not generally admit students directly to the M.S.Ch.E. Plan A degree, which is a thesis-based master's and is intended for current graduate students who choose not to seek a PhD.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or other related field.

Other requirements to be completed before admission:
This professional master of engineering degree is designed for employees of local industries who wish to pursue their studies part time. No financial support is available. Applicants should contact the program before applying for admission.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results.

Applications are accepted for fall semester only. January 1 is the application deadline; late applications are considered if space is available.
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

**Plan A:** Plan A requires 12 to 14 major credits, 6 to 8 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

The M.Ch.E. requires 20 course credits and 10 thesis credits. The course credits must include 12 credits in CHEN core courses, and a minimum of 6 credits outside the major. The remaining credits may be taken in the major or in any supporting field.

In addition to the coursework, M.Ch.E. students are required to complete a design project. The work-related M.Ch.E. design project consists of an in-depth study of an engineering design. It need not represent a publishable research project. While the amount of work should be the same as for a master's thesis, the project can contain elements that the thesis would not, such as economic considerations, design consultation, and social relevance. The written design report must be approved by a three-person faculty committee. The final exam consists of the written design report and an oral presentation to the faculty committee.

#### Core Courses

Take 4 or more course(s) from the following:

- **CHEN 8101** - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
- **CHEN 8201** - Applied Mathematics I: Linear Analysis (3.0 cr)
- **CHEN 8301** - Physical Rate Processes I: Transport (3.0 cr)
- **CHEN 8401** - Physical and Chemical Thermodynamics (3.0 cr)
- **CHEN 8402** - Statistical Thermodynamics and Kinetics (3.0 cr)
- **CHEN 8501** - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

#### Thesis Credits

10 thesis credits are required for the design project.

**CHEN 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)

#### Electives

The remaining course credits may be chosen from the following list, or consult with advisor for further options.

- **AEM 5321** - Modern Feedback Control (3.0 cr)
- **AEM 5501** - Continuum Mechanics (3.0 cr)
- **AEM 5503** - Theory of Elasticity (3.0 cr)
- **AEM 8201** - Fluid Mechanics I (3.0 cr)
- **AEM 8202** - Fluid Mechanics II (3.0 cr)
- **AEM 8203** - Fluid Mechanics III (3.0 cr)
- **AEM 8251** - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- **AEM 8421** - Robust Multivariable Control Design (3.0 cr)
- **AEM 8541** - Mechanics of Crystalline Solids (3.0 cr)
- **BIOC 4332** - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>CEGE 8504</td>
<td>Theory of Unit Operations</td>
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<td>CHEM 5210</td>
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<td>CHEM 8011</td>
<td>Mechanisms of Chemical Reactions</td>
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<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics I</td>
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<td>Polymers</td>
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<td>Survey of Renewable Energy Technologies</td>
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<td>CHEN 5751</td>
<td>Biochemical Engineering</td>
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<td>CHEN 5753</td>
<td>Biological Transport Processes</td>
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<td>Principles and Applications of Rheology</td>
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<td>CHEN 8104</td>
<td>Coating Process Fundamentals</td>
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<td>CHEN 8754</td>
<td>Systems Analysis of Biological Processes</td>
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<td>EE 5163</td>
<td>Semiconductor Properties and Devices I</td>
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<tr>
<td>EE 5164</td>
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<td>EE 5181</td>
<td>Introduction to Nanotechnology</td>
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<td>EE 5231</td>
<td>Linear Systems and Optimal Control</td>
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<td>EE 5239</td>
<td>Introduction to Nonlinear Optimization</td>
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<td>EE 5657</td>
<td>Physical Principles of Thin Film Technology [WI]</td>
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<td>EE 8161</td>
<td>Physics of Semiconductors</td>
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<td>GCD 4034</td>
<td>Molecular Genetics</td>
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<td>GCD 8151</td>
<td>Cell Structure and Function</td>
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<td>GCD 8161</td>
<td>Advanced Developmental Biology</td>
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<td>Differential Equations with Applications</td>
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<td>Introduction to Numerical Methods I</td>
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<td>MATH 5525</td>
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<td>Elementary Partial Differential Equations I</td>
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<td>Polymers</td>
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<td>Electron Microscopy</td>
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MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences (1.0 - 3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5701 - Science and State (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy and Environmental Policy (3.0 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Special Topics Electives
The following electives are topics courses. Only the approved topic titles below may be used.
AEM 8511 Advanced Topics in Continuum Mechanics - Problems in Materials Science
EE 5940 Special Topics - Infrared Technology and Environmental Sensing
Math 8450 Topics in Numerical Analysis - Applications of Continuum Mechanics in Biology
Mats 8995 Special Topics - Scattering from Soft Materials
Twin Cities Campus
Chemical Engineering M.S.Ch.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Ave SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Chemical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The CEMS Department offers two types of master's degrees: the MSChE (Plan A or C) and the MChE degree, also known as the professional master's. The MSChE Plan A degree is a thesis-based master's and is generally reserved only for current graduate students who choose not to seek a PhD. Working professionals who are interested in obtaining a master's degree part time should follow the requirements for the MChE degree, which requires a design project, or the MSChE Plan C, which is coursework only.

Research activities in CEMS focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or other related field.

Other requirements to be completed before admission:
With the exception of the professional master's degree (the MChE) and the MSChE Plan C, the CEMS Department focuses on the PhD and does not generally admit students directly to the MSChE Plan A degree.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results.

Applications are accepted for fall semester only. January 1 is the application deadline; late applications are considered if space is available. More information is available at http://www.cems.umn.edu/graduate/admissions
Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 12 to 14 major credits, 6 to 8 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan C:** Plan C requires 12 to 18 major credits and 12 to 18 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

**Core Courses**

Take 4 or more course(s) from the following:
- CHEN 8101 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
- CHEN 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
- CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
- CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

**Plan A**

Plan A requires 12 credits in the major, 6 credits outside the major, and 10 thesis credits. The remaining course credits may be taken in the major or in any supporting field.

CHEN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan C**

Plan C requires 12 credits in the major and a minimum of 12 credits outside the major. The remaining 6 credits may be taken in the major or in any supporting field.

**Electives**

The remaining credits may be chosen from the following list or consult with advisor for further options.
- CHEN 4214 - Polymers (3.0 cr)
- CHEN 5551 - Survey of Renewable Energy Technologies (3.0 cr)
- CHEN 5751 - Biochemical Engineering (3.0 cr)
- CHEN 5753 - Biological Transport Processes (3.0 - 4.0 cr)
- CHEN 8102 - Principles and Applications of Rheology (2.0 cr)
- CHEN 8104 - Coating Process Fundamentals (2.0 cr)
- CHEN 8221 - Synthetic Polymer Chemistry (4.0 cr)
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
- AEM 5321 - Modern Feedback Control (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
AEM 8203 - Fluid Mechanics III (3.0 cr)
AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 9421 - Robust Multivariable Control Design (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOC 6021 - Biochemistry (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 8551 - Systems and Synthetic Biology (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8151 - Analytical Separations and Chemical Equilibria (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8211 - Physical Polymer Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5181 - Introduction to Nanotechnology (4.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology [WI] (4.0 cr)
EE 8161 - Physics of Semiconductors (3.0 cr)
GCD 4034 - Molecular Genetics (3.0 cr)
GCD 8151 - Cell Structure and Function (3.0 cr)
GCD 8161 - Advanced Developmental Biology (3.0 cr)
MATS 4212 - Ceramics (3.0 cr)
MATS 4214 - Polymers (3.0 cr)
MATS 4223W - Polymer Laboratory [WI] (2.0 cr)
MATS 5517 - Electron Microscopy (3.0 cr)
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
MATH 4428 - Mathematical Modeling (4.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
ME 5113 - Aerosol/Particle Engineering (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences (1.0 - 3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5701 - Science and State (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy and Environmental Policy (3.0 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

**Special Topics Electives**

The following electives are topics courses. Only the approved topic titles below may be used.

AEM 8511 Advanced Topics in Continuum Mechanics - Problems in Materials Science
EE 5940 Special Topics - Infrared Technology and Environmental Sensing
Math 8450 Topics in Numerical Analysis - Applications of Continuum Mechanics in Biology
Mats 8995 Special Topics - Scattering from Soft Materials
**Twin Cities Campus**

**Chemical Engineering Minor**

*Chemical Engineering & Materials Science*

**College of Science and Engineering**

Link to a [list of faculty](#) for this program.

**Contact Information:**

Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Ave SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)

Email: cemsgrad@umn.edu

Website: [http://www.cems.umn.edu](http://www.cems.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

Use of 4xxx courses towards program requirements is not permitted.

Minor programs must be approved by the director of Graduate Studies in Chemical Engineering.

**Program Sub-plans**

Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

**Doctoral**

**Core Courses**
Take 4 or more course(s) totaling 12 or more credit(s) from the following:
- CHEN 8101 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
- CHEN 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
- CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
- CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

Masters
Core Courses
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
- CHEN 8101 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
- CHEN 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
- CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
- CHEN 8401 - Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
Twin Cities Campus

Chemical Engineering Ph.D.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or related field.

Other requirements to be completed before admission:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results.

Special Application Requirements:
Applications are accepted for fall semester only. Submission of all application materials by January 1 is strongly encouraged to ensure priority consideration for fellowships and assistantships; late applications are considered if space is available. More information is available at http://www.cems.umn.edu/graduate/admissions

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
Program Requirements
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires 33 course credits and 24 thesis credits. The course credits must include 12 credits in CHEN core courses and a minimum of 12 credits outside the major. The remaining 9 credits may be taken in the major or in any supporting field.

Students must attend, but not enroll in, the departmental seminar for six semesters. Informal attendance will be done within the department.

Core Courses
Take 4 or more course(s) from the following:
- CHEN 8101: Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
- CHEN 8201: Applied Mathematics I: Linear Analysis (3.0 cr)
- CHEN 8301: Physical Rate Processes I: Transport (3.0 cr)
- CHEN 8401: Physical and Chemical Thermodynamics (3.0 cr)
- CHEN 8402: Statistical Thermodynamics and Kinetics (3.0 cr)
- CHEN 8501: Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam.
CHEN 8888: Thesis Credit: Doctoral (1.0 - 24.0 cr)

Electives
The remaining credits may be chosen from this list or consult with advisor for further options.
AEM 5321: Modern Feedback Control (3.0 cr)
AEM 5501: Continuum Mechanics (3.0 cr)
AEM 5503: Theory of Elasticity (3.0 cr)
AEM 8201: Fluid Mechanics I (3.0 cr)
AEM 8202: Fluid Mechanics II (3.0 cr)
AEM 8203: Fluid Mechanics III (3.0 cr)
AEM 8251: Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 8421: Robust Multivariable Control Design (3.0 cr)
AEM 8541: Mechanics of Crystalline Solids (3.0 cr)
BIOC 4332: Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
BIOC 5528: Spectroscopy and Kinetics (4.0 cr)
BIOC 6021: Biochemistry (3.0 cr)
BIOC 8002: Molecular Biology and Regulation of Biological Processes (3.0 cr)
BMEN 5001: Advanced Biomaterials (3.0 cr)
BMEN 5201: Advanced Biomechanics (3.0 cr)
BMEN 5311: Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5351: Cell Engineering (3.0 cr)
BMEN 5501: Biology for Biomedical Engineers (3.0 cr)
BMEN 8511: Systems and Synthetic Biology (3.0 cr)
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ME 5446 - Introduction to Combustion (4.0 cr)
ME 8341 - Conduction (3.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences (1.0 - 3.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5701 - Science and State (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy and Environmental Policy (3.0 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Special Topics Electives
The following electives are topics courses. Only the approved topic titles below may be used.
AEM 8511 Advanced Topics in Continuum Mechanics - Problems in Materials Science
EE 5940 Special Topics - Infrared Technology and Environmental Sensing
Mats 8995 Special Topics - Scattering from Soft Materials
Math 8450 Topics in Numerical Analysis - Applications of Continuum Mechanics in Biology
Twin Cities Campus
Chemical Physics M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://chem.umn.edu/academics/graduate/chemical-physics

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on research areas where the techniques of chemistry and physics are combined for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, optical properties, laser applications, molecular collisions, chemical dynamics, quantum mechanics, computational chemistry, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, biochemistry, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate degree in chemistry, physics or a related field is required for admission. The preferred minimum undergraduate GPA for admittance to the program is 3.2.

Other requirements to be completed before admission:
Prospective graduate students should have adequate undergraduate preparation in chemistry, physics and mathematics.

Three letters of recommendation and scores from the GRE general test are required for all applications. In addition, international applicants are expected to provide scores of at least 587 (paper), 240 (computer), or 95 (Internet) on the TOEFL.

A Subject GRE score is not required but if available will help the admission committee to make better decisions, in particular in cases where undergraduate transcripts are more difficult to evaluate (which is especially true for international applicants, who are strongly encouraged to submit the GRE subject score). The Subject GRE can be taken in Chemistry, Physics, or a related discipline.

Special Application Requirements:
Applications for fall semester must be completed by December 15 in order to be considered for financial support. Applications received after December 15 will be reviewed on a space available basis. The department prefers to admit for fall semester and will only consider spring admission under extenuating circumstances. More application information is available at www.chem.umn.edu/chemphys

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
- IELTS
  - Total Score: 7
• MELAB
  - Final score: 83

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: Each Plan B project should involve a combined total of approximately 160 hours (the equivalent of four full-time weeks) of library research, reading, and/or writing resulting in the preparation of a significant written document. Students who plan to work on Plan B projects independent of the Preliminary Examination should present a plan, after consultation with the chosen instructor for the Plan B project, outlining the number and content of their projects to the director of Graduate Studies. Projects should be completed to the satisfaction of the instructor; the final grade is determined by the instructor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students are expected to pass a proficiency exam in physical chemistry during their first academic year in residence.

The MS degree requires a minimum of 30 credits and is offered under Plan A (thesis) and Plan B (project). The course credits must include at least 6 credits each in chemistry (CHEM) and physics (PHYS) or at least 3 credits each in quantum mechanics, thermodynamics, and statistical mechanics.

All first-year students must register for CHPH 8601 during both fall and spring semesters and for CHEM 8066 during the spring semester of their first year in residence.

Required Courses

Any CHPH, CHEM, and PHYS courses at the 5xxx or 8xxx level may be used to satisfy degree requirements. Up to 8 credits in 4xxx-level courses may be used with approval from the director of Graduate Studies.

Students may count one credit each of the following towards the degree.

CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
CHPH 8601 - Seminar: Modern Problems in Chemical Physics (1.0 cr)

Plan A

Plan A requires 20 course credits and 10 thesis credits.

CHPH 8777 - Thesis Credits: Master’s (1.0 - 18.0 cr)

Plan B

Plan B requires 30 credits of coursework, including 8 credits in the two Plan B project courses.

CHPH 8081 - M.S. Plan B Project I (4.0 cr)
CHPH 8082 - M.S. Plan B Project II (4.0 cr)
Twin Cities Campus
Chemical Physics Minor
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, University of Minnesota, 137 Smith Hall, 207 Pleasant Street SE, Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://chem.umn.edu/academics/graduate/chemical-physics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on research areas where the techniques of chemistry and physics are combined for the study of atoms and molecules; their interactions in gases, liquids, and solids, and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, optical properties, laser applications, molecular collisions, chemical dynamics, quantum mechanics, computational chemistry, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, biochemistry, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor field coursework, determined by the Chemical Physics director of Graduate Studies, student, and advisor, may include any 5xxx- or 8xxx-level CHPH, CHEM, or PHYS courses taken on the A-F grading basis.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
The master's minor requires a minimum of 3 credits each in chemistry (CHEM) and physics (PHYS).

Doctoral
The doctoral minor requires a minimum of 6 credits each in chemistry (CHEM) and physics (PHYS).
Twin Cities Campus
Chemical Physics Ph.D.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://chem.umn.edu/academics/graduate/chemical-physics

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on research areas where the techniques of chemistry and physics are combined for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, optical properties, laser applications, molecular collisions, chemical dynamics, quantum mechanics, computational chemistry, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, biochemistry, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
  - via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate degree in chemistry, physics, or a related field is required for admission. The preferred minimum undergraduate GPA for admittance to the program is 3.2

Other requirements to be completed before admission:
Prospective graduate students should have adequate undergraduate preparation in chemistry, physics and mathematics.

Three letters of recommendation and scores from the GRE general test are required for all applications. In addition, international applicants are expected to provide scores of at least 587 (paper), 240 (computer), or 95 (Internet) on the TOEFL.

A Subject GRE score is not required but if available will help the admission committee to make better decisions, in particular in cases where undergraduate transcripts are more difficult to evaluate (which is especially true for international applicants, who are strongly encouraged to submit the GRE subject score). The Subject GRE can be taken in chemistry, physics, or a related discipline.

Special Application Requirements:
Applications for fall semester must be completed by December 15 in order to be considered for financial support. Applications received after December 15 will be reviewed on a space available basis. The program prefers to admit for fall semester and will only consider spring admission under extenuating circumstances. More application information is available at www.chem.umn.edu/chemphys

Applicants must submit their test score(s) from the following:
  - GRE

International applicants must submit score(s) from one of the following tests:
  - TOEFL
    - Internet Based - Total Score: 95
    - Internet Based - Speaking Score: 23
  - IELTS
    - Total Score: 7
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students are expected to pass a proficiency exam in physical chemistry during their first academic year in residence.

Each first-year chemical physics student will choose a program of study in consultation with his or her TMC (three-member committee).

The 24 course credits required must include either:

(a) at least 5 credits in chemistry (CHEM) and at least 5 credits in physics (PHYS), or
(b) at least 16 credits in chemistry and/or physics combined, including at least 5 credits of quantum mechanics and at least 5 credits chosen from among the areas of thermodynamics, statistical mechanics, statistical physics, and chemical dynamics.

All first-year students must register for CHPH 8601 during both fall and spring semesters and for CHEM 8066 during the spring semester of their first year in residence.

Required Courses
Any CHPH, CHEM, and PHYS courses at the 5xxx or 8xxx level may be used to satisfy degree requirements. Up to 8 credits in 4xxx-level courses may be used with approval from the director of Graduate Studies.

Students may count 1 credit each of the following towards the degree.

- CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
- CHPH 8601 - Seminar: Modern Problems in Chemical Physics (1.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam.

CHPH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Chemistry M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While modern research in chemistry is very interdisciplinary, graduate work in the Department of Chemistry falls broadly into the focus areas of analytical chemistry, chemical biology, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, polymer chemistry, experimental physical chemistry, and computational chemistry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate degree in chemistry or a related field is required for admission. The preferred minimum undergraduate GPA for admittance to the program is 3.20.

Other requirements to be completed before admission:
Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry that are required of undergraduate majors in the University of Minnesota chemistry curriculum. They must also have at least one year of college physics, plus college mathematics through calculus.

Three letters of recommendation and scores from the GRE general test are required for all applications. International applicants are expected to provide scores of at least 587 (paper), 240 (computer), or 95 (Internet) on the TOEFL, as well as GRE scores.

A Subject GRE score is not required but if available will help the admission committee to make better decisions, in particular in cases where undergraduate transcripts are more difficult to evaluate (which is especially true for international applicants, who are strongly encouraged to submit the GRE subject score). The Subject GRE can be taken in Chemistry or a related discipline.

Special Application Requirements:
Applications for fall semester must be completed by December 15 in order to be considered for fellowship support and teaching and research assistantships. Applications received after December 15 will be reviewed on a space available basis. The department prefers to admit for fall semester and will only consider spring admission under extenuating circumstances. More application information is available at http://www.chem.umn.edu/grad/GradProspective.html

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
IELTS Total Score: 7
MELAB Final score: 83

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: Each Plan B project should involve a combined total of approximately 160 hours (the equivalent of four full-time weeks) of library research, reading, and/or writing resulting in the preparation of a significant written document. Students who plan to work on Plan B projects independent of the Preliminary Examination should present a plan, after consultation with the chosen instructor for the Plan B project, outlining the number and content of their projects to the director of Graduate Studies. Projects should be completed to the satisfaction of the instructor; the final grade is determined by the instructor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

M.S. students are expected to pass a proficiency exam during their first academic year in residence.

All first-year students must register for CHEM 8601 during both fall and spring semesters and for CHEM 8066 during the spring semester of their first year in residence.

All CHEM courses must be taken at the 5xxx or 8xxx level. Up to 8 credits in 4xxx-level courses from another department may be used with approval from the director of Graduate Studies.

Required Courses

Any 5xxx-level CHEM course can be used to satisfy degree requirements. Chem 5210 and 5755 will be accepted or consult with advisor for further 5xxx level course options.

- CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
- CHEM 8601 - Seminar: Modern Problems in Chemistry (1.0 cr)

Plan A

Plan A requires 20 course credits and 10 thesis credits.

- CHEM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B

Plan B requires 30 credits of coursework, including 8 credits in the two Plan B project courses.

- CHEM 8081 - M.S. Plan B Project I (1.0 - 4.0 cr)
- CHEM 8082 - M.S. Plan B Project II (1.0 - 4.0 cr)
Twin Cities Campus

Chemistry Minor

Chemistry

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While modern research in chemistry is very interdisciplinary, graduate work in the Department of Chemistry falls broadly into the focus areas of analytical chemistry, chemical biology, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, polymer chemistry, experimental physical chemistry, and computational chemistry.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Courses
Any 8xxx-level CHEM course taken on the A-F grading basis will satisfy the requirements for the minor. The following 5xxx-level courses will be accepted. Consult with the chemistry director of Graduate Studies for further options.
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Six credits from CHEM courses at the 5xxx- or 8xxx-level are required.

Doctoral
Twelve credits from CHEM courses at the 5xxx- or 8xxx-level are required.
Twin Cities Campus
Chemistry Ph.D.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant St SE, Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While modern research in chemistry is very interdisciplinary, graduate work in the Department of Chemistry falls broadly into the focus areas of analytical chemistry, chemical biology, environmental chemistry, inorganic chemistry, materials chemistry, organic chemistry, polymer chemistry, experimental physical chemistry, and computational chemistry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate degree in chemistry or a related field is required for admission. The preferred minimum undergraduate GPA for admittance to the program is 3.20.

Other requirements to be completed before admission:
Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry that are required of undergraduate majors in the University of Minnesota chemistry curriculum. They must also have at least one year of college physics, plus college mathematics through calculus.

Three letters of recommendation and scores from the GRE general test are required for all applications. International applicants are expected to provide scores of at least 587 (paper), 240 (computer), or 95 (Internet) on the TOEFL, as well as GRE scores.

A Subject GRE score is not required but if available will help the admission committee to make better decisions, in particular in cases where undergraduate transcripts are more difficult to evaluate (which is especially true for international applicants, who are strongly encouraged to submit the GRE subject score). The subject GRE can be taken in chemistry or a related discipline.

Special Application Requirements:
Applications for fall semester must be completed by December 15 in order to be considered for fellowship support and teaching and research assistantships. Applications received after December 15 will be reviewed on a space available basis. The department prefers to admit for fall semester and will only consider spring admission under extenuating circumstances. More application information is available at http://www.chem.umn.edu/grad/GradProspective.html

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Internet Based - Speaking Score: 23
IELTS
- Total Score: 7

MELAB
- Final score: 83

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students in the PhD program are expected to pass four of five proficiency examinations during their first year in residence. The exams, which are at the level of an advanced undergraduate course, are in analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry. The exams are given during the chemistry first-year orientation program in August. In the event that a student does not pass the first exam, the exams are offered two more times during the academic year.

A minimum GPA of 3.00, 18 credits of coursework with a grade of B- or better, and passing grades on all four proficiency exams are required for students to remain in good standing.

All first-year students must register for CHEM 8601 during both fall and spring semesters and for CHEM 8066 during the spring semester of their first year in residence.

All CHEM courses must be taken at the 5xxx or 8xxx level. Up to 8 credits in 4xxx-level courses from another department may be used with approval from the director of Graduate Studies.

Required Courses
Any 8xxx-level CHEM course can be used to satisfy degree requirements. CHEM 5210 and 5755 will be accepted or consult with advisor for other 5xxx-level course options.

Students may count one credit each of the following towards the degree.

CHEM 8066 - Professional Conduct of Chemical Research (1.0 cr)
CHEM 8601 - Seminar: Modern Problems in Chemistry (1.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam.

CHEM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Civil Engineering M.C.E.
CSENG Civil, Envirn & Geo-Eng (CEGE)

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cgeps@umn.edu
Website: http://www.cege.umn.edu

Program Type: Master's
Requirements for this program are current for Fall 2016
Length of program in credits: 30
This program does not require summer semesters for timely completion.
Degree: Master of Civil Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

The master of civil engineering (M.C.E.) degree is designed for the practicing engineer who would like to obtain an advanced degree on a part-time or full-time basis. Students who intend to proceed to the Ph.D. program or who think they may later wish to be admitted to the Ph.D. program should apply for the master of science program. The master of civil engineering degree is selected with the help of a faculty adviser and approved by the director of graduate studies. Students are expected to follow a coherent program of coursework in one of the following subareas of civil engineering: environmental, geomechanics, structural, transportation, or water resources engineering. The program is selected with the help of a faculty adviser and approved by the director of graduate studies. In addition to completing graduate-level courses, students must demonstrate professional competence either by carrying out and defending a design project or by taking a coursework-related final oral exam (without a project).

The degree typically takes 2-3 semesters (12-18 months) to complete on a full-time basis or 6-8 semesters on a part-time basis.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An ABET-accredited, four-year bachelor's degree in engineering is required for admission.

Other requirements to be completed before admission:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application. Additional information is available at http://www.cege.umn.edu/prospective/graduate/how-to-apply.html

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  - IELTS
    - Total Score: 6.5
  - MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.C.E. degree requires 30 credits and is offered under two plans. Plan A requires preparation of a thesis/design project. The thesis/design project must be carried out by the student in consultation with a faculty adviser. Plan C is a coursework-only degree program.

Required Courses

Any courses at the 5xxx and 8xxx level from the following programs may be used: AEM, AST, BBE, BMEN, CEGE, CHEM, CHEN, CSCI, EE, ESCI, IE, MATH, MATS, ME, PHYS, STAT. Use of 4xxx level courses must be approved by the Director of Graduate Studies and a maximum of 8 credits may be included. The following 4xxx courses may not be used: CEGE 4301, 4401, 4501, 4502, and 4522. Six credits in a minor may be included in the course credit total.

Seminar

Students may include one seminar credit in the course credit total.

CEGE 8200 - Seminar: Transportation (1.0 cr)
or CEGE 8300 - Seminar: Geomechanics (1.0 - 3.0 cr)
or CEGE 8400 - Seminar: Structures (1.0 cr)
or CEGE 8500 - Environmental Seminar (1.0 cr)

Plan A

Plan A requires a minimum of 20 course credits and 10 thesis credits for the design project.

CEGE 8777 - Thesis Credits: Master’s (1.0 - 18.0 cr)

Plan C

Plan C requires a minimum of 30 credits of coursework chosen in consultation with adviser.
Twin Cities Campus
Civil Engineering M.S.
CSENG Civil, Envirn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesp@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

The master of science (M.S.) degree balances education in engineering fundamentals and design, and provides preparation for students wishing to pursue a career in industry, as well as those wanting to continue studies toward a Ph.D. degree. Programs range from the Plan C, which is a coursework-only program, to the Plan A, which balances coursework with research and development. The Plan C program is intended for practicing engineers who want to pursue a degree on a part-time basis, self-funded full-time students, as well as students who plan to continue on for a Ph.D. degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in an engineering, basic science, or mathematics program is preferred.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack civil engineering training are often required to complete one or more appropriate courses from the undergraduate civil engineering program. Graduate credit is not awarded for such preparatory work.

Special Application Requirements:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application. Additional information is available at http://www.cege.umn.edu/prospective/graduate/how-to-apply.html

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral.

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. requires at least 30 credits and is offered under three plans. Plan A emphasizes research and preparation of a thesis; Plan B emphasizes coursework and a project; Plan C is coursework only. The Plan A thesis is written on a research project carried out in consultation with a faculty adviser. Under Plan B, students complete one to three Plan B papers as determined by the faculty adviser. Plan B papers can include computer programs, annotated bibliographies, field investigations, and analysis/design of special engineering problems. A program typically takes 18 to 24 months to complete.

Required Courses
Any courses at the 5xxx and 8xxx level from the following programs may be used: AEM, AST, BBE, BMEN, CEGE, CHEM, CHEN, CSCI, EE, ESCI, IE, MATH, MATS, ME, PHYS, STAT. Use of 4xxx level courses must be approved by the Director of Graduate Studies and a maximum of 8 credits may be included. The following 4xxx courses may not be used: CEGE 4301, 4401, 4501, 4502, and 4522. Six credits in a minor may be included in the course credit total.

Seminar
Students may count one seminar credit towards the course credit requirement.
CEGE 8200 - Seminar: Transportation (1.0 cr)
or CEGE 8300 - Seminar: Geomechanics (1.0 - 3.0 cr)
or CEGE 8400 - Seminar: Structures (1.0 cr)
or CEGE 8500 - Environmental Seminar (1.0 cr)

Plan A
Plan A requires a minimum of 20 course credits and 10 thesis credits.
CEGE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Plan B requires a minimum of 30 credits, which includes at least 27 course credits and a maximum of 3 credits of CEGE 8094 for the Plan B project.
CEGE 8094 - Civil Engineering Research (1.0 - 4.0 cr)

Plan C
Plan C requires 30 course credits and must include at least 2 courses at the 8xxx-level. Students must also complete 100 hours of project work, give an oral presentation of no less than 10 minutes, and complete two hours of ethics training.

Joint- or Dual-degree Coursework:
Dual Master's Degree in Civil Engineering and Industrial and Systems Engineering (Transportation Engineering Focus): Student may take a total of 15 credits in common among the academic programs. Dual Master's Degree in Civil Engineering and Urban and Regional Planning (Transportation or Environmental Engineering Focus): Student may take a total of 18
credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Integrated B.C.E./M.S. - Civil Engineering
The department offers an integrated Bachelor of Civil Engineering (B.C.E.) and Master of Science (M.S.) in Civil Engineering. The integrated B.C.E./M.S. program offers students the opportunity to earn a bachelor's degree and a master's degree in five years. These programs offer several benefits: streamlined admissions from the undergraduate to the graduate program (GRE not required); flexibility in fulfilling required courses for both degrees during the senior year (up to 16 credits can be transferred to the graduate program); and eligibility for teaching and research assistantships.

Both the B.C.E. and M.S. degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the M.S. degree are permitted to count credits originally planned for the graduate program toward their B.C.E. technical electives.

Eligibility Requirements:
Application to the Combined Program is open to civil engineering undergraduates who:
- are within 32 credits of completing the requirements for the bachelors degree;
- have a faculty advisor selected prior to admission; and
- hold a cumulative GPA of 3.3 or higher.

Integrated B.GeoE./M.S. - Civil Engineering
The department offers an integrated Bachelor of Geoengineering (B.GeoE.) and Master of Science (M.S.) in Civil Engineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the B.C.E./M.S. integrated program also apply to the B.GeoE./M.S.

Integrated B.Env.E./M.S. - Civil Engineering
The department offers an integrated Bachelor of Environmental Engineering (B.Env.E.) and Master of Science (M.S.) in Civil Engineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the B.C.E./M.S. integrated program also apply to the B.Env.E./M.S.
Twin Cities Campus

Civil Engineering Minor
CSENG Civil, Envrn & Geo-Eng (CEGE)

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor courses should be chosen from one of the following subareas.

Transportation Engineering
CEGE 52xx
CEGE 82XX

Geomechanics
CEGE 53xx
CEGE 83xx

Structural Engineering
CEGE 54xx
CEGE 84xx

Environmental/Water Resources Engineering
CEGE 55xx
CEGE 85xx
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
For a master's minor, two or more 5xxx or 8xxx level courses from the same subarea of civil engineering are required, for a total of 6 or more credits.

Doctoral
For the doctoral minor, four or more 5xxx or 8xxx level courses from one or two subareas of civil engineering are required for a total of 12 or more credits.
Twin Cities Campus
Civil Engineering Ph.D.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

The Ph.D. degree couples independent research with coursework in a comprehensive program for those wishing to attain mastery of their field. The Ph.D. degree demands the ability and desire to pursue independent and original studies and can be earned with emphasis in environmental, geomechanics, structural, transportation, or water resources engineering. Research performance, as judged by preparation of a dissertation on an independently pursued research topic, is the primary requirement for the Ph.D. degree.

Students enter the Ph.D. program two to four years following the bachelor's degree, normally after completing the M.S. degree. The Ph.D. program is typically completed in four to six years following the bachelor's degree. Each program of study is designed in consultation with a faculty adviser to meet the special needs of the student, although programs must be approved by the director of graduate studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor’s degree in an engineering, basic science, or mathematics program is preferred.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack civil engineering training are often required to complete one or more appropriate courses from the undergraduate civil engineering program. Graduate credit is not awarded for such preparatory work.

Special Application Requirements:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application. Additional information is available at http://www.cege.umn.edu/prospective/graduate/how-to-apply.html

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

36 credits are required in the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

A typical program consists of 36 credits of coursework beyond the bachelor's degree, plus 24 thesis credits. Credits earned in a M.S. program may be presented in partial fulfillment of the Ph.D. requirements. Rigid requirements for the number of 8xxx courses appropriate for Ph.D. programs have not been set; nonetheless, the Ph.D. represents the highest level of scholarly achievement and coursework should be selected accordingly.

**Required Courses**

Any courses at the 5xxx and 8xxx level from the following programs may be used: AEM, AST, BBE, BMEN, CEGE, CHEM, CHEN, CSCI, EE, ESCI, IE, MATH, MATS, ME, PHYS, STAT. Use of 4xxx level courses must be approved by the Director of Graduate Studies and a maximum of 8 credits may be included. The following 4xxx courses may not be used: CEGE 4301, 4401, 4501, 4502, and 4522. The 36 course credits may include 12 credits in a minor.

**Seminar**

Students may count up to two seminar credits for the Ph.D. program in the 36-credit total.

- CEGE 8200 - Seminar: Transportation (1.0 cr)
- or CEGE 8300 - Seminar: Geomechanics (1.0 - 3.0 cr)
- or CEGE 8400 - Seminar: Structures (1.0 cr)
- or CEGE 8500 - Environmental Seminar (1.0 cr)

**Thesis Credits**

Take 24 credits after passing preliminary oral exam

- CEGE 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus

Computer Science M.C.S.

Computer Science and Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Computer Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the M.C.S., a coursework-only degree that is intended to be a terminal degree.

The department also offers the M.S. (Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects) and the Ph.D. In addition, the department supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation, and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a undergraduate or graduate degree in a major with a substantial background in computer science & engineering.

Other requirements to be completed before admission:
The program requires all applicants to complete the department's online application as well as the University's online application. The names and email addresses of three recommenders are required; they will be asked to upload their letters of recommendation to the CS&E online application only. The department only accepts students for fall admission; the application deadline is April 1. Additional information is available at https://www.cs.umn.edu/admissions/graduate/mcs

Special Application Requirements:
Applicants with an inadequate background must resolve any deficiencies before applying to the program.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 31 major credits and 0 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.C.S. is a coursework-only degree requiring 31 course credits. At least 16 credits must be in computer science courses, including one course from each of the 3 breadth areas: theory, systems, and applications (9 credits); and 1 credit of colloquium (CSCI 8970). At least 6 credits must be in computer science 8xxx-level courses, in addition to the colloquium. The remaining 15 course credits may be taken in the major field or any supporting field.

All major courses must be taken on the A-F grading option and students must maintain a GPA above 3.00 after completing 8 credits.

Breadth Courses

Take one course from each subject area.

Applications
  Take 1 or more course(s) from the following:
  • CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
  • CSCI 5125 - Collaborative and Social Computing (3.0 cr)
  • CSCI 5271 - Introduction to Computer Security (3.0 cr)
  • CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
  • CSCI 5471 - Modern Cryptography (3.0 cr)
  • CSCI 5511 - Artificial Intelligence I (3.0 cr)
  • CSCI 5512 - Artificial Intelligence II (3.0 cr)
  • CSCI 5521 - Introduction to Machine Learning (3.0 cr)
  • CSCI 5523 - Introduction to Data Mining (3.0 cr)
  • CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
  • CSCI 5561 - Computer Vision (3.0 cr)
  • CSCI 5607 - Fundamentals of Computer Graphics 1 (3.0 cr)
  • CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
  • CSCI 5609 - Visualization (3.0 cr)
  • CSCI 5611 - Animation & Planning in Games (3.0 cr)
  • CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
  • CSCI 5707 - Principles of Database Systems (3.0 cr)

Architecture, Systems and Software

Take 1 or more course(s) from the following:
  • CSCI 5103 - Operating Systems (3.0 cr)
  • CSCI 5106 - Programming Languages (3.0 cr)
  • CSCI 5161 - Introduction to Compilers (3.0 cr)
  • CSCI 5204 - Advanced Computer Architecture (3.0 cr)
  • CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
  • CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
  • CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)

Theory and Algorithms
Take 1 or more course(s) from the following:
• CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
• CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
• CSCI 5403 - Computational Complexity (3.0 cr)
• CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5525 - Machine Learning (3.0 cr)

Colloquium Credits
Take 1 credit of CS colloquium
CSCI 8970 - Computer Science Colloquium (1.0 cr)

Computer Science Courses
Students may choose additional coursework from this list or consult with their adviser for further options.
Take 0 or more credit(s) from the following:
• CSCI 5103 - Operating Systems (3.0 cr)
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5106 - Programming Languages (3.0 cr)
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
• CSCI 5161 - Introduction to Compilers (3.0 cr)
• CSCI 5204 - Advanced Computer Architecture (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5271 - Introduction to Computer Security (3.0 cr)
• CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
• CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
• CSCI 5403 - Computational Complexity (3.0 cr)
• CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5511 - Artificial Intelligence I (3.0 cr)
• CSCI 5512 - Artificial Intelligence II (3.0 cr)
• CSCI 5521 - Introduction to Machine Learning (3.0 cr)
• CSCI 5523 - Introduction to Data Mining (3.0 cr)
• CSCI 5525 - Machine Learning (3.0 cr)
• CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
• CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
• CSCI 5561 - Computer Vision (3.0 cr)
• CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
• CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
• CSCI 5611 - Animation & Planning in Games (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)
• CSCI 5990 - Special Topics in Computer Science (1.0 - 3.0 cr)
• CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
• CSCI 8205 - Parallel Computer Organization (3.0 cr)
• CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
• CSCI 8271 - Security and Privacy in Computing (3.0 cr)
• CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
• CSCI 8551 - Intelligent Agents (3.0 cr)
• CSCI 8715 - Spatial Databases and Applications (3.0 cr)
• CSCI 8735 - Advanced Database Systems (3.0 cr)
Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Rochester

University of Minnesota Rochester (UMR) offers the M.C.S. degree. Students may complete all degree requirements in Rochester by combining courses taught via streaming video using the UNITE (University-Industry Television for Education) instructional television system. Students are able to watch class live via the internet or pick up class on a special server at a later time.
Twin Cities Campus

Computer Science M.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. The graduate program's faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bio-informatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the MS (offered Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects), the MCS (a terminal, coursework-only degree), and the PhD. The department also supports a master of science in software engineering (MSSE) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including bioinformatics and computational biology, health informatics, cognitive science, scientific computation, and human factors and ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A degree in any major with a substantial background in computer science is required; a computer science major is preferred.

Other requirements to be completed before admission:
Applicants with an inadequate background must resolve any deficiencies before applying to the program.

The program requires all applicants to complete the University’s online application. The names and email addresses of three recommenders are required; Scores from the General (Aptitude) Test of the GRE are required for MS program applicants. Master's students are accepted for fall admission only. The application deadline is April 1. Students seeking financial aid must apply by December 5. Additional information is available at https://www.cs.umn.edu/admissions/graduate

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 21 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 31 major credits and 0 credits outside the major. The final exam is oral.

**Plan C:** Plan C requires 31 major credits and 0 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

The MS requires a minimum of 31 credits and is offered under three plans. All plans require students to take one course from each of the 3 breadth areas in computer science (9 credits): theory and algorithms; architecture, systems and software; and applications; and 1 credit of colloquium (CSCI 8970).

A minimum of 6 credits in computer science 8xxx-level courses, in addition to the colloquium, must be included in the required coursework for Plan A and Plan C; Plan B students must include a minimum of 3 credits in computer science 8xxx-level courses, in addition to the colloquium and Plan B project credits.

Plan A requires 13 credits in computer science coursework, including the breadth courses and colloquium credit, plus 10 thesis credits. The remaining 8 credits may be taken in the major field or any related field.

Plan B and Plan C require 16 credits in computer science coursework, including the breadth courses and colloquium credit. Plan B students must also include 3 credits of the project course, CSCI 8760. The remaining 15 credits may be taken in the major field or in any related field.

**Breadth Courses**

Students in all plans must take 3 breadth requirement courses, one from each subject area.

**Applications**

Take 1 or more course(s) from the following:

- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 5125 - Collaborative and Social Computing (3.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5471 - Modern Cryptography (3.0 cr)
- CSCI 5511 - Artificial Intelligence I (3.0 cr)
- CSCI 5512 - Artificial Intelligence II (3.0 cr)
- CSCI 5521 - Introduction to Machine Learning (3.0 cr)
- CSCI 5523 - Introduction to Data Mining (3.0 cr)
- CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5607 - Fundamentals of Computer Graphics 1 (3.0 cr)
• CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5611 - Animation & Planning in Games (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)

Architecture, Systems and Software
Take 1 or more course(s) from the following:
• CSCI 5103 - Operating Systems (3.0 cr)
• CSCI 5106 - Programming Languages (3.0 cr)
• CSCI 5161 - Introduction to Compilers (3.0 cr)
• CSCI 5204 - Advanced Computer Architecture (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5508 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)

Theory and Algorithms
Take 1 or more course(s) from the following:
• CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
• CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
• CSCI 5403 - Computational Complexity (3.0 cr)
• CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5525 - Machine Learning (3.0 cr)

Colloquium Credits
Students must take 1 credit of CS Colloquium
CSCI 8970 - Computer Science Colloquium (1.0 cr)

Computer Science Courses
Students may choose additional coursework from this list or consult with their advisor for further options.
Take 0 or more credit(s) from the following:
• CSCI 5103 - Operating Systems (3.0 cr)
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5106 - Programming Languages (3.0 cr)
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
• CSCI 5161 - Introduction to Compilers (3.0 cr)
• CSCI 5204 - Advanced Computer Architecture (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5271 - Introduction to Computer Security (3.0 cr)
• CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
• CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
• CSCI 5403 - Computational Complexity (3.0 cr)
• CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5511 - Artificial Intelligence I (3.0 cr)
• CSCI 5512 - Artificial Intelligence II (3.0 cr)
• CSCI 5521 - Introduction to Machine Learning (3.0 cr)
• CSCI 5525 - Introduction to Data Mining (3.0 cr)
• CSCI 5526 - Machine Learning (3.0 cr)
• CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
• CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
• CSCI 5561 - Computer Vision (3.0 cr)
• CSCI 5607 - Fundamentals of Computer Graphics 1 (3.0 cr)
• CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
• CSCI 5611 - Animation & Planning in Games (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)
• CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
• CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
• CSCI 8205 - Parallel Computer Organization (3.0 cr)
• CSCI 8211 - Advanced Computer Networks and Their Applications (3.0 cr)
• CSCI 8271 - Security and Privacy in Computing (3.0 cr)
• CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
• CSCI 8551 - Intelligent Agents (3.0 cr)
• CSCI 8715 - Spatial Databases and Applications (3.0 cr)
• CSCI 8735 - Advanced Database Systems (3.0 cr)
• CSCI 8970 - Computer Science Colloquium (1.0 cr)

Plan A
Plan A students must take 10 thesis credits.
CSCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Plan B requires 3 credits of the Plan B project course, CSCI 8760. The Plan B project is a significant project demonstrating the student's familiarity with the tools of research, the capability to work independently, and the ability to effectively relate their results to their committee. A written report describing the Plan B project must be approved by the advisor. A copy of the report should be provided to the committee members at least 1 week before the oral presentation.
CSCI 8760 - Plan B Project (3.0 cr)

Plan C
Plan C is a coursework only degree. Students must complete a minimum of 100 hours of course-based project work, a written research report, and an oral presentation within CSCI courses taken for graduate credit. Students can count at most 3 credits of the following directed research/independent study courses toward their degree plan: CSCI 5994, 8994, 5991, and 8991.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
University of Minnesota Rochester (UMR) offers the MS in computer science. Students may complete all degree requirements in Rochester via streaming video using the UNITE (University-Industry Television for Education) instructional television system. Students are able to watch class live via the internet or pick up class on a special server at a later time.
Twin Cities Campus

Computer Science Minor

Computer Science and Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the M.C.S., the M.S. (Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects), and the Ph.D. The department also supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
A minor in computer science for master's students majoring in other fields must include 9 credits of graduate courses in CSCI. The
colloquium credit may not be included. There is a limit of one 4xxx course and a requirement of at least one 8xxx course or a 5xxx course that has a prerequisite of a 5xxx course. These courses must be taken on the A/F grading scale and a minimum GPA of 3.00 is expected.

**Doctoral**
A minor in computer science for Ph.D. students majoring in other fields must include 13 credits of graduate courses in CSCI, and should include the colloquium credit. There is a limit of one 4xxx course and a requirement of at least one 8xxx course or a 5xxx course that has a prerequisite of a 5xxx course. These courses must be taken on the A/F grading scale and a minimum GPA of 3.25 is expected.

**Colloquium Credit**
CSCI 8970 - Computer Science Colloquium (1.0 cr)
Twin Cities Campus

Computer Science Ph.D.

Computer Science and Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 55
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; machine learning; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the Ph.D., as well as the M.C.S. (a terminal, coursework-only degree), and the M.S. (offered Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects). The department also supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.45.

A degree in any major with a substantial background in computer science is required; a computer science major is preferred.

Other requirements to be completed before admission:
The program requires all applicants to complete the department's online application, as well as the University's online application. The names and email addresses of three recommenders are required; they will be asked to upload their letters of recommendation to the CS&E online application only. Scores from the General (Aptitude) Test of the GRE are required for Ph.D. program applicants. Ph.D. students are accepted for fall admission only. The application deadline is April 1. Students seeking financial aid must apply by December 5. Additional information is available at https://www.cs.umn.edu/admissions/graduate

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 23
Program Requirements
16 to 25 credits are required in the major.
6 to 15 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.45 is required for students to remain in good standing.

The Ph.D. requires a total of 55 credits consisting of 31 course credits and 24 thesis credits. Of the 31 course credits, 16 must be in computer science courses and at least 6 from outside the major. The 16 major credits must include five 3-credit courses that fulfill the breadth requirement in three different areas: theory and algorithms; architecture, systems and software; and applications; plus 1 credit of colloquium (CSCI 8970).

The remaining 9 credits may be taken as additional graduate-level courses in the major or in any supporting field. Students are recommended to take CSCI 8001/2 Introduction to Research in Computer Science I and II and a directed research course (CSCI 8994).

Students are expected to complete all courses in their degree program with a GPA of at least 3.45. All courses must be taken for graduate credit and on the A-F grading basis.

All doctoral students must demonstrate background knowledge in computer science as explained in the program requirements at: https://www.cs.umn.edu/academics/graduate/phd/bg-req

Breadth Requirement Courses
Students must take a total of 5 courses (typically 15 credits): one from each of the three subject areas and the remaining two from any of the three subject areas.
Take 5 or more course(s) from the following:
Theory and Algorithms
Take 1 or more course(s) from the following:
• CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
• CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
• CSCI 5403 - Computational Complexity (3.0 cr)
• CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5525 - Machine Learning (3.0 cr)

Architecture, Systems and Software
Take 1 or more course(s) from the following:
• CSCI 5103 - Operating Systems (3.0 cr)
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5106 - Programming Languages (3.0 cr)
• CSCI 5161 - Introduction to Compilers (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)
• CSCI 5204 - Advanced Computer Architecture (3.0 cr)

Applications
Take 1 or more course(s) from the following:
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5271 - Introduction to Computer Security (3.0 cr)
• CSCI 5471 - Modern Cryptography (3.0 cr)
• CSCI 5511 - Artificial Intelligence I (3.0 cr)
• CSCI 5512 - Artificial Intelligence II (3.0 cr)
• CSCI 5521 - Introduction to Machine Learning (3.0 cr)
• CSCI 5523 - Introduction to Data Mining (3.0 cr)
• CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
• CSCI 5561 - Computer Vision (3.0 cr)
• CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
• CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5611 - Animation & Planning in Games (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)

Supporting Program
Take 6 credits in courses outside of computer science. These credits may be used toward the requirements for a doctoral minor.

Colloquium Credits
Take 1 credit of GS colloquium.
CSCI 8970 - Computer Science Colloquium (1.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam.
CSCI 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Computer Science Courses
The remaining 9 credits of coursework may be taken in the major field or any supporting field. Students may choose courses from this list or consult with their adviser for additional options.
Take 0 or more credit(s) from the following:
• CSCI 5103 - Operating Systems (3.0 cr)
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5106 - Programming Languages (3.0 cr)
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 5117 - Developing the Interactive Web (3.0 cr)
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5161 - Introduction to Compilers (3.0 cr)
• CSCI 5204 - Advanced Computer Architecture (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5271 - Introduction to Computer Security (3.0 cr)
• CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
• CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
• CSCI 5403 - Computational Complexity (3.0 cr)
• CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
• CSCI 5471 - Modern Cryptography (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5511 - Artificial Intelligence I (3.0 cr)
• CSCI 5512 - Artificial Intelligence II (3.0 cr)
• CSCI 5521 - Introduction to Machine Learning (3.0 cr)
• CSCI 5523 - Introduction to Data Mining (3.0 cr)
• CSCI 5525 - Machine Learning (3.0 cr)
• CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
• CSCI 5561 - Computer Vision (3.0 cr)
• CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
• CSCI 5611 - Animation & Planning in Games (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)
• CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
• CSCI 5991 - Independent Study (1.0 - 3.0 cr)
• CSCI 5994 - Directed Research (1.0 - 3.0 cr)
• CSCI 8001 - Introduction to Research in Computer Science I (1.0 cr)
• CSCI 8002 - Introduction to Research in Computer Science, II (2.0 cr)
• CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
• CSCI 8205 - Parallel Computer Organization (3.0 cr)
• CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
• CSCI 8442 - Computational Geometry and Applications (3.0 cr)
• CSCI 8551 - Intelligent Agents (3.0 cr)
• CSCI 8735 - Advanced Database Systems (3.0 cr)
• CSCI 8801 - Advanced Software Engineering (3.0 cr)
• CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
• CSCI 8991 - Independent Study (1.0 - 3.0 cr)
• CSCI 8994 - Directed Research in Computer Science (1.0 - 3.0 cr)
Twin Cities Campus
Cyber Security Minor
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
(612-624-5474; fax: 612-624-7510)
Email: damian@umn.edu
Website: http://tli.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in the Cyber Security program is administered by the Technological Leadership Institute (TLI) in the College of Science and Engineering. The program integrates the fields of technology, security, and management, to provide students with the skills and insights to assume a leadership role in cyber security, or continue their field of study with a focus on cyber security and its role in organizations.

The curriculum applies fundamental concepts of business management, organizational leadership, and risk management techniques and strategies, each as applied in the context of cyber security, to empower engineering, technology, and business professionals to adapt and lead in the emerging field of cyber security. Each class will include exercises that inform students on those cyber security topics, and give them an opportunity to practice the fundamental skills of communications, teamwork, and project management.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Courses
These core courses are designed to be taken in sequence.
ST 8661 - Securing Cyberspace (Fundamentals) (3.0 cr)
ST 8662 - Securing Cyberspace - Advanced (0.0 - 3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Elective Courses
Take 2 or more credit(s) from the following:
• ST 8113 - Information and Cyber Security (2.0 cr)
- ST 8513 - Cyber Threat Intelligence (2.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5471 - Modern Cryptography (3.0 cr)
- CSCI 8271 - Security and Privacy in Computing (3.0 cr)

Doctoral

Elective Courses

Take 6 or more credit(s) from the following:

- ST 8113 - Information and Cyber Security (2.0 cr)
- ST 8513 - Cyber Threat Intelligence (2.0 cr)
- CSCI 5271 - Introduction to Computer Security (3.0 cr)
- CSCI 5471 - Modern Cryptography (3.0 cr)
- CSCI 8271 - Security and Privacy in Computing (3.0 cr)
Twin Cities Campus
Data Science M.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Data Science Graduate Program, Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572).
Email: datascience@umn.edu
Website: http://datascience.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. in Data Science program provides a strong foundation in the science of Big Data and its analysis by gathering in a single program the knowledge, expertise, and educational assets in data collection and management, data analytics, scalable data-driven pattern discovery, and the fundamental concepts behind these methods.

Students who graduate from this regular 2 year master's program will learn the state-of-the-art methods for treating Big Data, be exposed to the cutting edge methods and theory forming the basis for the next generation of Big Data technology, and will complete a project demonstrating that they can use the fundamental concepts to design innovative methods for new application areas arising from business, government, security, medicine, biology, physical sciences, and the environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited college or university in computer science, math, statistics, engineering, natural sciences, or a related field.

Other requirements to be completed before admission:
The undergraduate degree must include statistics, calculus, multivariable calculus, linear algebra, and mathematical software environments such as Matlab or R or the equivalent, programming languages such as C+, C++, Java, programming experience including algorithms and data structures normally taught in beginning computer science courses either as part of the undergraduate degree or subsequent work experience.

Special Application Requirements:
Admission application deadlines: February 1st international applicants, March 1st domestic applicants. Applicants are only considered for fall admission and decisions are made after all applications are received following the close of the application cycle. Application instructions can be found here: https://datascience.umn.edu/admissions

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Writing Score: 23
  - Internet Based - Reading Score: 23
  - Paper Based - Total Score: 550
- IELTS
- Total Score: 6.5
  • MELAB
    - Part 1 (Composition) score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 31 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Students must complete 6 credit hours of capstone project coursework supervised by a faculty member.

The final examination for the Capstone Project may be oral, written, or both. The format of the final exam is decided between the student, the adviser, and the director of graduate studies, and is based on what is most appropriate for the student's project. The final oral examination, if it is used, is a closed examination open only to the final oral examination committee and the student.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The program requires a total of 31 credits consisting of 6 credits each from the three emphasis areas: statistics, algorithms, and infrastructure and large scale computing; 6 credits in approved electives or in a minor; 1 credit of research colloquium; and 6 credits for the capstone project.

Statistics
Short List
  Take one course from the short list and one additional statistics course from any in this emphasis for a total of 6 or more credits.
  Take 2 or more course(s) totaling 6 or more credit(s) from the following:
  • STAT 5101 - Theory of Statistics I (4.0 cr)
  • STAT 5102 - Theory of Statistics II (4.0 cr)
  • STAT 5302 - Applied Regression Analysis (4.0 cr)
  • STAT 5401 - Applied Multivariate Methods (3.0 cr)
  • STAT 5511 - Time Series Analysis (3.0 cr)
  • STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
  • PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)

Additional Courses
  Take 0 or more course(s) totaling 0 or more credit(s) from the following:
  • PUBH 8401 - Linear Models (4.0 cr)
  • PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
  • PUBH 7405 - Biostatistics: Regression (4.0 cr)
  • PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
  • PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
  • EE 5531 - Probability and Stochastic Processes (3.0 cr)
  • EE 8581 - Detection and Estimation Theory (3.0 cr)

Algorithmics
Short List
  Take one course from the short list and one additional course from any in this emphasis for a total of 6 or more credits.
  Take 2 or more course(s) totaling 6 or more credit(s) from the following:
  • CSCI 5521 - Introduction to Machine Learning (3.0 cr)
  • CSCI 5523 - Introduction to Data Mining (3.0 cr)
  • CSCI 5525 - Machine Learning (3.0 cr)
  • EE 8591 - Predictive Learning from Data (3.0 cr)
  • PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)

Additional Courses
  Take 0 or more course(s) totaling 0 or more credit(s) from the following:
  • CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
  • CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
  • CSCI 5511 - Artificial Intelligence I (3.0 cr)
  • CSCI 5512 - Artificial Intelligence II (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 8314 - Sparse Matrix Computations (3.0 cr)
• EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
• EE 5251 - Optimal Filtering and Estimation (3.0 cr)
• EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
• EE 5551 - Multiscale and Multirate Signal Processing (3.0 cr)
• EE 5561 - Image Processing and Applications (3.0 cr)
• EE 5581 - Information Theory and Coding (3.0 cr)
• EE 5585 - Data Compression (3.0 cr)
• EE 8231 - Optimization Theory (3.0 cr)
• IE 5531 - Engineering Optimization I (4.0 cr)
• IE 8534 - Advanced Topics in Operations Research (4.0 cr)

Infrastructure and Large Scale Computing

Short List
Take one course from the short list and one additional course from any in this emphasis for a total of 6 or more credits.
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)
• CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
• EE 5351 - Applied Parallel Programming (3.0 cr)
• EE 8367 - Parallel Computer Organization (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)

Additional Courses
Take 0 or more course(s) totaling 0 or more credit(s) from the following:
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5271 - Introduction to Computer Security (3.0 cr)
• CSCI 5715 - From GPS and Virtual Globes to Spatial Computing (3.0 cr)
• CSCI 8701 - Overview of Database Research (3.0 cr)
• CSCI 8715 - Spatial Databases and Applications (3.0 cr)
• EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
• EE 5381 - Telecommunications Networks (3.0 cr)
• EE 5501 - Digital Communication (3.0 cr)

Electives
Take 2 elective courses. Students may choose courses from this list or consult with their adviser for further options. Examples include 5xxx & 8xxx special topics classes in CSCI, EE, STAT, & PUBH (Biostat).
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
• CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
• CSCI 5561 - Computer Vision (3.0 cr)
• CSCI 8271 - Security and Privacy in Computing (3.0 cr)
• CSCI 8363 - Numerical Linear Algebra in Data Exploration (3.0 cr)
• CSCI 8715 - Spatial Databases and Applications (3.0 cr)
• CSCI 8725 - Databases for Bioinformatics (3.0 cr)
• PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
• PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
• PUBH 8472 - Spatial Biostatistics (3.0 cr)
• MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)

Research Colloquium
DSCI 8970 - Data Science M.S. Colloquium (1.0 cr)

Capstone Course
Take twice for a total of 6 credits.
DSCI 8760 - Data Science M.S. Plan B Project (3.0 cr)
Twin Cities Campus
Earth Sciences M.S.
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Earth Sciences, University of Minnesota, 310 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: esci@umn.edu
Website: http://www.esci.umn.edu/programs/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, biogeochemistry, biogeology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students may accommodate other areas of interest such as engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in geology, geophysics, earth and material sciences, chemistry, physics, biology, or environmental science.

Other requirements to be completed before admission:
At least one year each of study in calculus, chemistry, and physics is required. In general, an outstanding academic record is expected.

Special Application Requirements:
Materials required for a complete application file include the student's statement of purpose, three letters of recommendation, transcripts, official GRE scores, and the Application for Admission. Applications are considered at any time; however, to be considered for financial aid, all materials must be submitted by January 8. Studies may begin in any semester or summer session, although fall semester is preferable. IMPORTANT: Refer to the Graduate Programs section of the department website (http://www.esci.umn.edu/programs/gradprospective) for a listing of all required application materials and preferred method of submission.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 to 22 major credits and 8 to 16 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Students must demonstrate familiarity with the tools of research or scholarship in their track, the ability to work independently, and the ability to present the results of their investigation effectively, by completing one or more projects, which may take the form of a research paper, presentation of research results, or completion of a faculty-supervised research experience. The Plan B project(s) should involve a minimum combined total of approximately 120 hours (the equivalent of three full-time weeks) of work.

Plan C: Plan C requires 14 to 21 major credits and 9 to 16 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At the onset of studies, a coursework "compact" will be developed with the student, his/her advisor, and the graduate studies committee. The compact will be reviewed annually to assure timely progress and revise as needed.

The masters degree is offered under Plan A (thesis), Plan B (project), or Plan C (coursework). Plan A and Plan B students must choose one of five tracks in the earth sciences program: geology, geophysics, biogeology, hydrogeology, or earth sciences. Plan C students may only choose the hydrogeology track. Tracks carry coursework requirements that are part of the student's course compact.

A maximum of 9 credits of 4xxx-level coursework may be used towards program requirements.

Required Courses
All students must complete ESCI 8001, preferably in the first year.

ESCI 8001 - Introductory Graduate Seminar (2.0 cr)

Plan A
Plan A requires 14 credits in the major (including the track requirements); 6 credits in a minor or in related fields outside ESCI, and 10 thesis credits.

ESCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Plan B requires 14 credits in the major (including the track requirements) and 8 credits outside ESCI, which can include a minor. The remaining 8 credits can be taken in the major or in any supporting field. Up to 3 credits of ESCI 8994 may be used for the project requirement.

ESCI 8994 - Research in Earth Sciences (1.0 - 4.0 cr)

Plan C
Plan C requires 14 credits in the major (including the track requirements) and 9 credits outside ESCI, which can include a minor. The remaining 7 credits can be taken in the major or in any supporting field. Plan C students may only choose the Hydrogeology track.
Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Biogeology**

This sub-plan is limited to students completing the program under Plan A or Plan B.

Biogeology represents a rapidly growing area at the intersection between Earth and the life sciences. It includes research in microbial evolution and biochemistry, microbe/mineral chemical interactions, the role of organisms in basic geological processes, the principles through which organisms or organic compounds can be used to reconstruct surface conditions, biogeochemical cycling, pollution control and remediation, the origin of life on Earth, and astrobiology. This is a broad field that is moving in new and exciting directions, and witnessing explosive growth in understanding the variety of ways biology mediates geology and vice versa. Many of the most basic earth surface processes are now seen as intimately biological with rates and pathways dictated by organic processes. Understanding the importance of these processes, quantifying them through time and place, and learning to utilize and/or control them will be major components of earth sciences research in the 21st century.

**Required Courses**

- Take 6 or more credit(s) from the following:
  - ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
  - ESCI 8801 - Geomicrobiology (3.0 cr)

**Earth Sciences**

This sub-plan is limited to students completing the program under Plan A or Plan B.

This generalist track exists for students whose curriculum and/or thesis (paper or project for MS Plan B) do not fit any of the other four tracks. Because it is not specific to a discipline, there are no mandatory courses in the major apart from the introductory graduate seminar, a minimum of 6 additional graduate-level credits in the major program, 12 supporting program credits or completion of all requirements for a minor, and thesis credits. A curriculum specific to the student will be set through the compact process.

6-credit minimum; courses determined on an individual basis.

**Geology**

This sub-plan is limited to students completing the program under Plan A or Plan B.

Geology uses field observation, laboratory work, analog and computer modeling, chemical and biological probes and assays to understand Earth’s coupled rock, water and biological systems, the underlying processes, and their history of interaction as evidenced in the rock record.

**Required Courses**

- Take 6 or more credit(s) from the following:
  - ESCI 5302 - Isotope Geology (3.0 cr)
  - ESCI 5351 - Geochemical Modeling of Aqueous Systems (3.0 cr)
  - ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
  - ESCI 5502 - Advanced Structural Geology (3.0 cr)
  - ESCI 5503 - Advanced Petrology (3.0 cr)
  - ESCI 5601W - Advanced Sedimentology [WI] (4.0 cr)
  - ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)

**Geophysics**

This sub-plan is limited to students completing the program under Plan A or Plan B.

Geophysics uses remote sensing probes (seismic waves, potential fields, etc.), laboratory simulation of deep earth conditions and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history and dynamics of solid Earth and other planets.

**Required Courses**

- ESCI 4211 - Solid Earth Geophysics I (3.0 cr)
  - Take 1 or more course(s) totaling 3 or more credit(s) from the following:
Hydrogeology

Hydrogeology uses direct observation and remote sensing, computer modeling and laboratory simulation to constrain the interaction of water and rock in Earth's shallow subsurface. Freshwater is Earth’s most precious and increasingly overexploited resource. Hydrogeology is a key discipline in the effective shepherding of this important reserve. This track establishes a baseline curriculum for hydrogeology at the graduate level. The compact process will identify additional coursework appropriate to the student's prior training and research directions.

Required Courses

- **ESCI 4702** - General Hydrogeology (3.0 cr)
- Take 1 or more course(s) totaling 3 or more credit(s) from the following:
  - **ESCI 5205** - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
  - **ESCI 5713** - Tracers and Karst Hydrogeology (3.0 cr)
  - **ESCI 5971** - Field Hydrogeology (2.0 cr)
Twin Cities Campus

Earth Sciences Minor
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Graduate Program, Department of Earth Sciences, University of Minnesota, 310 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: esci@umn.edu
Website: http://www.esci.umn.edu/programs/graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, biogeochemistry, biogeology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students may accommodate other areas of interest such as engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minor is established individually with approval by the graduate studies committee.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

- Masters
  The master's minor requires a minimum of 6 credits in ESCI courses.

- Doctoral
  The doctoral minor requires a minimum of 12 credits in ESCI courses.
Twin Cities Campus
Earth Sciences Ph.D.
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Graduate Program, Department of Earth Sciences, University of Minnesota, 310 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: esci@umn.edu
Website: http://www.esci.umn.edu/programs/graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, biogeochemistry, biogeology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics.

Students may accommodate other areas of interest such as engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree in geology, geophysics, earth and material sciences, chemistry, physics, biology, or environmental science.

Other requirements to be completed before admission:
At least one year of study each in calculus, chemistry, and physics is required. In general, an outstanding academic record is expected.

Special Application Requirements:
Materials required for a complete application file include the student's statement of purpose, three letters of recommendation, transcripts, official GRE scores, and the Application for Admission. Applications are considered at any time; however, to be considered for financial aid, all materials must be submitted by January 8. Studies may begin in any semester or summer session, although fall semester is preferable. IMPORTANT: Refer to the Graduate Programs section of the department website (http://www.esci.umn.edu/programs/gradprospective) for a listing of all required application materials and preferred method of submission.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  - IELTS
    - Total Score: 6.5
  - MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At the onset of studies, a coursework "compact" will be developed with the student, his/her advisor, and the graduate studies committee. The compact will be reviewed annually to assure timely progress and revise as needed.

Students must choose one of five tracks in the earth sciences program: geology, geophysics, biogeology, hydrogeology, or earth sciences. Tracks carry coursework requirements that are part of the student's course compact.

The PhD requires a minimum 12 credits of coursework in earth sciences, including the track requirements, a minimum of 12 credits in a minor or supporting field, plus 24 thesis credits.

A maximum of 9 credits of 4xxx-level coursework may be used towards programs requirements. Coursework taken A/F must be completed with an average grade of B or better.

Required Courses
All students must complete ESCI 8001, preferably in the first year.
ESCI 8001 - Introductory Graduate Seminar (2.0 cr)

Minor or Supporting Program Coursework
Take 12 credits in a minor or in supporting fields outside ESCI.

Thesis Credits
Take 24 credits after passing preliminary oral exam
ESCI 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Biogeology
Biogeology represents a rapidly growing area at the intersection between Earth and the life sciences. It includes research in microbial evolution and biochemistry, microbe/mineral chemical interactions, the role of organisms in basic geological processes, the principles through which organisms or organic compounds can be used to reconstruct surface conditions, biogeochemical cycling, pollution control and remediation, the origin of life on Earth, and astrobiology. This is a broad field that is moving in new and exciting directions, and witnessing explosive growth in understanding the variety of ways biology mediates geology and vice versa. Many of the most basic earth surface processes are now seen as intimately biological with rates and pathways dictated by organic processes. Understanding the importance of these processes, quantifying them through time and place, and learning to utilize and/or control them will be major
components of earth sciences research in the 21st century.

Required Courses
Take 6 or more credit(s) from the following:
•ESCI 8402 - Biogeochemical Cycles in the Ocean (3.0 cr)
•ESCI 8801 - Geomicrobiology (3.0 cr)

Earth Sciences
This generalist track exists for students whose curriculum and/or thesis (paper or project for MS Plan B) do not fit any of the other four tracks. Because it is not specific to a discipline, there are no mandatory courses in the major apart from the introductory graduate seminar, a minimum of 6 additional graduate-level credits in the major program, 12 supporting program credits or completion of all requirements for a minor, and thesis credits. A curriculum specific to the student will be set through the compact process.

6-credit minimum; courses determined on an individual basis.

Geology
Geology uses field observation, laboratory work, analog and computer modeling, chemical and biological probes and assays to understand Earth's coupled rock, water and biological systems, the underlying processes, and their history of interaction as evidenced in the rock record.

Required Courses
Take 6 or more credit(s) from the following:
•ESCI 5302 - Isotope Geology (3.0 cr)
•ESCI 5351 - Geochemical Modeling of Aqueous Systems (3.0 cr)
•ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
•ESCI 5502 - Advanced Structural Geology (3.0 cr)
•ESCI 5503 - Advanced Petrology (3.0 cr)
•ESCI 5601W - Advanced Sedimentology [WI] (4.0 cr)
•ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)

Geophysics
Geophysics uses remote sensing probes (seismic waves, potential fields, etc.), laboratory simulation of deep Earth conditions and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history and dynamics of solid Earth and other planets.

Required Courses
ESCI 4211 - Solid Earth Geophysics I (3.0 cr)
Take 1 or more course(s) totaling 3 or more credit(s) from the following:
•ESCI 4212 - Solid Earth Geophysics II (3.0 cr)
•ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
•ESCI 5203 - Mineral and Rock Physics (3.0 cr)
•ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
•ESCI 8203 - Principles of Geophysical Exploration (3.0 cr)
•ESCI 8204 - Geomagnetism and Paleomagnetism (3.0 cr)

Hydrogeology
Hydrogeology uses direct observation and remote sensing, computer modeling and laboratory simulation to constrain the interaction of water and rock in Earth's shallow subsurface. Freshwater is Earth's most precious and increasingly overexploited resource. Hydrogeology is a key discipline in the effective shepherding of this important reserve. This track establishes a baseline curriculum for hydrogeology at the graduate level. The compact process will identify additional coursework appropriate to the student's prior training and research directions.

Required Courses
ESCI 4702 - General Hydrogeology (3.0 cr)
Take 1 or more course(s) totaling 3 or more credit(s) from the following:
•ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
•ESCI 5713 - Tracers and Karst Hydrogeology (3.0 cr)
•ESCI 5971 - Field Hydrogeology (2.0 cr)
Twin Cities Campus
Electrical Engineering M.S.E.E.
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-3564; fax: 612-626-1136).
Email: jager001@umn.edu
Website: http://www.ece.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Electrical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Students are considered for admission beginning fall semester only (except for part-time students living in Minnesota who work in industry and who may apply for other terms). The deadline for applying for fall semester is December 1.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

Other requirements to be completed before admission:
Consideration is given to students who have completed another curriculum in engineering, science, physics, or mathematics that includes sufficient preparation to pursue a graduate program in electrical engineering. In some instances, additional preparatory studies may be required after admission.

All documents must be submitted electronically. No documents should be mailed to the department or the Graduate Admissions Office.

Every applicant must submit the General Test of the GRE (except University of Minnesota bachelor of electrical engineering graduates who have a GPA of 3.40 or better). The GRE Subject Test is not required for admission.

Special Application Requirements:
Applications are accepted for fall admission only. The deadline is December 1. Additional application information is available at http://www.ece.umn.edu/ProspectiveStudentsGraduate/index.htm

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

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### Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 18 to 24 major credits and 6 to 12 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The MSEE requires a minimum of 30 credits. Plan A requires 14 credits in EE courses, 6 credits in a minor or in related fields outside of the department, and 10 thesis credits. Plan C requires at least 18 credits from EE courses 5xxx and above, at least 6 credits in a minor or in related fields outside of the department, and additional credits from the major or related fields to meet the 30-credit minimum. Courses taken outside of the major field must be within the College of Science and Engineering.

Part-time students must choose Plan C; full-time students may choose either Plan A or Plan C. The department limits project, seminar, special investigation, directed study credits, and GRAD 999 registrations.

All courses must be taken A-F, with the exception of EE 5041, EE 8925, and graduate seminars, which are only offered S-N. Cross-listed courses must be taken under the EE designator to count towards degree requirements. Non-EE coursework that is cross-listed with Electrical Engineering does not count toward the non-EE coursework requirement.

A maximum of nine 4xxx-level course credits may be used to satisfy masters degree requirements; of these, only six credits may be in EE courses. Only the 4xxx-level courses included on the lists below will be accepted.

M.S.E.E. students who wish to pursue the Ph.D. must pass the Ph.D. preliminary written examination by the end of their second year in residence. Students have two chances to pass the examination. The Ph.D. preliminary written examination is typically held in November and in April.

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### Coursework

**Major Coursework**

Courses from this list can be applied to both Plan A and Plan C major field credit requirements. Plan C students can also apply these courses toward MSEE's 30-credit minimum.

- EE 5121 - Transistor Device Modeling for Circuit Simulation (3.0 cr)
- EE 5141 - Introduction to Microsystem Technology (4.0 cr)
- EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
- EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
- EE 5171 - Microelectronic Fabrication (4.0 cr)
- EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
- EE 5181 - Introduction to Nanotechnology (4.0 cr)
- EE 5231 - Linear Systems and Optimal Control (3.0 cr)
- EE 5235 - Robust Control System Design (3.0 cr)
- EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
- EE 5251 - Optimal Filtering and Estimation (3.0 cr)
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<td>3.0</td>
</tr>
<tr>
<td>EE 5302</td>
<td>VLSI Design Automation II</td>
<td>3.0</td>
</tr>
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EE 8591 - Predictive Learning from Data (3.0 cr)
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EE 8611 - Plasma Physics (3.0 cr)
EE 8620 - Advanced Topics in Magnetics (1.0 - 3.0 cr)
EE 8630 - Advanced Topics in Electromagnetics (1.0 - 3.0 cr)
EE 8725 - Advanced Power System Analysis and Economics (3.0 cr)
EE 8741 - Power Electronics in Power Systems (3.0 cr)
EE 8950 - Advanced Topics in Electrical and Computer Engineering (1.0 - 3.0 cr)

Outside Coursework
Courses from this list can be applied to both the Plan A and Plan C outside (non-EE) credit requirements. Plan C students can also apply these courses toward MSEE's 30-credit minimum.

AEM 4203 - Aerospace Propulsion (4.0 cr)
AEM 4295 - Problems in Fluid Mechanics (1.0 - 3.0 cr)
AEM 4301 - Orbital Mechanics (3.0 cr)
AEM 4303W - Flight Dynamics and Control [WI] (3.0 cr)
AEM 4305 - Spacecraft Attitude Dynamics and Control (3.0 cr)
AEM 4331 - Aerospace Vehicle Design (4.0 cr)
AEM 4333 - Aerospace Design: Special Projects (3.0 cr)
AEM 4371 - Helicopter Aerodynamics (3.0 cr)
AEM 4495 - Problems in Aerospace Systems (3.0 cr)
AEM 4501 - Aerospace Structures (3.0 cr)
AEM 4502 - Computational Structural Analysis (3.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 4581 - Mechanics of Solids (3.0 cr)
AEM 4595 - Problems in Mechanics and Materials (1.0 - 3.0 cr)
AEM 4601 - Instrumentation Laboratory (3.0 cr)
AEM 4602W - Aeromechanics Laboratory [WI] (4.0 cr)
AEM 5247 - Hypersonic Aerodynamics (3.0 cr)
AEM 5253 - Computational Fluid Mechanics (3.0 cr)
AEM 5333 - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 5581 - Mechanics of Solids (3.0 cr)
AEM 5651 - Aeroelasticity (3.0 cr)
BBE 5023 - Process Control and Instrumentation (3.0 cr)
BBE 5333 - Off-road Vehicle Design (4.0 cr)
BBE 5413 - A Systems Approach to Residential Construction (4.0 cr)
BBE 5416 - Building Testing & Diagnostics (2.0 cr)
BBE 5733 - Renewable Energy Technologies (3.0 cr)
BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
BIOC 5527 - Introduction to Modern Structural Biology (4.0 cr)
BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
BIOL 4003 - Genetics (3.0 cr)
BIOL 4004 - Cell Biology (3.0 cr)
BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
BIOL 4850 - Special Topics in Biology (1.0 - 5.0 cr)
BIOL 4950 - Special Topics in Biology (1.0 - 4.0 cr)
BIOL 5272 - Applied Biostatistics (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5041 - Tissue Engineering (3.0 cr)
BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
BMEN 5111 - Biomedical Ultrasound (3.0 cr)
BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
BMEN 5351 - Cell Engineering (3.0 cr)
BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
BMEN 5411 - Neural Engineering (3.0 cr)
BMEN 5412 - Neuromodulation (3.0 cr)
BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
BMEN 5701 - Cancer Bioengineering (3.0 cr)
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CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
CSCI 5271 - Introduction to Computer Security (3.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5403 - Computational Complexity (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5471 - Modern Cryptography (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5511 - Artificial Intelligence I (3.0 cr)
CSCI 5512 - Artificial Intelligence II (3.0 cr)
CSCI 5521 - Introduction to Machine Learning (3.0 cr)
CSCI 5523 - Introduction to Data Mining (3.0 cr)
CSCI 5525 - Machine Learning (3.0 cr)
CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5611 - Animation & Planning in Games (3.0 cr)
CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
ESCI 5204 - Geostatistics and Inverse Theory (3.0 cr)
ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
ESCI 5302 - Isotope Geology (3.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
IE 5111 - Systems Engineering I (2.0 cr)
IE 5112 - Introduction to Operations Research (3.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5441 - Financial Decision Making (4.0 cr)
MATH 4065 - Theory of Interest (4.0 cr)
MATH 4152 - Elementary Mathematical Logic (3.0 cr)
MATH 4242 - Applied Linear Algebra (4.0 cr)
MATH 4281 - Introduction to Modern Algebra (4.0 cr)
MATH 4428 - Mathematical Modeling (4.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
MATH 4567 - Applied Fourier Analysis (4.0 cr)
MATH 4603 - Advanced Calculus I (4.0 cr)
MATH 4604 - Advanced Calculus II (4.0 cr)
MATH 4653 - Elementary Probability (4.0 cr)
MATH 4707 - Introduction to Combinatorics and Graph Theory (4.0 cr)
MATH 4990 - Topics in Mathematics (1.0 - 4.0 cr)
MATH 5067 - Actuarial Mathematics I (4.0 cr)
MATH 5068 - Actuarial Mathematics II (4.0 cr)
MATH 5075 - Mathematics of Options, Futures, and Derivative Securities I (4.0 cr)
MATH 5076 - Mathematics of Options, Futures, and Derivative Securities II (4.0 cr)
MATH 5165 - Mathematical Logic I (4.0 cr)
MATH 5166 - Mathematical Logic II (4.0 cr)
MATH 5248 - Cryptology and Number Theory (4.0 cr)
MATH 5251 - Error-Correcting Codes, Finite Fields, Algebraic Curves (4.0 cr)
MATH 5335 - Geometry I (4.0 cr)
MATH 5336 - Geometry II (4.0 cr)
MATH 5378 - Differential Geometry (4.0 cr)
MATH 5385 - Introduction to Computational Algebraic Geometry (4.0 cr)
MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
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<td>ME 5247</td>
<td>Stress Analysis, Sensing, and Transducers</td>
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<td>ME 5281</td>
<td>Analog and Digital Control</td>
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<td>ME 5461</td>
<td>Internal Combustion Engines</td>
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<td>Leadership, Professionalism and Business Basics for Engineers</td>
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<td>Basic Radiological Physics</td>
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<td>Medical and Health Physics of Imaging I</td>
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<td>Brain Networks: From Connectivity to Dynamics</td>
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<td>PHYS 4303</td>
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<td>PHYS 4611</td>
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<td>PHYS 4621</td>
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<td>Solid-State Physics for Engineers and Scientists</td>
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<td>STAT 5302</td>
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<td>STAT 5303</td>
<td>Designing Experiments (4.0 cr)</td>
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<td>STAT 5401</td>
<td>Applied Multivariate Methods (3.0 cr)</td>
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<td>STAT 5501</td>
<td>Multivariate Analysis (3.0 cr)</td>
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**Plan A**

Plan A students have the option to apply the following courses to their major field credit requirement. A maximum of 2 credits from the following subset of this list can be used: EE 8190, EE 8210, EE 8230, EE 8360, EE 8370, EE 8500, EE 8610, EE 8660, EE 8920, EE 8925, EE 8940.

<table>
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<td>Advanced Analog Electronics Design (4.0 cr)</td>
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<tr>
<td>EE 4161W</td>
<td>Energy Conversion and Storage [WI]</td>
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<tr>
<td>EE 4163</td>
<td>Energy Conversion and Storage Laboratory (1.0 cr)</td>
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<td>EE 4231</td>
<td>Linear Control Systems: Designed by Input/Output Methods (3.0 cr)</td>
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<td>EE 4233</td>
<td>State Space Control System Design (3.0 cr)</td>
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<td>EE 4235</td>
<td>Linear Control Systems Laboratory (1.0 cr)</td>
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<td>Digital Design With Programmable Logic (4.0 cr)</td>
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<td>EE 4303</td>
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<td>EE 4341</td>
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<td>EE 4363</td>
<td>Computer Architecture and Machine Organization (4.0 cr)</td>
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<td>EE 4389W</td>
<td>Introduction to Predictive Learning [WI] (3.0 cr)</td>
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<td>EE 4501</td>
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<td>Wireless Hardware System Design (3.0 cr)</td>
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<td>EE 4701</td>
<td>Electric Drives (3.0 cr)</td>
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<td>EE 4721</td>
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<td>EE 4741</td>
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<td>EE 8210</td>
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<td>Ethics in Electrical and Computer Engineering (1.0 cr)</td>
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<td>EE 8940</td>
<td>Special Investigations (1.0 - 3.0 cr)</td>
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**Thesis Credits**

All Plan A students must take at least 10 master's thesis credits.

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<td>EE 8777</td>
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**Plan C**

Plan C students have the option to apply the following courses toward MSEE's 30-credit minimum. These courses do not satisfy the major or outside (non-EE) credit requirements. A maximum of 2 credits of the following may be applied: EE 5041, EE 8190, EE 8210, EE 8230, EE 8360, EE 8370, EE 8500, EE 8610, EE 8660, EE 8920, EE 8925, and EE 8940.

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<th>Course Name</th>
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<td>Advanced Analog Electronics Design (4.0 cr)</td>
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<tr>
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<td>Energy Conversion and Storage [WI]</td>
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<td>EE 4231</td>
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### Project Requirement

Plan C students must complete a paper and project. The following courses satisfy all or a portion of the requirement. Contact the EE department for additional information.

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<td>Robust Control System Design</td>
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<td>EE 5301</td>
<td>VLSI Design Automation I</td>
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<td>EE 5324</td>
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<td>Computer Systems Performance Measurement and Evaluation</td>
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<td>Wireless Communication</td>
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<td>EE 5545</td>
<td>Digital Signal Processing Design</td>
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<td>Introduction to RF/Microwave Engineering</td>
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<td>Power Systems Engineering</td>
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<td>Physics of Semiconductors</td>
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<td>Analog Circuits for Wire/Wireless Communications</td>
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<td>Predictive Learning from Data</td>
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Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
The University of Minnesota Rochester (UMR) offers the MS degree in electrical engineering. Students may complete all degree requirements in Rochester by combining courses taught by College of Science and Engineering faculty in person (face-to-face), or via streaming video using the UNITE (University-Industry Television for Education) instructional television system. UNITE enables students to watch class live via the internet or pick up class on a special server at a later time.

Integrated B.E.E./M.S.E.E.
The Department of Electrical and Computer Engineering offers an integrated bachelor of electrical engineering (BEE) and master of science in electrical engineering (MSEE). The integrated BEE/MSEE program offers students the opportunity to earn both degrees in five years. The programs were established to allow high-achieving University undergraduates the opportunity to work toward a masters degree while simultaneously working toward their undergraduate degree. The combined program offers several advantages: flexibility in fulfilling required courses for both degrees during the senior year; eligibility for graduate assistantships and fellowships; and the ability to save money by completing up to 16 graduate credits at the undergraduate tuition rate.

Both the BEE and MSEE degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied.

Eligibility requirements:
Application to the integrated program is open to University students in the electrical engineering or computer engineering program who have completed a majority of the required upper division courses for their undergraduate degree and have a cumulative GPA of 3.4 or higher. Students with a GPA between 3.2 and 3.4 may also apply, but must submit a GRE score.

Integrated B.Comp.E./M.S.E.E.
The Department of Electrical and Computer Engineering offers an integrated bachelor of computer engineering (B.Comp.E.) and master of science in electrical engineering (MSEE). Benefits, eligibility requirements, and degree-completion requirements outlined for the BEEE/MSEE integrated program also apply to the B.Comp.E./MSEE.
Twin Cities Campus
Electrical Engineering Minor
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-3564; fax: 612-626-1136)
Email: jager001@umn.edu
Website: http://www.ece.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory, to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor credits must be 5xxx or 8xxx level. Coursework must be from classroom and laboratory courses. No colloquia, seminar, or special investigation credits count toward meeting the minor requirements.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
The master's minor requires a minimum of 6 credits in EE courses. All courses must be taken A-F. Courses that are cross-listed must be taken under the EE designator to count towards degree requirements.
Doctoral
The doctoral minor requires a minimum of 12 credits in EE courses. All courses must be taken A-F. Courses that are cross-listed must be taken under the EE designator to count towards degree requirements.
Twin Cities Campus
Electrical Engineering Ph.D.
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street SE, Minneapolis, MN 55455 (612-625-3564; fax: 612-626-1136)
Email: jager001@umn.edu
Website: http://www.ece.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 64
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Students are considered for admission beginning fall semester only (except for part-time students living in Minnesota who work in industry who may apply for other terms). The deadline for applying for fall semester is December 1.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

Other requirements to be completed before admission:
All documents must be submitted electronically. No documents should be mailed to the department or the Graduate Admissions Office.

Applicants to the doctoral program must submit a writing sample with their online application. The writing sample should consist of a minimum of one, to a maximum of three, class papers or publications.

Every applicant, except University of Minnesota bachelor of electrical engineering graduates who have a GPA of 3.40 or better, must submit the General Test of the GRE. The GRE Subject Test is not required for admission.

Special Application Requirements:
Applications are accepted for fall admission only. The deadline is December 1. Additional application information is available at http://www.ece.umn.edu/ProspectiveStudentsGraduate/index.htm

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

**IELTS**
- Total Score: 6.5

**MELAB**
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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**Program Requirements**

14 to 28 credits are required in the major.
12 to 26 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

The PhD degree requires a minimum of 40 course credits and 24 thesis credits. The program must include 14 credits in EE courses at the 5xxx-level and above, and 12 credits in a minor or supporting program outside of EE but within the College of Science and Engineering (CSE). The remaining 14 credits may be taken in the major field or in any supporting field within CSE.

All courses must be taken A-F, with the exception of EE 5041, EE 8925, and graduate seminars, which are only offered S-N. Courses that are cross-listed must be taken under the EE designator to count towards degree requirements, and non-EE coursework that is cross listed with EE does not count toward the outside field requirement.

A minimum of 6 course credits at the 8xxx-level must be included. Courses can be from the major or outside field; but seminars, directed study, and special investigations may not be used to satisfy this requirement.

A maximum of nine 4xxx-level course credits may be used toward degree requirements. Only the 4xxx-level courses included on the lists below will be accepted.

PhD students who enter the department with a MS degree in electrical engineering must pass the PhD Preliminary Written Examination by the end of their third semester in residence. Students who enter with an MS in another field, or students who enter with a bachelor's degree, have until the end of their second year in residence to pass the exam. Students have two chances to pass the exam. The exam is typically held in November and in April.

**Required Courses**

**Major Field Coursework**

Major field coursework is accepted from the following list only. Take 14 or more credit(s) from the following:

- **EE 5121** - Transistor Device Modeling for Circuit Simulation (3.0 cr)
- **EE 5141** - Introduction to Microsystem Technology (4.0 cr)
- **EE 5163** - Semiconductor Properties and Devices I (3.0 cr)
- **EE 5164** - Semiconductor Properties and Devices II (3.0 cr)
- **EE 5171** - Microelectronic Fabrication (4.0 cr)
- **EE 5173** - Basic Microelectronics Laboratory (1.0 cr)
- **EE 5181** - Introduction to Nanotechnology (4.0 cr)
- **EE 5231** - Linear Systems and Optimal Control (3.0 cr)
- **EE 5235** - Robust Control System Design (3.0 cr)
- **EE 5239** - Introduction to Nonlinear Optimization (3.0 cr)
- **EE 5251** - Optimal Filtering and Estimation (3.0 cr)
- **EE 5301** - VLSI Design Automation I (3.0 cr)
- **EE 5302** - VLSI Design Automation II (3.0 cr)
- **EE 5323** - VLSI Design I (3.0 cr)
• EE 5324 - VLSI Design II (3.0 cr)
• EE 5327 - VLSI Design Laboratory (3.0 cr)
• EE 5329 - VLSI Digital Signal Processing Systems (3.0 cr)
• EE 5333 - Analog Integrated Circuit Design (3.0 cr)
• EE 5351 - Applied Parallel Programming (3.0 cr)
• EE 5364 - Advanced Computer Architecture (3.0 cr)
• EE 5371 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
• EE 5381 - Telecommunications Networks (3.0 cr)
• EE 5391 - Computing With Neural Networks (3.0 cr)
• EE 5393 - Circuits, Computation, and Biology (3.0 cr)
• EE 5501 - Digital Communication (3.0 cr)
• EE 5505 - Wireless Communication (3.0 cr)
• EE 5531 - Probability and Stochastic Processes (3.0 cr)
• EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
• EE 5545 - Digital Signal Processing Design (3.0 cr)
• EE 5549 - Digital Signal Processing Structures for VLSI (3.0 cr)
• EE 5551 - Multiscale and Multirate Signal Processing (3.0 cr)
• EE 5561 - Image Processing and Applications (3.0 cr)
• EE 5581 - Information Theory and Coding (3.0 cr)
• EE 5583 - Error Control Coding (3.0 cr)
• EE 5585 - Data Compression (3.0 cr)
• EE 5601 - Introduction to RF/Microwave Engineering (3.0 cr)
• EE 5602 - RF/Microwave Circuit Design (3.0 cr)
• EE 5611 - Plasma-Aided Manufacturing (4.0 cr)
• EE 5613 - RF/Microwave Circuit Design Laboratory (2.0 cr)
• EE 5616 - Antenna Theory and Design (3.0 cr)
• EE 5621 - Physical Optics (3.0 cr)
• EE 5622 - Physical Optics Laboratory (1.0 cr)
• EE 5624 - Optical Electronics (4.0 cr)
• EE 5627 - Optical Fiber Communication (3.0 cr)
• EE 5628 - Fiber Optics Laboratory (1.0 cr)
• EE 5629 - Optical System Design (2.0 cr)
• EE 5653 - Physical Principles of Magnetic Materials (3.0 cr)
• EE 5655 - Magnetic Recording (3.0 cr)
• EE 5657 - Physical Principles of Thin Film Technology [WI] (4.0 cr)
• EE 5705 - Electric Drives in Sustainable Energy Systems (3.0 cr)
• EE 5709 - Electric Drives in Sustainable Energy Systems Laboratory (1.0 cr)
• EE 5721 - Power Generation Operation and Control (3.0 cr)
• EE 5725 - Power Systems Engineering (3.0 cr)
• EE 5741 - Advanced Power Electronics (3.0 cr)
• EE 5745 - Wind Energy Essentials (2.0 cr)
• EE 5940 - Special Topics in Electrical Engineering I (1.0 - 4.0 cr)
• EE 5950 - Special Topics in Electrical Engineering II (1.0 - 4.0 cr)
• EE 5960 - Special Topics in Electrical Engineering III (1.0 - 4.0 cr)
• EE 5970 - Special Topics in Electrical Engineering IV (1.0 - 4.0 cr)
• EE 8100 - Advanced Topics in Electronics (1.0 - 3.0 cr)
• EE 8141 - Advanced Heterojunction Transistors (3.0 cr)
• EE 8161 - Physics of Semiconductors (3.0 cr)
• EE 8163 - Quantum Electronics (3.0 cr)
• EE 8213 - Advanced System Theory (3.0 cr)
• EE 8215 - Nonlinear Systems (3.0 cr)
• EE 8231 - Optimization Theory (3.0 cr)
• EE 8235 - Advanced Control Topics (3.0 cr)
• EE 8300 - Advanced Topics in Computers (1.0 - 3.0 cr)
• EE 8310 - Advanced Topics in VLSI (1.0 - 3.0 cr)
• EE 8320 - Advanced Topics in Design Automation (1.0 - 3.0 cr)
• EE 8331 - CMOS Data Converters: A/D and D/A (3.0 cr)
• EE 8337 - Analog Circuits for Wire/Wireless Communications (3.0 cr)
• EE 8367 - Parallel Computer Organization (3.0 cr)
• EE 8510 - Advanced Topics in Communications (1.0 - 3.0 cr)
• EE 8520 - Advanced Topics in Signal Processing (1.0 - 3.0 cr)
• EE 8581 - Detection and Estimation Theory (3.0 cr)
• EE 8591 - Predictive Learning from Data (3.0 cr)
• EE 8601 - Advanced Electromagnetic Theory (3.0 cr)
• EE 8611 - Plasma Physics (3.0 cr)
• EE 8620 - Advanced Topics in Magnetics (1.0 - 3.0 cr)
• EE 8630 - Advanced Topics in Electromagnetics (1.0 - 3.0 cr)
• EE 8725 - Advanced Power System Analysis and Economics (3.0 cr)
• EE 8741 - Power Electronics in Power Systems (3.0 cr)
• EE 8950 - Advanced Topics in Electrical and Computer Engineering (1.0 - 3.0 cr)

Outside Field Coursework

Outside field and the additional coursework credits may be chosen from this list. A maximum of 2 credits of the following may be applied: EE 5041, EE 8190, EE 8210, EE 8230, EE 8360, EE 8370, EE 8500, EE 8610, EE 8660, EE 8920, EE 8925, and EE 8940. Take 12 or more credit(s) from the following:

• AEM 4203 - Aerospace Propulsion (4.0 cr)
• AEM 4295 - Problems in Fluid Mechanics (1.0 - 3.0 cr)
• AEM 4301 - Orbital Mechanics (3.0 cr)
• AEM 4303W - Flight Dynamics and Control [WI] (3.0 cr)
• AEM 4305 - Spacecraft Attitude Dynamics and Control (3.0 cr)
• AEM 4331 - Aerospace Vehicle Design (4.0 cr)
• AEM 4333 - Aerospace Design: Special Projects (3.0 cr)
• AEM 4371 - Helicopter Aerodynamics (3.0 cr)
• AEM 4495 - Problems in Aerospace Systems (3.0 cr)
• AEM 4501 - Aerospace Structures (3.0 cr)
• AEM 4502 - Computational Structural Analysis (3.0 cr)
• AEM 4511 - Mechanics of Composite Materials (3.0 cr)
• AEM 4581 - Mechanics of Solids (3.0 cr)
• AEM 4595 - Problems in Mechanics and Materials (1.0 - 3.0 cr)
• AEM 4601 - Instrumentation Laboratory (3.0 cr)
• AEM 4602W - Aeromechanics Laboratory [WI] (4.0 cr)
• AEM 5247 - Hypersonic Aerodynamics (3.0 cr)
• AEM 5253 - Computational Fluid Mechanics (3.0 cr)
• AEM 5333 - Design-to-Flight: Small Uninhabited Aerial Vehicles (3.0 cr)
• AEM 5401 - Intermediate Dynamics (3.0 cr)
• AEM 5501 - Continuum Mechanics (3.0 cr)
• AEM 5581 - Mechanics of Solids (3.0 cr)
• AEM 5651 - Aeroelasticity (3.0 cr)
• AEM 8202 - Fluid Mechanics II (3.0 cr)
• AEM 8211 - Theory of Turbulence I (3.0 cr)
• AEM 8253 - Computational Methods in Fluid Mechanics (3.0 cr)
• AEM 8421 - Robust Multivariable Control Design (3.0 cr)
• AEM 8423 - Convex Optimization Methods in Control (3.0 cr)
• AEM 8495 - Advanced Topics in Aerospace Systems (1.0 - 4.0 cr)
• BBE 5023 - Process Control and Instrumentation (3.0 cr)
• BBE 5333 - Off-road Vehicle Design (4.0 cr)
• BBE 5413 - A Systems Approach to Residential Construction (4.0 cr)
• BBE 5416 - Building Testing & Diagnostics (2.0 cr)
• BBE 5733 - Renewable Energy Technologies (3.0 cr)
• BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
• BIOC 5527 - Introduction to Modern Structural Biology (4.0 cr)
• BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
• BIOL 4003 - Genetics (3.0 cr)
• BIOL 4004 - Cell Biology (3.0 cr)
• BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
• BIOL 4850 - Special Topics in Biology (1.0 - 5.0 cr)
• BIOL 4950 - Special Topics in Biology (1.0 - 4.0 cr)
• BIOL 5272 - Applied Biostatistics (3.0 cr)
• BMEN 5001 - Advanced Biomaterials (3.0 cr)
• BMEN 5041 - Tissue Engineering (3.0 cr)
• BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
• BMEN 5111 - Biomedical Ultrasound (3.0 cr)
• BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
• BMEN 5201 - Advanced Biomechanics (3.0 cr)
• BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
• BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
• BMEN 5351 - Cell Engineering (3.0 cr)
• BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
• BMEN 5411 - Neural Engineering (3.0 cr)
• BMEN 5412 - Neuroumodulation (3.0 cr)
• BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
• BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
• BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
• BMEN 5701 - Cancer Bioengineering (3.0 cr)
• BMEN 8001 - Polymeric Biomaterials (3.0 cr)
• BMEN 8041 - Advanced Tissue Engineering Lab (3.0 cr)
• BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
• BMEN 8201 - Advanced Tissue Mechanics (3.0 cr)
• BMEN 8381 - Bioheat and Mass Transfer (3.0 cr)
• BMEN 8401 - New Product Design and Business Development (4.0 cr)
• BMEN 8402 - New Product Design and Business Development (4.0 cr)
• BMEN 8421 - Biophotonics (3.0 cr)
• BMEN 8501 - Dynamical Systems in Biology (3.0 cr)
• BMEN 8502 - Physiological Control Systems (3.0 cr)
• BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
• BMEN 8500 - Special Topics in Biomedical Engineering (1.0 - 4.0 cr)
• CEGE 5211 - Traffic Engineering (3.0 cr)
• CEGE 5214 - Transportation Systems Analysis (4.0 cr)
• CEGE 5341 - Wave Methods for Nondestructive Testing (4.0 cr)
• CEGE 5411 - Applied Structural Mechanics (3.0 cr)
• CHEM 4001 - Chemistry of Biomass and Biomass Conversion to Fuels and Products (4.0 cr)
• CHEM 4011 - Mechanisms of Chemical Reactions (3.0 cr)
• CHEM 4021 - Computational Chemistry (3.0 cr)
• CHEM 4068 - Chemistry of Industry (3.0 cr)
• CHEM 4101 - Modern Instrumental Methods of Chemical Analysis (3.0 cr)
• CHEM 4111W - Modern Instrumental Methods of Chemical Analysis Lab [WI] (2.0 cr)
• CHEM 4201 - Materials Chemistry (3.0 cr)
• CHEM 4214 - Polymers (3.0 cr)
• CHEM 4221 - Introduction to Polymer Chemistry (3.0 cr)
• CHEM 4223W - Polymer Laboratory [WI] (2.0 cr)
• CHEM 4301 - Applied Surface and Colloid Science (3.0 cr)
• CHEM 4311W - Advanced Organic Chemistry Lab [WI] (4.0 cr)
• CHEM 4321 - Organic Synthesis (3.0 cr)
• CHEM 4322 - Advanced Organic Chemistry (3.0 cr)
• CHEM 4352 - Physical Organic Chemistry (3.0 cr)
• CHEM 4361 - Interpretation of Organic Spectra (3.0 cr)
• CHEM 4411 - Introduction to Chemical Biology (3.0 cr)
• CHEM 4412 - Chemical Biology of Enzymes (3.0 cr)
• CHEM 4413 - Nucleic Acids (3.0 cr)
• CHEM 4501 - Introduction to Thermodynamics, Kinetics, and Statistical Mechanics (3.0 cr)
• CHEM 4502 - Introduction to Quantum Mechanics and Spectroscopy (3.0 cr)
• CHEM 4511W - Advanced Physical Chemistry Lab [WI] (3.0 cr)
• CHEM 4601 - Green Chemistry [ENV] (3.0 cr)
• CHEM 4701 - Inorganic Chemistry (3.0 cr)
• CHEM 4711W - Advanced Inorganic Chemistry Lab [WI] (3.0 cr)
• CHEM 4715 - Physical Inorganic Chemistry (3.0 cr)
• CHEM 4725 - Organometallic Chemistry (3.0 cr)
• CHEM 4735 - Bioinorganic Chemistry (3.0 cr)
• CHEM 4745 - Advanced Inorganic Chemistry (3.0 cr)
• CHEM 5755 - X-Ray Crystallography (4.0 cr)
• CHEM 8152 - Analytical Spectroscopy (4.0 cr)
• CHEM 8201 - Materials Chemistry (4.0 cr)
• CHEM 8551 - Quantum Mechanics I (4.0 cr)
• CHEM 8552 - Quantum Mechanics II (4.0 cr)
• CHEM 4214 - Polymers (3.0 cr)
• CHEM 4401W - Senior Chemical Engineering Lab [WI] (3.0 cr)
• CHEM 4501W - Chemical Engineering Design I [WI] (3.0 cr)
• CHEM 4502W - Chemical Engineering Design II [WI] (2.0 cr)
• CHEM 4601 - Process Control (3.0 cr)
• CHEM 4701 - Advanced Undergraduate Applied Math I: Linear Analysis (3.0 cr)
• CHEM 4702 - Advanced Undergraduate Rheology (2.0 cr)
• CHEM 4704 - Advanced Undergraduate Physical Rate Processes I: Transport (3.0 cr)
• CHEM 4707 - Advanced Undergraduate Statistical Thermodynamics and Kinetics (3.0 cr)
• CHEM 4708 - Advanced Undergraduate Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
• CHEM 5751 - Biochemical Engineering (3.0 cr)
<table>
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<tr>
<td>CHEN 5771</td>
<td>Colloids and Dispersions</td>
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<td>Fluid Mechanics I: Change, Deformation, Equations of Flow</td>
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<td>CSCI 5552</td>
<td>Sensing and Estimation in Robotics</td>
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<td>CSCI 5561</td>
<td>Computer Vision</td>
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<td>CSCI 5619</td>
<td>Virtual Reality and 3D Interaction</td>
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<td>CSCI 5707</td>
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<td>Architecture and Implementation of Database Management Systems</td>
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<td>CSCI 8314</td>
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<td>Linear Control Systems: Designed by Input/Output Methods</td>
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<td>State Space Control System Design</td>
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<td>Digital Design With Programmable Logic</td>
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<td>Introduction to Programmable Devices Laboratory</td>
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<td>Digital Signal Processing</td>
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<td>Wireless Hardware System Design</td>
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<td>EE 4701</td>
<td>Electric Drives</td>
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<td>Electric Drives Laboratory</td>
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<td>EE 4721</td>
<td>Introduction to Power System Analysis</td>
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<td>EE 4722</td>
<td>Power System Analysis Laboratory</td>
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<td>EE 4741</td>
<td>Power Electronics</td>
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<td>EE 4743</td>
<td>Switch-Mode Power Electronics Laboratory</td>
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<td>EE 5041</td>
<td>Industrial Assignment for Graduate Students</td>
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<td>EE 8190</td>
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<td>Control Theory Seminar</td>
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<td>EE 8370</td>
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<td>EE 8500</td>
<td>Seminar: Communications</td>
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<tr>
<td>EE 8610</td>
<td>Seminar: Electronics, Fields, and Photonics</td>
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<td>EE 8660</td>
<td>Seminar: Magnetics</td>
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<td>EE 8925</td>
<td>Ethics in Electrical and Computer Engineering</td>
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<td>IE 5441</td>
<td>Financial Decision Making</td>
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<td>IE 8532</td>
<td>Stochastic Processes and Queuing Systems</td>
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<td>IE 8534</td>
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<td>Theory of Interest</td>
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<td>Topics in Mathematics</td>
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<td>Actuarial Mathematics I</td>
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<td>Mathematical Logic II</td>
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<td>Cryptology and Number Theory</td>
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<td>MATH 5251</td>
<td>Error-Correcting Codes, Finite Fields, Algebraic Curves</td>
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<td>MATH 5335</td>
<td>Geometry I</td>
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<td>Introduction to Computational Algebraic Geometry</td>
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• MATH 5445 - Mathematical Analysis of Biological Networks (4.0 cr)
• MATH 5447 - Theoretical Neuroscience (4.0 cr)
• MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
• MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
• MATH 5486 - Introduction to Numerical Methods II (4.0 cr)
• MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
• MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
• MATH 5583 - Complex Analysis (4.0 cr)
• MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
• MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
• MATH 5654 - Prediction and Filtering (4.0 cr)
• MATH 5705 - Enumerative Combinatorics (4.0 cr)
• MATH 5707 - Graph Theory and Non-Enumerative Combinatorics (4.0 cr)
• MATH 5711 - Linear Programming and Combinatorial Optimization (4.0 cr)
• MATH 8301 - Manifolds and Topology (3.0 cr)
• MATH 8302 - Manifolds and Topology (3.0 cr)
• MATH 8401 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
• MATH 8402 - Mathematical Modeling and Methods of Applied Mathematics (3.0 cr)
• MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
• MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
• MATH 8450 - Topics in Numerical Analysis (1.0 - 3.0 cr)
• MATH 8600 - Topics in Advanced Applied Mathematics (1.0 - 3.0 cr)
• MATH 8601 - Real Analysis (3.0 cr)
• MATH 8602 - Real Analysis (3.0 cr)
• MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
• MATH 8668 - Combinatorial Theory (3.0 cr)
• MATH 8995 - Special Topics (1.0 - 4.0 cr)
• ME 5113 - Aerosol/Particle Engineering (4.0 cr)
• ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
• ME 5241 - Computer-Aided Engineering (4.0 cr)
• ME 5243 - Advanced Mechanism Design (4.0 cr)
• ME 5247 - Stress Analysis, Sensing, and Transducers (4.0 cr)
• ME 5281 - Analog and Digital Control (4.0 cr)
• ME 5286 - Robotics (4.0 cr)
• ME 5312 - Solar Thermal Technologies (4.0 cr)
• ME 5344 - Thermodynamics of Fluid Flow With Applications (4.0 cr)
• ME 5351 - Computational Heat Transfer (4.0 cr)
• ME 5461 - Internal Combustion Engines (4.0 cr)
• ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
• NPSE 8101 - Nanoparticle Science and Engineering Seminar (1.0 cr)
• PHSL 5201 - Computational Neuroscience I: Membranes and Channels (3.0 cr)
• PHYS 4001 - Analytical Mechanics (4.0 cr)
• PHYS 4002 - Electricity and Magnetism (4.0 cr)
• PHYS 4041 - Computational Methods in the Physical Sciences (4.0 cr)
• PHYS 4051 - Methods of Experimental Physics I (5.0 cr)
• PHYS 4052W - Methods of Experimental Physics II [WI] (5.0 cr)
• PHYS 4101 - Quantum Mechanics (4.0 cr)
• PHYS 4121W - History of 20th-Century Physics [WI] (3.0 cr)
• PHYS 4201 - Statistical and Thermal Physics (3.0 cr)
• PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
• PHYS 4303 - Electrodynamics and Waves (3.0 cr)
• PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
• PHYS 4611 - Introduction to Space Physics (3.0 cr)
• PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
• PHYS 4911 - Introduction to Biopolymer Physics (3.0 cr)
• PHYS 5001 - Quantum Mechanics I (4.0 cr)
• PHYS 5002 - Quantum Mechanics II (4.0 cr)
• PHYS 5011 - Classical Physics I (4.0 cr)
• PHYS 5012 - Classical Physics II (4.0 cr)
• PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
• PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
• PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
• PHYS 5402 - Radiological Physics (4.0 cr)
• PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
• PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
• PHYS 8711 - Solid-State Physics I (3.0 cr)
• PHYS 8712 - Solid-State Physics II (3.0 cr)
• PSY 5036W - Computational Vision [WI] (3.0 cr)
• PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
• STAT 4101 - Theory of Statistics I (4.0 cr)
• STAT 4102 - Theory of Statistics II (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5031 - Statistical Methods for Quality Improvement (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5201 - Sampling Methodology in Finite Populations (3.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5303 - Designing Experiments (4.0 cr)
• STAT 5401 - Applied Multivariate Methods (3.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5511 - Time Series Analysis (3.0 cr)
• STAT 8053 - Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression (3.0 cr)
• STAT 8054 - Statistical Methods 4: Advanced Statistical Computing (3.0 cr)
• STAT 8101 - Theory of Statistics I (3.0 cr)
• STAT 8111 - Mathematical Statistics I (3.0 cr)
• STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)
• STAT 8711 - Statistical Computing (3.0 cr)
• STAT 8931 - Advanced Topics in Statistics (3.0 cr)
• STAT 8932 - Advanced Topics in Statistics (3.0 cr)

**Thesis Credits**

Take 24 credits after passing preliminary oral exam.

**EE 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Environmental Restoration Engineering and Science M.S.
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Environmental Restoration Engineering and Science Graduate Program, 122 Civil Engineering, 500 Pillsbury Drive SE, Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: volle001@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program is not admitting students.

The goal of the master of science in environmental restoration engineering and science is to produce graduates who will understand how to combine engineering with physical, biological, and social sciences in order to contribute to the process of prioritizing, designing, implementing, evaluating, and setting policy for environmental restoration projects. In short, the program aims to generate future leaders who will both succeed in practice and set the national agenda for restoring, maintaining, and sustaining the Earth-surface environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in a field related to ecology, civil engineering, or environmental and earth sciences. Other degrees will be accepted based on relevant experience at the discretion of the DGS.

Other requirements to be completed before admission:
This program is not admitting students.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 16
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Students complete the capstone project by undertaking a field research internship for 6 credits. Students will be required to document 100 hours of project-based work and will complement this work with a 10-minute oral presentation on the required Stream Restoration Practice course (CEGE 8602).

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

The program requires a minimum of 30 credits consisting of 9 credits in required core classes and 15 credits in elective courses chosen in consultation with advisor. The remaining 6 credits are met by undertaking a field-based internship.

Required Courses

- CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
- CEGE 8602 - Stream Restoration Practice (2.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)

Electives

Take at least 15 elective course credits, in consultation with the advisor.

Internship

Complete a 6-credit internship, in consultation with the advisor.
Twin Cities Campus
Environmental Restoration Engineering and Science Minor
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Contact Information:
Environmental Restoration Science and Engineering Graduate Program, 122 Civil Engineering, 500 Pillsbury Dr SE, Minneapolis, MN 55455 (612-626-5522; fax: 612-626-7750)
Email: volle001@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The environmental restoration engineering and science minor is not currently admitting students.

The goal of the Environmental Restoration Engineering and Science program is to produce graduates who will understand how to combine engineering with physical, biological, and social sciences in order to contribute to the process of prioritizing, designing, implementing, evaluating, and setting policy for environmental restoration projects. In short, the program aims to generate future leaders who will both succeed in practice and set the national agenda for restoring, maintaining, and sustaining the Earth-surface environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
The environmental restoration engineering and science minor is not currently admitting students.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The required courses, CEGE 8601 and CEGE 8602, are also offered as EEB/ESCI 8601 and EEB/ESCI 8602. Students obtaining a degree in earth sciences, civil engineering, or ecology, evolution and behavior should register for these courses under a designator other than their major field.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's
Required Courses

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Information current as of December 20, 2016
CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
CEGE 8602 - Stream Restoration Practice (2.0 cr)

**Recommended Elective**
Take at least 3 credits. Consult with the ERES director of graduate studies for other course options.

HORT 5071 - Ecological Restoration (4.0 cr)
Twin Cities Campus
Financial Mathematics M.F.M.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Program in Financial Mathematics, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: mfmath@umn.edu
Website: http://www.math.umn.edu/finmath/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Financial Mathematics

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of financial mathematics degree program helps students understand the underlying mathematics of quantitative finance. The program offers a range of courses, from theoretical to practical, including a mathematical course on stochastic processes, a practitioner's course offering hands-on application of financial software tools, and a programming course focusing on C# and MATLAB.

Courses are offered in the evenings to accommodate working professionals. The program is designed with the possibility for full-time students to complete all requirements in one year.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree from an accredited US university or foreign equivalent. The minimum undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants should have completed college level courses in single variable and multivariable calculus and linear algebra. Background in probability and familiarity with programming language are highly recommended.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is February 1. Additional information is available at http://www.math.umn.edu/finmath/admission_requirements/

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 32 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

The MFM requires 32 credits, consisting of four year-long course sequences. These sequences may be taken either in parallel or sequentially, following their numerical order, with the exception of FM 5091/5092, which is recommended to be taken as early as possible. In addition to the 32 required credits, students who either do not have a strong mathematics background or who need a refresher may be asked to take FM 5001/5002 - Preparation for Financial Mathematics.

Students may take the optional FM 5990 topics course, which is offered periodically.

Required Courses
- FM 5011 - Mathematical Background for Finance I (4.0 cr)
- FM 5012 - Mathematical Background for Finance II (4.0 cr)
- FM 5021 - Mathematical Theory Applied to Finance I (4.0 cr)
- FM 5022 - Mathematical Theory Applied to Finance II (4.0 cr)
- FM 5031 - A Practitioner's Course in Finance I (4.0 cr)
- FM 5032 - A Practitioner's Course in Finance II (4.0 cr)
- FM 5091 - Computation, Algorithms, and Coding in Finance I (4.0 cr)
- FM 5092 - Computation, Algorithms, and Coding in Finance II (4.0 cr)

Elective Course
- FM 5990 - Topics in Financial Mathematics (1.0 - 2.0 cr)
Twin Cities Campus
Fundamentals of Quantitative Finance Postbaccalaureate Certificate
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: mfmath@umn.edu
Website: http://www.math.umn.edu/finmath/

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Fundamentals of Quantitative Finance PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in fundamentals of quantitative finance (FQF) is a 14-credit certificate with four required courses. The certificate is good preparation for the master of financial mathematics (M.F.M.) degree program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• completely online (all program coursework can be completed online)

Prerequisites for Admission
A bachelor's degree from an accredited U.S. university or foreign equivalent. The minimum undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants should have a good background in mathematics, but not necessarily at the level of a mathematics major. In particular, all applicants must have taken at least three semesters of college calculus, covering two semesters of single variable calculus and an additional semester of either multivariable calculus or linear algebra.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is May 15. Additional information is available at http://www.math.umn.edu/finmath/admission_requirements/

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
Students must complete four courses in Financial Mathematics for 14 credits.

**Required Courses**
- FM 5001 - Preparation for Financial Mathematics I (3.0 cr)
- FM 5002 - Preparation for Financial Mathematics II (3.0 cr)
- FM 5091 - Computation, Algorithms, and Coding in Finance I (4.0 cr)
- FM 5092 - Computation, Algorithms, and Coding in Finance II (4.0 cr)
Twin Cities Campus

Geoengineering M.GeoE.
CSENG Civil, Envrn & Geo-Eng (CEGE)

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Geoengineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing.

The master of geoengineering (M.GeoE.) degree is for the practicing engineer who would like to obtain an advanced degree enrolling part-time or full-time. Students who intend to proceed to the Ph.D. program, or who think they may later wish to be admitted to the Ph.D. program, should apply for the master of science program. Students are expected to follow a coherent program of coursework selected with the help of a faculty adviser and approved by the director of graduate studies. Students also must demonstrate professional competence by carrying out and defending a design project or by taking a coursework-related final oral exam (without a project).

The degree typically takes 2-3 semesters (12-18 months) to complete on a full-time basis or 6-8 semesters on a part-time basis. Students interested in pursuing doctoral studies should see the Ph.D. program in civil engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An ABET-accredited, four-year bachelor's degree in engineering is required for admission.

Other requirements to be completed before admission:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application. Additional information is available at http://www.cege.umn.edu/prospective/graduate/how-to-apply.html

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
- Total Score: 6.5
- MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.GeoE. requires a minimum of 30 credits and is offered under two plans. Plan A requires preparation of a thesis/design project. The thesis/design project must be carried out by the student in consultation with a faculty adviser. Plan C is a coursework-only degree program.

Required Courses

Any courses at the 5xxx and 8xxx level from the following programs may be used: AEM, AST, BBE, BMEN, CEGE, CHEM, CHEN, CSCI, EE, ESCI, IE, MATH, MATS, ME, PHYS, STAT. Use of 4xxx level courses must be approved by the Director of Graduate Studies and a maximum of 8 credits may be included. The following 4xxx courses may not be used: CEGE 4121, 4311, 4501, and 4522. Six credits in a minor may be included in the course credit total.

Seminar

Students may count one seminar credit in the course credit total.

CEGE 8300 - Seminar: Geomechanics (1.0 - 3.0 cr)

Plan A

Plan A requires a minimum of 20 course credits and 10 thesis credits for the design project.

CEGE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan C

Plan C requires a minimum of 30 credits of coursework chosen in consultation with adviser.
Twin Cities Campus

Geoengineering M.S.
CSENG Civil, Envrm & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesps@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of communication, flow of granular materials, hydraulic fracturing, and nondestructive testing.

The master of science (M.S.) degree balances education in engineering fundamentals and design with research and development. It is designed for students wishing to pursue a career in industry or to continue toward a Ph.D. degree.

Students interested in pursuing doctoral studies should see the Ph.D. program in civil engineering.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in engineering, basic science, or mathematics is preferred.

Other requirements to be completed before admission:
Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack geoengineering training are often required to complete at least one appropriate course from the undergraduate program. Graduate degree credit is not awarded for such preparatory work.

Special Application Requirements:
The application deadlines are December 3 for fall admission and August 31 for spring admission. All materials must be submitted to the online application. Additional information is available at http://www.cenge.umn.edu/prospective/graduate/how-to-apply.html

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  - IELTS
    - Total Score: 6.5
  - MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral.

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. requires at least 30 credits and is offered under three plans. Plan A emphasizes research and preparation of a thesis; Plan B emphasizes coursework and a project; Plan C is coursework only. The Plan A thesis is written on a research project carried out in consultation with a faculty adviser. Under Plan B, students complete one to three Plan B papers as determined by the faculty adviser. Plan B papers can include computer programs, annotated bibliographies, field investigations, and analysis/design of special engineering problems. A program typically takes 18 to 24 months to complete.

Required Courses

Any courses at the 5xxx and 8xxx level from the following programs may be used: AEM, AST, BBE, BMEN, CEGE, CHEM, CHEN, CSCI, EE, ESCI, IE, MATH, MATS, ME, PHYS, STAT. Use of 4xxx level courses must be approved by the Director of Graduate Studies and a maximum of 8 credits may be included. The following 4xxx courses may not be used: CEGE 4121, 4311, 4501, and 4522. Six credits in a minor may be included in the course credit total.

Seminar

Students may include one seminar credit in the course credit total
CEGE 8300 - Seminar: Geomechanics (1.0 - 3.0 cr)

Plan A

Plan A requires a minimum of 20 course credits and 10 thesis credits.
CEGE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B

Plan B requires a minimum of 30 credits, which includes at least 27 course credits and a maximum of 3 credits of CEGE 8094 for the Plan B project.
CEGE 8094 - Civil Engineering Research (1.0 - 4.0 cr)

Plan C

Plan C requires 30 course credits and must include at least two courses at the 8xxx-level. Students must also complete 100 hours of project work, give an oral presentation of no less than 10 minutes, and complete two hours of ethics training.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Integrated B.GeoE./M.S. - Geoengineering

The department offers an integrated Bachelor of Geoengineering (B.GeoE.) and Master of Science (M.S.) in Geoengineering. The integrated B.GeoE./M.S. program offers students the opportunity to earn the bachelors and masters degree in five years. These
programs offer several benefits: streamlined admissions from the undergraduate to the graduate program (GRE not required); flexibility in fulfilling required courses for both degrees during the senior year (up to 16 credits can be transferred to the graduate program); and eligibility for teaching and research assistantships.

Both the B.GeoE. and M.S. degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the M.S. degree are permitted to count credits originally planned for the graduate program toward their B.GeoE. technical electives.

Eligibility Requirements:

Application to the Combined Program is open to geoengineering undergraduates who:

- are within 32 credits of completing the requirements for the bachelors degree;
- have a faculty adviser selected prior to admission; and
- hold a cumulative GPA of 3.3 or higher.

**Integrated B.C.E./M.S. - Geoengineering**
The department offers an integrated Bachelor of Civil Engineering (B.C.E) and Master of Science (M.S.) in Geoengineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the B.GeoE./M.S. integrated program also apply to the B.C.E./M.S.

**Integrated B.Env.E./M.S. - Geoengineering**
The department offers an integrated Bachelor of Environmental Engineering (B.Env.E.) and Master of Science (M.S.) in Geoengineering. Benefits, eligibility requirements, and degree-completion requirements outlined for the B.GeoE./M.S. integrated program also apply to the B.Env.E./M.S.
Twin Cities Campus
Geoengineering Minor
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil, Environmental, and Geo-Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cegesp@umn.edu
Website: http://www.cege.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
For a master's minor, two or more 5xxx or 8xxx level courses in geoengineering are required, for a total of 6 or more credits.

Geoengineering
CEGE 53xx
CEGE 83xx
Twin Cities Campus
Industrial and Systems Engineering M.S.I.S.Y.E.

Industrial and Systems Engineering
College of Science and Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

The Department of Industrial & Systems Engineering (ISyE) offers an MS degree with two tracks: the Industrial Engineering (IE) track and the Systems Engineering (SE) track, and a PhD degree. MS degree applicants must indicate which track they are applying for on the application form. Note that the admission requirements for the two tracks are different. In addition, the ISyE program also offers a dual MS in ISyE and Civil Engineering (Transportation Engineering focus) and an integrated bachelor's/master's program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in engineering or a closely related field is required.

Other requirements to be completed before admission:
For applicants to the SE Track, at least two years of professional work experience in a technical field are required. Promising candidates with less experience will be considered under exceptional circumstances. Applicants must submit three letters of recommendation and a personal statement. In addition to the academic record, the professional record of the applicant and the letters of recommendation carry weight in admission decisions. A GRE score is not required.

Special Application Requirements:
All application materials should be submitted electronically through the ApplyYourself application system.

Applicants to the IE Track must submit a GRE score. Letters of recommendation are not required, but are highly recommended if you want to be considered for financial aid.

The application deadlines are December 15 for fall semester and October 15 for spring semester. Additional information is available at http://www.isye.umn.edu/apply/

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

IELTS
- Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 16 to 24 major credits and 6 to 14 credits outside the major. The final exam is oral.

Plan C: Plan C requires 16 to 26 major credits and 6 to 16 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The Master of Science in Industrial and Systems Engineering (M.S.I.Sy.E.) is offered with two tracks.

The industrial engineering (IE) track has three options. Plan A (thesis) and Plan B (project) require 30 credits and Plan C (coursework) requires 32 credits. Plan A requires a minimum of 14 course credits in the major field, and Plan B or Plan C requires 16 course credits in the major field. All plans must include a minimum of 6 course credits in a minor or related field outside ISyE and 1 credit of graduate seminar. The remaining credits may be taken in the major field or any supporting field.

The systems engineering (SE) track is a coursework-only option (Plan C) requiring 30 credits. It requires a minimum of 14 course credits in the major field and 6 course credits in a minor or related field outside ISyE. The remaining 10 credits may be taken in the major or in any supporting field.

Students may replace a required course with a qualifying replacement course if they have taken the equivalent of the required course elsewhere. A list of qualifying replacements is available on the ISyE program web page.

Joint- or Dual-degree Coursework: Dual M.S. in ISyE and Civil Engineering (Transportation Engineering Focus): Student may take a total of 15 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans.

Industrial Engineering

Plan A

Required Courses
- IE 5531 - Engineering Optimization I (4.0 cr)
- IE 5532 - Stochastic Models (4.0 cr)
- ME 8001 - Research Ethics and Professional Practice (0.0 cr)

Take 1 or more course(s) from the following:
- IE 5511 - Human Factors and Work Analysis (4.0 cr)
- IE 5545 - Decision Analysis (4.0 cr)
- IE 5551 - Production Planning and Inventory Control (4.0 cr)

Seminar
- Take 1 seminar credit. The following may be used or consult with adviser for further options.
  - IE 8773 - Graduate Seminar (1.0 cr)
  - IE 8774 - Graduate Seminar (1.0 cr)
Thesis Credits
Take 10 credits
IE 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B or Plan C

Required Courses
IE 5531 - Engineering Optimization I (4.0 cr)
IE 5532 - Stochastic Models (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)
Take 2 or more course(s) from the following:
• IE 5511 - Human Factors and Work Analysis (4.0 cr)
• IE 5545 - Decision Analysis (4.0 cr)
• IE 5551 - Production Planning and Inventory Control (4.0 cr)

Seminar
Take 1 seminar credit. The following may be used or consult with adviser for further options.
IE 8773 - Graduate Seminar (1.0 cr)
IE 8774 - Graduate Seminar (1.0 cr)

Project Requirement
Plan B students must either take the Plan B courses IE 8951/8953 (3 credits), or complete one to three Plan B papers, determined in consultation with the adviser.
IE 8951 - Plan B Course (1.0 cr)
IE 8953 - Plan B (2.0 cr)

Systems Engineering
This sub-plan is limited to students completing the program under Plan C.

Required Courses
IE 5111 - Systems Engineering I (2.0 cr)
IE 5113 - Systems Engineering II (4.0 cr)
IE 5541 - Project Management (4.0 cr)
IE 5553 - Simulation (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)

Integrated B.M.E./M.S.I.S.Y.E.
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The Department of Industrial and Systems Engineering and the Department of Mechanical Engineering offer an integrated bachelor’s/master’s degree program. The program makes it possible for students to earn a bachelor’s degree in Mechanical Engineering (B.M.E.) and a master’s degree in Industrial & Systems Engineering (M.S.I.S.Y.E.) in five years. The program has several benefits: a streamlined admissions process from the ME undergraduate program to the ISyE graduate program; graduate student status granted in the senior year; eligibility for teaching and research assistantships; and, flexibility in fulfilling required courses for both degrees simultaneously in the last two years of study. The integrated program is available only for the Industrial Engineering Track.

Both the BME and MSISYE degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MSISYE degree are permitted to count credits originally planned for the graduate program toward their undergraduate technical electives.

Eligibility Requirements:
- Students must be enrolled in the Mechanical Engineering undergraduate program at the University of Minnesota, Twin Cities.
- Students who are within 32 semester credits completing the requirements for the BME degree are eligible to apply.
- Students with a GPA of 3.25 or greater are preferred. For students who have transferred from another institution, at least one semester must be completed at the University of Minnesota, Twin Cities before admission to the program will be granted.
Twin Cities Campus
Industrial and Systems Engineering Minor
Industrial and Systems Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gradinfo@ie.umn.edu
Website: http://www.ie.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum of 6 credits are required for a master's minor and a minimum of 12 credits are required for a doctoral minor.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
The master's minor requires 6 credits in ISyE courses at the 5xxx-level or above. The following courses may not be used: IE 8773, IE 8774, and IE 8794.

Doctoral
The doctoral minor requires 12 credits in ISyE courses at the 5xxx-level or above. The following courses may not be used: IE 8773, IE 8774, and IE 8794.
Twin Cities Campus
Industrial and Systems Engineering Ph.D.

Industrial and Systems Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gradinfo@ie.umn.edu
Website: http://www.ie.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in engineering or a closely related field is required.

Special Application Requirements:
All application materials should be submitted electronically through the ApplyYourself application system. Students whose native language is not English are required to submit scores from one of the following English proficiency examinations: TOEFL, MELAB, or IELTS. The GRE General Test is required for students applying to the PhD program.

The application deadlines are December 15 for fall semester and October 15 for spring semester. Additional information is available at http://www.isye.umn.edu/apply/apply_phd.shtml

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

32 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The Ph.D. degree requires a minimum of 68 credits consisting of 16 required major credits, 12 course credits in a minor or a supporting program outside ISyE, 2 credits of graduate seminar, and 24 thesis credits. The remaining 14 course credits may be taken in the major or any supporting field.

Required Courses

Students may replace a required course with a qualifying replacement course if they have taken the equivalent of the required course elsewhere. A list of qualifying replacements is available on the ISyE program web page.

IE 8521 - Optimization (4.0 cr)
IE 8532 - Stochastic Processes and Queuing Systems (4.0 cr)
ME 8001 - Research Ethics and Professional Practice (0.0 cr)

Take 2 or more course(s) from the following:

- IE 5511 - Human Factors and Work Analysis (4.0 cr)
- IE 5545 - Decision Analysis (4.0 cr)
- IE 5551 - Production Planning and Inventory Control (4.0 cr)

Minor or Supporting Program

Take 12 credits in a minor or supporting program outside ISyE. The following courses may be used or consult with advisor for further options.

CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5521 - Introduction to Machine Learning (3.0 cr)
CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8117 - Noncooperative Game Theory (2.0 cr)
ECON 8118 - Noncooperative Game Theory (2.0 cr)
ECON 8119 - Cooperative Game Theory (2.0 cr)
MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
MATH 8601 - Real Analysis (3.0 cr)
MATH 8602 - Real Analysis (3.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 8651 - Theory of Probability Including Measure Theory (3.0 cr)
MATH 8652 - Theory of Probability Including Measure Theory (3.0 cr)
STAT 8501 - Introduction to Stochastic Processes with Applications (3.0 cr)

Seminar

Take 2 seminar credits. The following may be used or consult with advisor for further options.

IE 8773 - Graduate Seminar (1.0 cr)
IE 8774 - Graduate Seminar (1.0 cr)

Thesis Credits

Take 24 credits after passing preliminary oral exam

IE 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Industrial Engineering
Infrastructure Systems Management and Engineering M.S.I.S.M.E

Contact Information:
Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
(612-624-5474; fax: 612-624-7510)
Email: isme@umn.edu
Website: http://tli.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Infrastructure Sys Mgmt & Eng

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students are no longer being accepted into this program. Program requirements below are for current students only.

The master of science in infrastructure systems management and engineering (MSISME) focuses on developing management and engineering tools that address issues in local, county, and state infrastructure. It is an interdisciplinary program offered through the College of Science and Engineering's Technological Leadership Institute. The two-year, professional-format program focuses on key knowledge areas of engineering, technology, and science; management of personnel, projects, and programs; communications; governance; and synthesis. Fields of application include transportation engineering/pavement management; water resources/environmental engineering; municipal engineering; construction and maintenance; computer applications/asset management; parks, recreation and open space. The degree is offered in a hybrid online format, with in-person residencies scheduled over the course of the program.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students are no longer being accepted into this program.

A BS degree in engineering, plus a minimum of one year of professional work experience in an infrastructure area, or a BS degree in a related science or technology field and a minimum of two years professional work experience in an infrastructure area are required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 30 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The capstone integrates knowledge from courses in the master's program with job experience. Students will prepare a proposal, conduct the project and report the results in written and oral form. The project will involve some aspect of the design, management, and operation of some feature of infrastructure. Students must register for the capstone course ISME 8105 (3 cr).

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

Required Courses

- ISME 5101 - Project Management (3.0 cr)
- ISME 5112 - Infrastructure Systems Engineering Management (2.0 cr)
- ISME 5201 - Pavement Management Maintenance and Rehabilitation (2.0 cr)
- ISME 5202 - Traffic Engineering Management (2.0 cr)
- ISME 5301 - Bridge Management Maintenance and Rehabilitation (2.0 cr)
- ISME 5302 - Critical Infrastructure Security and Protection (2.0 cr)
- ISME 5402 - Storm Water Management (2.0 cr)
- ISME 5500 - Public Interactions (1.0 cr)
- ISME 5503 - Financial Management in Public Organizations (2.0 cr)
- ISME 5504 - Construction Law and Ethics (2.0 cr)

Capstone

Take a total of 3 credits.

- ISME 8105 - Capstone Project (1.0 - 2.0 cr)

Electives

Choose at least 7 elective credits in consultation with the director of graduate studies.
Twin Cities Campus
Management of Technology M.S.M.O.T.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Management of Technology Graduate Program, Technological Leadership Institute, University of Minnesota, 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455 (612-624-5474; fax: 612-624-7510)
Email: MOT@umn.edu
Website: http://www.tli.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Management of Technology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in the management of technology (MSMOT) program is administered by the College of Sciences and Engineering's Technological Leadership Institute (TLI). The two-year, executive-format program integrates the fields of technology and management and provides working engineers and scientists with management knowledge and skills needed to assume a technical leadership role within their organizations. The program focuses on management in technology-based environments in traditional and emerging industries. The curriculum includes technical and advanced management courses, such as pivotal technologies, technology forecasting, project management, management of innovation, intellectual property management, and strategic management of technology. The core management curriculum includes areas such as finance, marketing, accounting, strategic planning and decision making, and conflict management. Students proceed through the program and advance as a cohort, taking a prescribed sequence of courses together. Case studies, class discussions, and study-group interaction stimulate the learning process. Students also participate in off-campus residencies, including an international residency; complete individual and team projects; and develop final projects as part of a capstone course. Most students receive corporate financial support.

The program is offered in a format designed for full-time working professionals. Students take courses one day per week on alternating Fridays and Saturdays and complete the degree within two years.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in an engineering, science, or other technology-related field from an accredited program.

Other requirements to be completed before admission:
Applicants should have at least 5 years of professional experience in a technical field and have completed coursework (or show proficiency) in economics, mathematical modeling, statistics, and computer literacy.

In exceptional circumstances, promising candidates with less experience may be considered.

Special Application Requirements:
The program accepts applications on a rolling basis for fall semester of each year.

Applicants must submit three letters of recommendation, a resume, and a statement of purpose. Additional application information is available at http://tli.umn.edu/graduate/mot/prospective_students/mot-admissions-requirements

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 36 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The capstone project consists of an independent, original investigation requiring between 110 and 130 hours of effort. Students use concepts and methods learned in the MOT program to research and develop an industry-based product, project, process, or venture. The capstone project enables students to directly apply their MOT education at work.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

The MSMOT requires 36 credits. Students attend the program as a cohort and complete their studies in four semesters.

In addition to course requirements, students must complete an oral exam and a written report for the capstone project (MOT 8234).

Required Courses

MOT 8111 - Marketing Management for Technology-based Organizations (2.0 cr)
MOT 8112 - Management Accounting (1.5 cr)
MOT 8113 - Operations Management for Competitive Advantage (1.5 cr)
MOT 8114 - Strategic Technology Analysis (2.0 cr)
MOT 8121 - Managing Organizations in a Technological Environment (2.0 cr)
MOT 8122 - Financial Management for Technology-based Organizations (2.0 cr)
MOT 8133 - Communication in a Technical Environment (2.0 cr)
MOT 8212 - Developing New Technology Products (2.0 cr)
MOT 8213 - Macroenvironment of Technology (2.0 cr)
MOT 8214 - Technology Foresight and Forecasting (2.0 cr)
MOT 8221 - Project and Knowledge Management (1.5 cr)
MOT 8224 - Pivotal Technologies (2.0 cr)
MOT 8232 - Managing Technological Innovation (2.0 cr)
MOT 8233 - Strategic Management of Technology (2.0 cr)
MOT 8501 - Leading Individual & Teach Performance (1.0 cr)
MOT 8502 - Innovation Leadership and Organizational Effectiveness (1.0 cr)
MOT 8900 - Conflict Management (0.5 cr)
MOT 8910 - Corporate Responsibility (1.0 cr)
MOT 8920 - Science and Technology Policy (1.5 cr)
MOT 8921 - Global Management of Technology (0.5 cr)
MOT 8940 - Managing Intellectual Property (0.5 cr)
MOT 8950 - International Management of Technology Project (1.5 cr)

Capstone Project

Take a total of 2 credits

MOT 8234 - Capstone Project (0.5 - 2.0 cr)
Twin Cities Campus
Management of Technology Minor
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, College of Science and Engineering, University of Minnesota, Suite 290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455
Phone: 612-624-5747
Fax: 612-624-7510
Email: mot@umn.edu
Website: http://www.tli.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The management of technology minor program is administered by the Technological Leadership Institute (TLI) in the College of Science and Engineering. The program integrates the fields of technology and management, allowing students in science and engineering majors to develop understanding and expertise in business principles. The curriculum includes basic business knowledge, with an emphasis on technology-intensive organizations. Topics include strategy, finance, marketing, intellectual property, innovation, and technology planning. Each class will include exercises that inform students on those business topics, and give them an opportunity to practice the fundamental skills of communications, teamwork and project management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in an engineering, science, or other technology-related field from an accredited program.

Special Application Requirements:
Applicants for the minor must be enrolled in a graduate-level degree program at the University of Minnesota and have director of graduate studies approval.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The MOT minor requires two core courses for a total of 4 credits. The remaining credits can be taken from the list of approved electives.

MOT minor courses cannot be counted towards the master of science in management of technology degree requirements.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Core Courses
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)

Electives
Other courses may be chosen in consultation with the director of graduate studies
Take 2 or more credit(s) from the following:
• MOT 5003 - Technological Business Planning Workshop (1.0 cr)
• HSCI 5401 - Ethics in Science and Technology (3.0 cr)
• HSCI 5421 - Engineering Ethics (3.0 cr)
• IDSC 6040 - Information Technology Management (2.0 cr)
• IE 5111 - Systems Engineering I (2.0 cr)
• IE 5541 - Project Management (4.0 cr)
• ME 8221 - New Product Design and Business Development I (4.0 cr)
• ME 8222 - New Product Design and Business Development II (4.0 cr)
• MILI 5589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MBA 6110 - Leading Others (2.0 cr)
• IDSC 6041 - Negotiation Strategies (2.0 cr)
• MGMT 6084 - Management of Groups (2.0 cr)
• PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
• PA 5741 - Risk, Resilience and Decision Making (1.5 cr)

Doctoral
Core Courses
MOT 5001 - Technological Business Fundamentals (2.0 cr)
MOT 5002 - Creating Technological Innovation (2.0 cr)

Electives
Other courses may be chosen in consultation with the director of graduate studies
Take 8 or more credit(s) from the following:
• MOT 5003 - Technological Business Planning Workshop (1.0 cr)
• HSCI 5401 - Ethics in Science and Technology (3.0 cr)
• HSCI 5421 - Engineering Ethics (3.0 cr)
• IDSC 6040 - Information Technology Management (2.0 cr)
• IE 5111 - Systems Engineering I (2.0 cr)
• IE 5541 - Project Management (4.0 cr)
• ME 8221 - New Product Design and Business Development I (4.0 cr)
• ME 8222 - New Product Design and Business Development II (4.0 cr)
• MILI 5589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MBA 6110 - Leading Others (2.0 cr)
• MGMT 6004 - Negotiation Strategies (2.0 cr)
• MGMT 6084 - Management of Groups (2.0 cr)
• PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
• PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
Twin Cities Campus  
Materials Science and Engineering M.Mat.S.E.  
Chemical Engineering & Materials Science  
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:  
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)  
Email: cemsgrad@umn.edu  
Website: http://www.cems.umn.edu

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 30  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Materials Science And Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate courses offered by the Chemical Engineering and Materials Science (CEMS) Department cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

The master of materials science and engineering (M.Mat.S.E.), also known as the professional master's, is designed for working professionals who are interested in obtaining a master's degree part time. This degree requires a design project. Part-time students may also choose the M.S.Mat.S.E. Plan C, which is coursework only.

The CEMS department focuses on the PhD and does not generally admit students directly to the M.S.Mat.S.E. Plan A degree, which is a thesis based master's and is intended for current graduate students who choose not to seek a PhD.

Program Delivery  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission  
A bachelor's degree in materials science or other related field.

Other requirements to be completed before admission:  
The professional master's in engineering degree is designed for employees of local industries who wish to pursue their studies part-time. No financial support is available. Applicants should contact the program before applying for admission.

Special Application Requirements:  
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results.

Applications are accepted for fall semester only. January 1 is the application deadline; late applications are considered if space is available. More information is available at http://www.cems.umn.edu/graduate/admissions

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21
Program Requirements

**Plan A:** Plan A requires 12 to 14 major credits, 6 to 8 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

The M.Mat.S.E. requires 20 course credits and 10 thesis credits. The course credits must include 12 credits in MATS core courses, and a minimum of 6 credits outside the major. The remaining credits may be taken in the major or in any supporting field.

In addition to the coursework, M.Mat.S.E. students are required to complete a design project. The work-related M.Mat.S.E. design project consists of an in-depth study of an engineering design. It need not represent a publishable research project. While the amount of work should be the same as for a master's thesis, the project can contain elements that the thesis would not, such as economic considerations, design consultation, and social relevance. The written design report must be approved by a three-person faculty committee. The final exam consists of the written design report and an oral presentation to the faculty committee.

**Core Courses**
- MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- MATS 8004 - Mechanical Properties (3.0 cr)

**Thesis Credits**
10 thesis credits are required for the design project.
- MATS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Electives**
The remaining credits may be chosen from the following list. Consult with advisor for further options.
- AEM 4201 - Fluid Mechanics (4.0 cr)
- AEM 4511 - Mechanics of Composite Materials (3.0 cr)
- AEM 4581 - Mechanics of Solids (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- AEM 8531 - Fracture Mechanics (3.0 cr)
- AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
- CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
- CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
- CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
- CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
- CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
- CEGE 8504 - Theory of Unit Operations (4.0 cr)
- CEGE 8505 - Biological Processes (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 5210</td>
<td>Materials Characterization</td>
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<td>CHEM 5755</td>
<td>X-Ray Crystallography</td>
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<td>CHEM 8011</td>
<td>Mechanisms of Chemical Reactions</td>
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<td>CHEM 8152</td>
<td>Analytical Spectroscopy</td>
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<tr>
<td>CHEM 8201</td>
<td>Materials Chemistry</td>
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<tr>
<td>CHEM 8221</td>
<td>Synthetic Polymer Chemistry</td>
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<td>CHEM 8321</td>
<td>Organic Synthesis</td>
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<td>CHEM 8322</td>
<td>Advanced Organic Chemistry</td>
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<td>CHEM 8361</td>
<td>Interpretation of Organic Spectra</td>
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<td>CHEM 8551</td>
<td>Quantum Mechanics I</td>
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<td>Quantum Mechanics II</td>
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<td>CHEM 8561</td>
<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics I</td>
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<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics II</td>
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<td>CHEN 5551</td>
<td>Survey of Renewable Energy Technologies</td>
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<td>CHEN 5753</td>
<td>Biological Transport Processes</td>
<td>3.0 - 4.0 cr</td>
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<td>CHEN 5771</td>
<td>Colloids and Dispersions</td>
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<td>CHEN 8101</td>
<td>Fluid Mechanics I: Change, Deformation, Equations of Flow</td>
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<td>CHEN 8102</td>
<td>Principles and Applications of Rheology</td>
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<td>CHEN 8104</td>
<td>Coating Process Fundamentals</td>
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<td>Systems Analysis of Biological Processes</td>
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<td>EE 5163</td>
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<td>EE 5173</td>
<td>Basic Microelectronics Laboratory</td>
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<td>EE 5181</td>
<td>Introduction to Nanotechnology</td>
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<td>EE 5621</td>
<td>Physical Optics</td>
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<td>EE 5622</td>
<td>Physical Optics Laboratory</td>
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<td>EE 5624</td>
<td>Optical Electronics</td>
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<td>EE 5653</td>
<td>Physical Principles of Magnetic Materials</td>
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<td>EE 5655</td>
<td>Magnetic Recording</td>
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<tr>
<td>EE 5657</td>
<td>Physical Principles of Thin Film Technology [WI]</td>
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<td>GCD 5036</td>
<td>Molecular Cell Biology</td>
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<td>MATH 4428</td>
<td>Mathematical Modeling</td>
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<td>MATH 4512</td>
<td>Differential Equations with Applications</td>
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<tr>
<td>MATH 5485</td>
<td>Introduction to Numerical Methods I</td>
<td>4.0 cr</td>
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<td>MATH 5486</td>
<td>Introduction To Numerical Methods II</td>
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<td>MATH 5525</td>
<td>Introduction to Ordinary Differential Equations</td>
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<td>MATH 5535</td>
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<td>MATH 5587</td>
<td>Elementary Partial Differential Equations I</td>
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<td>MATH 5652</td>
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<td>MATH 8442</td>
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<td>MATH 8212</td>
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<td>MATH 8221</td>
<td>Polymers Performance</td>
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<tr>
<td>MATH 8223W</td>
<td>Polymer Laboratory [WI]</td>
<td>2.0 cr</td>
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<td>MATH 4301W</td>
<td>Materials Processing [WI]</td>
<td>4.0 cr</td>
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<td>MATH 4511W</td>
<td>Corrosion and Electrochemistry of Corrosion [WI]</td>
<td>4.0 cr</td>
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<td>MATH 5353</td>
<td>Electron Microprobe Theory and Practice</td>
<td>3.0 cr</td>
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<td>Electron Microscopy</td>
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<tr>
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<td>Physical Chemistry of Polymers</td>
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<tr>
<td>MATH 8221</td>
<td>Synthetic Polymer Chemistry</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>ME 5228</td>
<td>Introduction to Finite Element Modeling, Analysis, and Design</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>ME 5247</td>
<td>Stress Analysis, Sensing, and Transducers</td>
<td>4.0 cr</td>
</tr>
<tr>
<td>ME 5446</td>
<td>Introduction to Combustion</td>
<td>4.0 cr</td>
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<tr>
<td>ME 8390</td>
<td>Advanced Topics in the Thermal Sciences</td>
<td>1.0 - 3.0 cr</td>
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<tr>
<td>PA 5011</td>
<td>Management of Organizations</td>
<td>3.0 cr</td>
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PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5701 - Science and State (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy and Environmental Policy (3.0 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Special Topics Electives
The following electives are topics courses. Only the approved topic titles below may be used.
AEM 8511 Advanced Topics in Continuum Mechanics - Problems in Materials Science
EE 5940 Special Topics - Thin Films and Nanostructures: Materials and Devices
EE 8950 Advanced Topics - Materials & Design for Future Nonvolatile Memory
Math 8450 Topics in Numerical Analysis - Applications of Continuum Mechanics in Biology
Twin Cities Campus
Materials Science and Engineering M.S.Mat.S.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science Materials Science And Engr

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The CEMS Department offers two types of master's degrees: the M.S.Mat.S.E. (Plan A or C) and the M.Mat.S.E. degree, also known as the professional master's. The M.S.Mat.S.E. Plan A degree is a thesis-based master's and is generally reserved only for current graduate students who choose not to seek a Ph.D. Working professionals who are interested in obtaining a master's degree part time should follow the requirements for the M.Mat.S.E. degree, which requires a design project, or the M.S.Mat.S.E. Plan C, which is coursework only.

Graduate courses offered by CEMS cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

Other requirements to be completed before admission:
With the exception of the professional master's degree (the M.Mat.S.E.) and the M.S.Mat.S.E. Plan C, the CEMS department focuses on the PhD and does not generally admit students directly to the M.S.Mat.S.E. Plan A degree.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results.

Applications are accepted for fall semester only. January 1 is the application deadline; late applications are considered if space is available. More information is available at http://www.cems.umn.edu/graduate/admissions

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 560

IELTS
- Total Score: 6.5
MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 12 to 14 major credits, 6 to 8 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan C: Plan C requires 12 to 18 major credits and 12 to 18 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Core Courses

- MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- MATS 8004 - Mechanical Properties (3.0 cr)

Plan A

The Plan A requires 12 credits in core MATS coursework, 6 credits outside the major, and 10 thesis credits. The remaining course credits may be taken in the major or in any supporting field.

MATS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan C

The Plan C requires 12 credits in core MATS coursework, and 12 credits outside the major. The remaining course credits may be taken in the major or in any supporting field.

Electives

The remaining credits may be chosen from the following list or consult with adviser for further options.

- AEM 4201 - Fluid Mechanics (4.0 cr)
- AEM 4511 - Mechanics of Composite Materials (3.0 cr)
- AEM 4581 - Mechanics of Solids (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 5503 - Theory of Elasticity (3.0 cr)
- AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- AEM 8531 - Fracture Mechanics (3.0 cr)
- AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5041 - Tissue Engineering (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
- CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
- CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
- CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
- CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
- CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
- CEGE 8504 - Theory of Unit Operations (4.0 cr)
CADE 8505 - Biological Processes (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)
CHEM 8322 - Advanced Organic Chemistry (4.0 cr)
CHEM 8361 - Interpretation of Organic Spectra (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (4.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CHEN 5551 - Survey of Renewable Energy Technologies (3.0 cr)
CHEN 5753 - Biological Transport Processes (3.0 - 4.0 cr)
CHEN 5771 - Colloids and Dispersions (3.0 cr)
CHEN 8101 - Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)
CHEN 8102 - Principles and Applications of Rheology (2.0 cr)
CHEN 8104 - Coating Process Fundamentals (2.0 cr)
CHEN 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
CHEN 8301 - Physical Rate Processes I: Transport (3.0 cr)
CHEN 8402 - Statistical Thermodynamics and Kinetics (3.0 cr)
CHEN 8501 - Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)
CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
EE 5171 - Microelectronic Fabrication (4.0 cr)
EE 5173 - Basic Microelectronics Laboratory (1.0 cr)
EE 5181 - Introduction to Nanotechnology (4.0 cr)
EE 5621 - Physical Optics (3.0 cr)
EE 5651 - Physical Principles of Magnetic Materials (3.0 cr)
EE 5655 - Magnetic Recording (3.0 cr)
EE 5657 - Physical Principles of Thin Film Technology [WI] (4.0 cr)
ESCI 5353 - Electron Microprobe Theory and Practice (3.0 cr)
GCD 5036 - Molecular Cell Biology (3.0 cr)
MATH 4428 - Mathematical Modeling (4.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
MATH 4585 - Introduction to Numerical Methods I (4.0 cr)
MATH 4586 - Introduction To Numerical Methods II (4.0 cr)
MATH 5525 - Introduction to Ordinary Differential Equations (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5652 - Introduction to Stochastic Processes (4.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATS 4212 - Ceramics (3.0 cr)
MATS 4214 - Polymers (3.0 cr)
MATS 4221 - Materials Performance (4.0 cr)
MATS 4223W - Polymer Laboratory [WI] (2.0 cr)
MATS 4301W - Materials Processing [WI] (4.0 cr)
MATS 4511W - Corrosion and Electrochemistry of Corrosion [WI] (4.0 cr)
MATS 5353 - Electron Microprobe Theory and Practice (3.0 cr)
MATS 5517 - Electron Microscopy (3.0 cr)
MATS 5531 - Electrochemical Engineering (3.0 cr)
MATS 8201 - Applied Mathematics I: Linear Analysis (3.0 cr)
MATS 8211 - Physical Chemistry of Polymers (4.0 cr)
MATS 8221 - Synthetic Polymer Chemistry (4.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5247 - Stress Analysis, Sensing, and Transducers (4.0 cr)
ME 5446 - Introduction to Combustion (4.0 cr)
ME 8390 - Advanced Topics in the Thermal Sciences (1.0 - 3.0 cr)
PA 5011 - Management of Organizations (3.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5701 - Science and State (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy and Environmental Policy (3.0 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Special Topics Electives
The following electives are topics courses. Only the approved topic titles below may be used.
AEM 8511 Advanced Topics in Continuum Mechanics - Problems in Materials Science
EE 5940 Special Topics - Thin Films and Nanostructures: Materials and Devices
EE 8950 Advanced Topics - Materials & Design for Future Nonvolatile Memory
Math 8450 Topics in Numerical Analysis - Applications of Continuum Mechanics in Biology
Twin Cities Campus
Materials Science and Engineering Minor
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate courses offered by the Chemical Engineering and Materials Science (CEMS) Department cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor must be approved by the director of graduate studies in materials science and engineering.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Core Courses
Take 2 or more course(s) from the following:
- MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
- MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
- MATS 8003 - Electronic Properties (3.0 cr)
- MATS 8004 - Mechanical Properties (3.0 cr)
Doctoral

Core Courses
Take all 4 core courses

MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)
Twin Cities Campus
Materials Science and Engineering Ph.D.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue
SE, Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate courses offered by the Chemical Engineering and Materials Science (CEMS) Department cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

Other requirements to be completed before admission:
Applicants must submit scores from the general test of the GRE, three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results.

Special Application Requirements:
Applications are accepted for fall semester only. Submission of all application materials by January 1 is strongly encouraged to ensure priority consideration for fellowships and assistantships; late applications are considered if space is available. More information is available at http://www.cems.umn.edu/graduate/admissions

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires 33 course credits and 24 thesis credits. The course credits must include 12 credits in four core MATS courses, and a minimum of 12 credits outside the major. The remaining 9 credits may be taken in the major or in any supporting field.

Students must attend, but not enroll in, the departmental seminar for six semesters. Informal attendance will be done within the department.

Core Courses
MATS 8001 - Structure and Symmetry of Materials (3.0 cr)
MATS 8002 - Thermodynamics and Kinetics (3.0 cr)
MATS 8003 - Electronic Properties (3.0 cr)
MATS 8004 - Mechanical Properties (3.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam
MATS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Electives
The remaining credits may be chosen from the following list or consult with advisor for further options.
AEM 4201 - Fluid Mechanics (4.0 cr)
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 4581 - Mechanics of Solids (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 5503 - Theory of Elasticity (3.0 cr)
AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
AEM 8531 - Fracture Mechanics (3.0 cr)
AEM 8541 - Mechanics of Crystalline Solids (3.0 cr)
BMEN 5001 - Advanced Biomaterials (3.0 cr)
BMEN 5041 - Tissue Engineering (3.0 cr)
BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
BMEN 5201 - Advanced Biomechanics (3.0 cr)
BMEN 5501 - Biomechanics for Biomedical Engineers (3.0 cr)
BMEN 8511 - Systems and Synthetic Biology (3.0 cr)
CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8501 - Environmental Fluid Mechanics I (4.0 cr)
CEGE 8502 - Environmental Fluid Mechanics II (4.0 cr)
CEGE 8504 - Theory of Unit Operations (4.0 cr)
CEGE 8505 - Biological Processes (3.0 cr)
CHEM 5210 - Materials Characterization (4.0 cr)
CHEM 5755 - X-Ray Crystallography (4.0 cr)
CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
CHEM 8152 - Analytical Spectroscopy (4.0 cr)
CHEM 8201 - Materials Chemistry (4.0 cr)
CHEM 8221 - Synthetic Polymer Chemistry (4.0 cr)
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<tr>
<th>Course Code</th>
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<tr>
<td>CHEM 8322</td>
<td>Advanced Organic Chemistry (4.0 cr)</td>
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<tr>
<td>CHEM 8361</td>
<td>Interpretation of Organic Spectra (4.0 cr)</td>
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<tr>
<td>CHEM 8551</td>
<td>Quantum Mechanics I (4.0 cr)</td>
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<tr>
<td>CHEM 8552</td>
<td>Quantum Mechanics II (4.0 cr)</td>
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<tr>
<td>CHEM 8561</td>
<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)</td>
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<tr>
<td>CHEM 8562</td>
<td>Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)</td>
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<tr>
<td>CHEN 5551</td>
<td>Survey of Renewable Energy Technologies (3.0 cr)</td>
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<td>CHEN 5753</td>
<td>Biological Transport Processes (3.0 - 4.0 cr)</td>
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<tr>
<td>CHEN 5771</td>
<td>Colloids and Dispersions (3.0 cr)</td>
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<tr>
<td>CHEN 8101</td>
<td>Fluid Mechanics I: Change, Deformation, Equations of Flow (3.0 cr)</td>
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<tr>
<td>CHEN 8102</td>
<td>Principles and Applications of Rheology (2.0 cr)</td>
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<td>CHEN 8104</td>
<td>Coating Process Fundamentals (2.0 cr)</td>
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<td>CHEN 8201</td>
<td>Applied Mathematics I: Linear Analysis (3.0 cr)</td>
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<td>Physical Rate Processes I: Transport (3.0 cr)</td>
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<td>Statistical Thermodynamics and Kinetics (3.0 cr)</td>
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<td>Chemical Rate Processes: Analysis of Chemical Reactors (3.0 cr)</td>
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<td>Systems Analysis of Biological Processes (3.0 cr)</td>
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<td>Semiconductor Properties and Devices I (3.0 cr)</td>
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<td>Microelectronic Fabrication (4.0 cr)</td>
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<td>EE 5173</td>
<td>Basic Microelectronics Laboratory (1.0 cr)</td>
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<td>EE 5181</td>
<td>Introduction to Nanotechnology (4.0 cr)</td>
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<tr>
<td>EE 5261</td>
<td>Physical Optics (3.0 cr)</td>
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<td>EE 5622</td>
<td>Physical Optics Laboratory (1.0 cr)</td>
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<tr>
<td>EE 5624</td>
<td>Optical Electronics (4.0 cr)</td>
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<tr>
<td>EE 5653</td>
<td>Physical Principles of Magnetic Materials (3.0 cr)</td>
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<tr>
<td>EE 5655</td>
<td>Magnetic Recording (3.0 cr)</td>
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<td>EE 5657</td>
<td>Physical Principles of Thin Film Technology [WI] (4.0 cr)</td>
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<td>ESCI 5353</td>
<td>Electron Microprobe Theory and Practice (3.0 cr)</td>
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<td>GCD 5036</td>
<td>Molecular Cell Biology (3.0 cr)</td>
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<td>MATH 4428</td>
<td>Mathematical Modeling (4.0 cr)</td>
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<td>MATH 4512</td>
<td>Differential Equations with Applications (3.0 cr)</td>
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<td>MATH 5485</td>
<td>Introduction to Numerical Methods I (4.0 cr)</td>
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<tr>
<td>MATH 5486</td>
<td>Introduction To Numerical Methods II (4.0 cr)</td>
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<td>MATH 5525</td>
<td>Introduction to Ordinary Differential Equations (4.0 cr)</td>
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<td>MATH 5535</td>
<td>Dynamical Systems and Chaos (4.0 cr)</td>
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<td>MATH 5587</td>
<td>Elementary Partial Differential Equations I (4.0 cr)</td>
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<td>MATH 5588</td>
<td>Elementary Partial Differential Equations II (4.0 cr)</td>
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<td>MATH 5651</td>
<td>Basic Theory of Probability and Statistics (4.0 cr)</td>
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<td>MATH 5652</td>
<td>Introduction to Stochastic Processes (4.0 cr)</td>
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<td>MATH 8441</td>
<td>Numerical Analysis and Scientific Computing (3.0 cr)</td>
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<tr>
<td>MATH 8442</td>
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<td>MATS 4212</td>
<td>Ceramics (3.0 cr)</td>
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<td>MATS 4214</td>
<td>Polymers (3.0 cr)</td>
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<td>MATS 4221</td>
<td>Materials Performance (4.0 cr)</td>
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<td>MATS 4223W</td>
<td>Polymer Laboratory [WI] (2.0 cr)</td>
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<td>MATS 4301W</td>
<td>Materials Processing [WI] (4.0 cr)</td>
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<td>MATS 4511W</td>
<td>Corrosion and Electrochemistry of Corrosion [WI] (4.0 cr)</td>
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<tr>
<td>MATS 5353</td>
<td>Electron Microprobe Theory and Practice (3.0 cr)</td>
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<tr>
<td>MATS 5517</td>
<td>Electron Microscopy (3.0 cr)</td>
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<td>MATS 5531</td>
<td>Electrochemical Engineering (3.0 cr)</td>
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<tr>
<td>MATS 8001</td>
<td>Structure and Symmetry of Materials (3.0 cr)</td>
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<tr>
<td>MATS 8002</td>
<td>Thermodynamics and Kinetics (3.0 cr)</td>
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<td>MATS 8003</td>
<td>Electronic Properties (3.0 cr)</td>
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<td>MATS 8004</td>
<td>Mechanical Properties (3.0 cr)</td>
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<td>MATS 8201</td>
<td>Applied Mathematics I: Linear Analysis (3.0 cr)</td>
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<td>MATS 8211</td>
<td>Physical Chemistry of Polymers (4.0 cr)</td>
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<td>MATS 8221</td>
<td>Synthetic Polymer Chemistry (4.0 cr)</td>
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<tr>
<td>ME 5228</td>
<td>Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)</td>
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<tr>
<td>ME 5247</td>
<td>Stress Analysis, Sensing, and Transducers (4.0 cr)</td>
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<tr>
<td>ME 5446</td>
<td>Introduction to Combustion (4.0 cr)</td>
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<tr>
<td>ME 8890</td>
<td>Advanced Topics in the Thermal Sciences (1.0 - 3.0 cr)</td>
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<tr>
<td>PA 5011</td>
<td>Management of Organizations (3.0 cr)</td>
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<tr>
<td>PA 5012</td>
<td>The Politics of Public Affairs (3.0 cr)</td>
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</table>
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5701 - Science and State (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5721 - Energy and Environmental Policy (3.0 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
PA 5801 - Global Public Policy (3.0 cr)
PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)

Special Topics Electives
The following electives are topics courses. Only the approved topic titles below may be used.
AEM 8511 Advanced Topics in Continuum Mechanics - Problems in Materials Science
EE 5940 Special Topics - Thin Films and Nanostructures: Materials and Devices
EE 8950 Advanced Topics - Materials & Design for Future Nonvolatile Memory
Math 8450 Topics in Numerical Analysis - Applications of Continuum Mechanics in Biology
Twin Cities Campus
Mathematics M.S.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: http://www.math.umn.edu/grad/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a master of science (MS) in mathematics. Students may also earn the MS degree with emphasis in applied and industrial mathematics or with emphasis in mathematics education.

Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Undergraduate degree in mathematics or equivalent.

Other requirements to be completed before admission:
Applicants should have the prerequisite material of linear algebra, advanced calculus and differential equations, and should be ready for higher level courses in analysis and algebra. The GRE Math subject test is strongly recommended. To receive full consideration for financial support, international applicants should have a TOEFL score of at least 100 with a speaking score of at least 23.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is February 1. Additional information is available at http://www.math.umn.edu/grad/admission-application.shtml

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 18

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 15 to 30 major credits and 0 to 15 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Plan A
Plan A requires 14 credits in mathematics courses, 6 credits in a minor or related field, and 10 thesis credits. One sequence of two 8xxx-level mathematics courses in the student's concentration area must be included.

Thesis Credits
Take a minimum of 10 credits
MATH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Plan B allows more breadth; students complete a minimum of 30 course credits, half of which may be in a related area outside of Mathematics. Mathematics courses outside the student's major research area may be used toward the related field requirement.
Contact Information:
School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391, fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: http://www.math.umn.edu/grad/

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires a minimum of 6 credits, consisting of two 5xxx- or 8xxx-level courses.

The PhD minor requires a minimum of 12 credits, consisting of four 5xxx- or 8xxx-level courses.

Courses must be completed with a grade of B or higher to satisfy the requirements. We recommend that you consult the director of graduate studies in Mathematics in advance for course approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters Minor
Minor requires two 5xxx- or 8xxx-level mathematics courses. Minor programs must be approved by the director of graduate studies in the School of Mathematics.

Doctoral Minor
Minor requires four 5xxx- or 8xxx-level mathematics courses. Minor programs must be approved by the director of graduate studies in
the School of Mathematics.
Twin Cities Campus  
Mathematics Ph.D.  
School of Mathematics  
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:  
127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)  
Email: gradprog@math.umn.edu  
Website: http://www.math.umn.edu/grad/

- Program Type: Doctorate  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 60  
- This program does not require summer semesters for timely completion.  
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a PhD in mathematics, and a PhD in mathematics with emphasis in applied mathematics.

Special areas of research include ordinary and partial differential equations; probability: real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission  
The preferred undergraduate GPA for admittance to the program is 3.00.

Undergraduate degree in mathematics or equivalent.

Other requirements to be completed before admission:  
Applicants should have the prerequisite material of abstract algebra, analysis, and topology. The GRE Math subject test is strongly recommended. To receive full consideration for financial support, international applicants should have a TOEFL score of at least 100 with a speaking score of at least 23.

Special Application Requirements:  
Applications are accepted for fall semester only. The application deadline is December 15. Additional information is available at http://www.math.umn.edu/grad/admission-application.shtml

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Internet Based - Speaking Score: 18

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements  
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: French, German, Italian, or Russian

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires 24 credits in mathematics courses, 12 credits in a minor or in a supporting program, and 24 thesis credits. If a supporting program is chosen, it may consist partly or entirely of mathematics courses outside the student's major research area.

Students choose a program of coursework in consultation with their advisor and the director of graduate studies.

The PhD preliminary written examination, given twice each year, covers real analysis, complex analysis, algebra, and manifolds and topology. Students are expected to pass the written exam by the end of their second year; complete required coursework and pass the preliminary oral exam by the end of their fourth year; and pass the final oral exam and complete their dissertation by the end of the sixth year.

Reading proficiency is required in one of the following: French, German, Italian, or Russian

Thesis Credits
Take 24 credits after passing preliminary oral exam.
MATH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Mechanical Engineering M.S.M.E.
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gardn032@umn.edu, hogan108@umn.edu
Website: http://www.me.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Mechanical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research for all graduate degrees are offered in bioengineering; biomechanics; combustion; computer-aided design; computer-aided manufacturing; computer graphics; control systems; design; energy conservation; environmental control; environmental engineering; fluid mechanics; heat and mass transfer; history of science and technology; human factors engineering; industrial engineering; innovative methodologies; integration of structural and environmental systems; lubrication; manufacturing engineering; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; socioeconomic systems; solar energy; solar processing and thermochemistry; statistics; structures; systems dynamics; technology assessment; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; tribology; vibration; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year BS degree in engineering, science, or mathematics.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is December 15. Additional information is available at http://www.me.umn.edu/education/graduate/prospective/admissions.shtml

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 16 credits outside the major. The final exam is oral.

Plan C: Plan C requires 24 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The M.S.M.E. requires a minimum of 30 credits and is offered under Plan A (thesis), Plan B (project), and Plan C (coursework only). All three plans require completion of 1-2 graduate seminar credits and one research and professional ethics course. All courses, with the exception of seminars and the ethics course, must be taken on an A/F basis.

Major Course Credits

Any 5xxx or 8xxx level mechanical engineering course counts toward the major field credit requirement, with the exception of independent research courses. The following courses also meet the requirement for ME graduate course credits.

- AEM 5401 - Intermediate Dynamics (3.0 cr)
- AEM 5501 - Continuum Mechanics (3.0 cr)
- AEM 8201 - Fluid Mechanics I (3.0 cr)
- AEM 8202 - Fluid Mechanics II (3.0 cr)
- EE 5231 - Linear Systems and Optimal Control (3.0 cr)
- EE 8215 - Nonlinear Systems (3.0 cr)

Ethics Course

Take one research and professional ethics course. The following may be used or consult with advisor for further options.

- ME 8001 - Research Ethics and Professional Practice (0.0 cr)

Seminar

Take 1-2 seminar credits. The following may be used or consult with advisor for further options.

- ME 8773 - Graduate Seminar (1.0 cr)
- ME 8774 - Graduate Seminar (1.0 cr)

Supporting Program

The remaining course credits may be taken in the major or in any supporting field with significant scientific or engineering content, and may include 6 credits in a minor.

Use of 4xxx-level Courses

No more than six 4xxx-level course credits may be used for graduate-level credit. Only the following courses are acceptable.

- AEM 4511 - Mechanics of Composite Materials (3.0 cr)
- AEM 4581 - Mechanics of Solids (3.0 cr)
- CHEM 4502 - Introduction to Quantum Mechanics and Spectroscopy (3.0 cr)
- EE 4541 - Digital Signal Processing (3.0 cr)
- MATH 4512 - Differential Equations with Applications (3.0 cr)
- PHYS 4051 - Methods of Experimental Physics I (5.0 cr)
- PHYS 4101 - Quantum Mechanics (4.0 cr)
- PHYS 4201 - Statistical and Thermal Physics (3.0 cr)
- PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)

Plan A

Requires 14 credits in the major, 6 additional graduate level credits, and 10 thesis credits.

- ME 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B

Requires 14 credits in the major, 16 additional graduate level credits, plus completion of a project or 1-3 Plan B papers, determined in consultation with the advisor. Up to 4 credits of ME 8794, taken S/N, may be used for the Plan B project.

- ME 8794 - Mechanical Engineering Research (1.0 - 4.0 cr)

Plan C

Requires 24 credits in the major and 6 additional graduate level credits. Up to 4 credits of ME 8794, taken S/N, may be applied to the degree requirements.

- ME 8794 - Mechanical Engineering Research (1.0 - 4.0 cr)
Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Integrated B.M.E./M.S.M.E.
The Department of Mechanical Engineering offers an integrated bachelor's/master's degree program. The program makes it possible for students to earn a bachelor's degree (B.M.E.) and a master's degree (M.S.M.E.) in Mechanical Engineering in five years. The program has several benefits: a streamlined admissions process from the undergraduate program to the graduate program; graduate student status granted in the senior year; eligibility for teaching and research assistantships; and flexibility in fulfilling required courses for both degrees simultaneously in the last two years of study.

Both the BME and MSME degrees must be completed in their entirety, with no courses shared between them. The graduate degree cannot be earned before the undergraduate requirements are satisfied. Admitted students who decide not to complete the MSME degree are permitted to count credits originally planned for the graduate program toward their undergraduate technical electives.

Eligibility Requirements:
- Students must be enrolled in the Mechanical Engineering undergraduate program at the University of Minnesota, Twin Cities.
- Students who are within 32 semester credits completing the requirements for the BME degree are eligible to apply.
- Students with a GPA of 3.25 or greater are preferred. For students who have transferred from another institution, at least one semester must be completed at the University of Minnesota, Twin Cities before admission to the program will be granted.
Twin Cities Campus
Mechanical Engineering Minor
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gardn032@umn.edu, hogan108@umn.edu
Website: http://www.me.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research for all graduate degrees are offered in bioengineering; biomechanics; combustion; computer-aided design; computer-aided manufacturing; computer graphics; control systems; design; energy conservation; environmental control; environmental engineering; fluid mechanics; heat and mass transfer; history of science and technology; human factors engineering; industrial engineering; innovative methodologies; integration of structural and environmental systems; lubrication; manufacturing engineering; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; socioeconomic systems; solar energy; solar processing and thermochemistry; statistics; structures; systems dynamics; technology assessment; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; tribology; vibration; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Mechanical engineering courses at the 5xxx or 8xxx level may be used for the minor, with the following exceptions: ME 8773, ME 8774, and ME 8794.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Master's Minor
At least 6 credits in mechanical engineering are required for a master's minor.

Doctoral Minor
At least 12 credits in mechanical engineering are required for a doctoral minor.
Twin Cities Campus
Mechanical Engineering Ph.D.
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gardn032@umn.edu, hogan108@umn.edu
Website: http://www.me.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 62
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research for all graduate degrees are offered in bioengineering; biomechanics; combustion; computer-aided design; computer-aided manufacturing; computer graphics; control systems; design; energy conservation; environmental control; environmental engineering; fluid mechanics; heat and mass transfer; history of science and technology; human factors engineering; industrial engineering; innovative methodologies; integration of structural and environmental systems; lubrication; manufacturing engineering; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; socioeconomic systems; solar energy; solar processing and thermochemistry; statistics; structures; systems dynamics; technology assessment; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; tribology; vibration; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year B.S. degree in engineering, science, or mathematics.

Special Application Requirements:
Applications are accepted for fall semester only. The application deadline is December 15. Additional information is available at http://www.me.umn.edu/education/graduate/prospective/admissions.shtml

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
18 credits are required in the major.
20 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

The Ph.D. requires a minimum of 38 course credits, consisting of 18 credits in the major and 20 additional graduate level credits. Courses must be taken on an A/F basis, with the exception of seminars and the ethics course. A minimum of 12 course credits at the 8000-level are required (seminars and ethics courses may not be included). Students must complete 2-3 graduate seminar credits, and one research and professional ethics course. 24 thesis credits are also required.

Major Course Credits
Take 18 credits in any 5xxx or 8xxx level mechanical engineering courses. Independent research courses do not count toward the credit requirement. The following courses also meet the requirement for ME graduate course credits.
AEM 5401 - Intermediate Dynamics (3.0 cr)
AEM 5501 - Continuum Mechanics (3.0 cr)
AEM 8201 - Fluid Mechanics I (3.0 cr)
AEM 8202 - Fluid Mechanics II (3.0 cr)
EE 5231 - Linear Systems and Optimal Control (3.0 cr)
EE 8215 - Nonlinear Systems (3.0 cr)

Ethics Course
Take one research and professional ethics course. The following may be used or consult with advisor for further options.
ME 8001 - Research Ethics and Professional Practice (0.0 cr)

Seminar
Take 2-3 seminar credits. The following may be used or consult with advisor for further options.
ME 8773 - Graduate Seminar (1.0 cr)
ME 8774 - Graduate Seminar (1.0 cr)

Supporting Program
The remaining course credits may be taken in the major or in any supporting field with significant scientific or engineering content, and may include 12 credits in a minor.

Thesis Credits
Take 24 thesis credits after passing the preliminary oral exam
ME 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Use of 4xxx-level Courses
No more than six 4xxx-level course credits may be used for graduate-level credit. Only the following courses are acceptable.
AEM 4511 - Mechanics of Composite Materials (3.0 cr)
AEM 4581 - Mechanics of Solids (3.0 cr)
CHEM 4502 - Introduction to Quantum Mechanics and Spectroscopy (3.0 cr)
EE 4541 - Digital Signal Processing (3.0 cr)
MATH 4512 - Differential Equations with Applications (3.0 cr)
PHYS 4051 - Methods of Experimental Physics I (5.0 cr)
PHYS 4101 - Quantum Mechanics (4.0 cr)
PHYS 4201 - Statistical and Thermal Physics (3.0 cr)
PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
Twin Cities Campus
Medical Device Innovation M.S.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Medical Device Innovation Program, Technological Leadership Institute, University of Minnesota, Suite 290 McNamara Alumni Center, 200 Oak St SE, Minneapolis, MN 55455 (612-624-5747; fax: 612-624-7510)
Email: mdi@umn.edu
Website: http://www.tli.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in medical device innovation (MDI) program is an interdisciplinary program administered by the College of Science and Engineering's Technological Leadership Institute (TLI). The program is comprised of courses in the core areas of technology innovation management and medical industry dynamics. Students experiences are enhanced through therapeutic area-based group activities and hands-on experiences in innovative biodesign through practicums at the Medical Devices Center. Students have the opportunity to specialize in an area of interest by taking 9 credits of electives in medical, technical, or business courses. The 14-month program draws upon the fields of technology innovation, product development, project and business management, intellectual property, regulatory affairs, clinical needs, entrepreneurship, emerging trends, globalization, reimbursement, and public policy. This program provides students with a full understanding of medical device innovation from start to finish. In doing so, it goes well beyond the traditional technology focus of most master's programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a related field, such as biological or physical sciences, engineering, computer science, mathematics, or statistics.

Other requirements to be completed before admission:
Strong background in science, engineering, and math, with at least two to five years of work experience.

Special Application Requirements:
Applications are accepted on a rolling basis for the program's start in the summer of each year. The deadline for international students is March 15. Additional information is available at http://tli.umn.edu/graduate mdi.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The capstone project is independent, original, and applied research on a relevant subject, problem, or issue in areas of medical device technologies, policy, business, or innovation. The capstone project is rooted in real-world topics in the industry, and is usually framed in cooperation with the students organization or employer. The capstone is the students opportunity to demonstrate mastery of the concepts and methods (quantitative as well as qualitative) that have been learned in the MDI program, and to apply them to an industry-based medical device technology, venture, process, or organizational challenge. A written capstone report and formal presentation to the capstone committee is required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

Core Courses
MDI 5001 - Technical Writing (1.0 cr)
MDI 5002 - Technology Foresight and Forecasting (3.0 cr)
MDI 5004 - Clinical Foundations of Medical Device Innovation (3.0 cr)
MDI 5006 - Finance, Valuation, and Entrepreneurship (3.0 cr)
MDI 5008 - Quality, Regulatory and Manufacturing Management (2.0 cr)
MDI 5010 - Product Innovation & Development Management (3.0 cr)
MDI 5012 - Medical Industry Macro Environment (3.0 cr)
MDI 5013 - Medical Device Center Practicum I (2.0 cr)
MDI 5014 - Medical Device Center Practicum II (2.0 cr)
MDI 5015 - Medical Device Center Practicum III (2.0 cr)
MDI 5050 - Interpersonal & Team Effectiveness (1.0 cr)
MDI 5051 - Leading Innovation & Change (1.0 cr)

Capstone Project
MDI 5020 - Medical Device Innovation Capstone (2.0 cr)

Electives
Other courses may be selected in consultation with the director of graduate studies.

Take 6 or more credit(s) from the following:
- BMEN 5001 - Advanced Biomaterials (3.0 cr)
- BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)
- BMEN 5151 - Introduction to BioMEMS and Medical Microdevices (2.0 cr)
- BMEN 5201 - Advanced Biomechanics (3.0 cr)
- BMEN 5311 - Advanced Biomedical Transport Processes (3.0 cr)
- BMEN 5321 - Microfluidics in Biology and Medicine (3.0 cr)
- BMEN 5351 - Cell Engineering (3.0 cr)
- BMEN 5401 - Advanced Biomedical Imaging (3.0 cr)
- BMEN 5411 - Neural Engineering (3.0 cr)
- BMEN 5412 - Neuromodulation (3.0 cr)
- BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
- BMEN 5421 - Introduction to Biomedical Optics (3.0 cr)
- BMEN 5501 - Biology for Biomedical Engineers (3.0 cr)
- BMEN 5701 - Cancer Bioengineering (3.0 cr)
- BMEN 8101 - Biomedical Digital Signal Processing (3.0 cr)
- BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
- BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
- BTHX 5300 - Foundations of Bioethics (3.0 cr)
• BTHX 5325 - Biomedical Ethics (3.0 cr)
• BTHX 5400 - Intro Ethics in Hlth Policy (3.0 cr)
• BTHX 5411 - Health Law and Policy (3.0 cr)
• BTHX 5453 - Law, Biomedicine, and Bioethics (3.0 cr)
• BTHX 5610 - Research & Publication Seminar (1.0 cr)
• BTHX 5620 - Social Context of Health and Illness (3.0 cr)
• BTHX 8114 - Ethical and legal issues in Genetic Counseling (3.0 cr)
• BTHX 8510 - Gender and the Politics of Health (3.0 cr)
• BTHX 8610 - Medical Consumerism (3.0 cr)
• CSCI 5103 - Operating Systems (3.0 cr)
• CSCI 5105 - Introduction to Distributed Systems (3.0 cr)
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 5143 - Real-Time and Embedded Systems (3.0 cr)
• CSCI 5204 - Advanced Computer Architecture (3.0 cr)
• CSCI 5211 - Data Communications and Computer Networks (3.0 cr)
• CSCI 5221 - Foundations of Advanced Networking (3.0 cr)
• CSCI 5231 - Wireless and Sensor Networks (3.0 cr)
• CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
• CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5523 - Introduction to Data Mining (3.0 cr)
• CSCI 5551 - Introduction to Intelligent Robotic Systems (3.0 cr)
• CSCI 5552 - Sensing and Estimation in Robotics (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5707 - Principles of Database Systems (3.0 cr)
• CSCI 5708 - Architecture and Implementation of Database Management Systems (3.0 cr)
• CSCI 5801 - Software Engineering I (3.0 cr)
• CSCI 5802 - Software Engineering II (3.0 cr)
• CSCI 8725 - Databases for Bioinformatics (3.0 cr)
• EE 5121 - Transistor Device Modeling for Circuit Simulation (3.0 cr)
• EE 5141 - Introduction to Microsystem Technology (4.0 cr)
• EE 5163 - Semiconductor Properties and Devices I (3.0 cr)
• EE 5164 - Semiconductor Properties and Devices II (3.0 cr)
• EE 5171 - Microelectronic Fabrication (4.0 cr)
• EE 5181 - Introduction to Nanotechnology (4.0 cr)
• EE 5364 - Advanced Computer Architecture (3.0 cr)
• EE 5391 - Computer Systems Performance Measurement and Evaluation (3.0 cr)
• EE 5393 - Circuits, Computation, and Biology (3.0 cr)
• EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
• EE 5545 - Digital Signal Processing Design (3.0 cr)
• EE 5551 - Multiscale and Multirate Signal Processing (3.0 cr)
• EE 5581 - Information Theory and Coding (3.0 cr)
• EE 5583 - Error Control Coding (3.0 cr)
• EE 5585 - Data Compression (3.0 cr)
• EE 8367 - Parallel Computer Organization (3.0 cr)
• ENTR 6020 - Business Formation (4.0 cr)
• HINF 5502 - Programming Essentials Python 3 (1.0 cr)
• HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
• HINF 5520 - Clinical Informatics and Patient Safety (2.0 cr)
• HINF 5530 - Health Care Software Management (2.0 cr)
• HINF 5531 - Health Data Analytics and Data Science (2.0 cr)
• IE 5111 - Systems Engineering I (2.0 cr)
• IE 5112 - Introduction to Operations Research (3.0 cr)
• IE 5113 - Systems Engineering II (4.0 cr)
• IE 5522 - Quality Engineering and Reliability (4.0 cr)
• IE 5541 - Project Management (4.0 cr)
• IE 5545 - Decision Analysis (4.0 cr)
• IE 5551 - Production Planning and Inventory Control (4.0 cr)
• IE 5553 - Simulation (4.0 cr)
• MBA 6110 - Leading Others (2.0 cr)
• MBA 6300 - Strategic Management (3.0 cr)
• ME 5223 - Materials in Design (4.0 cr)
• ME 5341 - Case Studies in Thermal Engineering and Design (4.0 cr)
• ME 8262 - Topics in Modeling and Analysis of Manufacturing Processes (4.0 cr)
• ME 8381 - Bioheat and Mass Transfer (3.0 cr)
• ME 8775 - Technical Communication (1.0 cr)
• MGMT 6050 - Management of Innovation and Change (2.0 cr)
• MGMT 6100 - Topics in Management (2.0 - 4.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6562 - Information Technology in Health Care (2.0 cr)
• MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
• MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
• MILI 6990 - The Health Care Marketplace (2.0 cr)
• MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
• MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
• MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
• MKTG 6088 - Strategic Marketing (2.0 cr)
• NEUR 5230 - Cerebrovascular Hemodynamics and Diseases I (4.0 cr)
• NEUR 5240 - Cerebrovascular Hemodynamics and Diseases II (4.0 cr)
• PDES 5701 - Creativity, Idea Generation, and Innovation (3.0 cr)
• PDES 5702 - Concept Sketching and Rendering (3.0 cr)
• PDES 5704 - Computer-Aided Design Methods (3.0 cr)
• PHSL 5061 - Principles of Physiology for Biomedical Engineering (4.0 cr)
• PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
• PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)
• PSY 5065 - Functional Imaging: Hands-on Training (3.0 cr)
• PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
• PUBH 6832 - Economics of the Health Care System (3.0 cr)
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
• RSC 5101 - Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences (1.0 cr)
• RSC 5105 - Advanced Biomechanics I: Kinematics (3.0 cr)
• RSC 5200 - Introduction to Transcranial Magnetic Stimulation (3.0 cr)
• RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
• RSC 5281 - Scientific Foundations: Exercise Theory (3.0 cr)
• SCB 8181 - Stem Cell Biology (3.0 cr)
• ST 8109 - Cybersecurity Foundations - Technology, Risk & Communication (2.0 cr)
• ST 8110 - Security Science and Technology Foundations (3.0 cr)
• ST 8111 - Methods, Theory, and Applications (2.5 cr)
• ST 8113 - Information and Cyber Security (2.0 cr)
• ST 8220 - Vulnerability, Risk and Threat Assessment and Management (3.0 cr)
• ST 8330 - Critical Infrastructure Protections (3.0 cr)
• ST 8331 - Dynamic Systems Modeling and Simulation Tools (2.0 cr)
• ST 8513 - Cyber Threat Intelligence (2.0 cr)
• ST 8661 - Securing Cyberspace (Fundamentals) (3.0 cr)
• ST 8662 - Securing Cyberspace - Advanced (0.0 - 3.0 cr)

Students may choose a minor in human factors and ergonomics, but must have courses pre-approved by the director of graduate studies.
Twin Cities Campus

Neuroengineering Minor
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Graduate Minor in Neuroengineering, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax 612-626-6583)
Email: igert-ne@umn.edu
Website: http://neuroengineering.umn.edu/

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in Neuroengineering (NE) is motivated by the notion that future breakthroughs in this rapidly-growing area of research will be made by engineers who understand the fundamental issues and principles of neuroscience that occur during neural interventions, and by neuroscientists who are truly competent in engineering concepts and tools. The minor trains doctoral students to develop the skills to revolutionize technologies for interfacing with the brain and to advance our understanding of the neuroscience processes that arise when we interface with and modulate the brain.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Enrollment in the Neuroengineering Minor is open to all currently enrolled Ph.D. students in Biomedical Engineering, Electrical Engineering, Mechanical Engineering, and Neuroscience. Ph.D. students majoring in other programs may obtain approval from the Neuroengineering Director of Graduate Studies to participate in the minor program if they have the necessary science background to complete the coursework and are in good standing in their major program.

Students must officially declare the minor before taking the Oral Preliminary Examination (OPE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework for the minor must total at least 12 credits and must be approved by the Neuroengineering Director of Graduate Studies (DGS) - see http://neuroengineering.umn.edu/faculty.html.

For any course listed in multiple categories, students must choose which requirement that course will fulfill. A single course cannot be counted simultaneously toward multiple categories.

Students may not use any of their minor courses to satisfy the core course requirements for their major program (i.e., a Neuroscience student cannot count NSCI 5101 as both a Neuroengineering Minor course and a core Neuroscience course).

Introduction Course
At least one introductory neural engineering/neuroscience course is required.
Take 1 or more course(s) from the following:
- BMEN 5411 - Neural Engineering (3.0 cr)
• NSCI 5101 - Introduction to Neuroscience for Graduate Students (3.0 cr)
• NSC 5561 - Systems Neuroscience (4.0 cr)

Neuroengineering Core Courses
Two courses designated as Neuroengineering Core must be completed. If NSC 8320 is used it must be Section 017 Neurostatistics; other sections of NSC 8320 do not satisfy this requirement. Only 3 credits of NSC 8320 may be applied to the minor. Take 2 or more course(s) from the following:
• BMEN 5412 - Neuromodulation (3.0 cr)
• BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
• BMEN 8335 - Neuroengineering Practicum (3.0 cr)
• NSC 8320 - Readings in Neurobiology (1.0 - 4.0 cr)

Elective Course
One additional course from either an engineering or neuroscience discipline is required. If NSC 8320 is used it must be Section 017 Neurostatistics; other sections of NSC 8320 do not satisfy this requirement. Only 3 credits of NSC 8320 may be applied to the minor. Additional courses may be approved as electives by the Neuroengineering DGS. Take 1 or more course(s) from the following:
• BMEN 5411 - Neural Engineering (3.0 cr)
• BMEN 5412 - Neuromodulation (3.0 cr)
• BMEN 5413 - Neural Decoding and Interfacing (3.0 cr)
• BMEN 8335 - Neuroengineering Practicum (3.0 cr)
• EE 5231 - Linear Systems and Optimal Control (3.0 cr)
• EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
• EE 5542 - Adaptive Digital Signal Processing (3.0 cr)
• ME 5281 - Analog and Digital Control (4.0 cr)
• ME 5286 - Robotics (4.0 cr)
• NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
• NSC 8217 - Systems and Computational Neuroscience (2.0 cr)
• NSC 8320 - Readings in Neurobiology (1.0 - 4.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Physics M.S.
School of Physics & Astronomy
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: grad@physics.umn.edu
Website: http://www.physics.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students applying for a terminal MS degree are not admitted, unless they arrange for their own financial support. Students admitted to the PhD program are automatically eligible for the MS program.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.30.

Other requirements to be completed before admission:
Upper division courses in the core areas of classical mechanics, electricity and magnetism, quantum mechanics, and statistical and thermal physics are required. It is advisable to have taken an upper division course in experimental methods in physics.

Special Application Requirements:
Students admitted to the Ph.D. program are automatically eligible for the M.S. program. Students applying for a terminal M.S. degree are not admitted unless they arrange for their own financial support.

Applications are accepted for fall admission only. Application by December 15 is strongly encouraged. Additional application information is available at http://www.physics.umn.edu/grad/physics/application.html

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
**Program Requirements**

**Plan A**: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B**: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required. **Capstone Project**: The Plan B project is a self-contained research problem performed in conjunction with the student's advisor. Students register for 4 credits of Physics 8500: Plan B project, which count toward the program requirement of 30 credits. The project is described in a written paper. Examples of Plan B projects include carrying out a specific calculation, writing and documenting a computer program, analyzing a set of experimental data, designing and/or constructing experimental instrumentation, and designing and/or constructing an undergraduate laboratory experiment. The alternative to the Plan B project is writing 1-3 Plan B papers. The Plan B papers are related to three courses that the student has taken and do not require original research. It's expected that completion of either the project or the Plan B papers require a nominal three weeks of full-time effort.

**Plan C**: Plan C requires 30 major credits and 0 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy degree requirements.

To remain in good academic standing, Plan A and Plan B students must maintain a minimum GPA of 2.80, and Plan C students must maintain a minimum GPA of 3.30.

Students completing the Plan C option must also pass the physics graduate written exam.

**Required Courses**

Plan A and Plan B students must complete either the quantum mechanics sequence or the classical physics sequence. Plan C students must complete both sequences.

**Quantum Mechanics Sequence**

- PHYS 5001 - Quantum Mechanics I (4.0 cr)
- PHYS 5002 - Quantum Mechanics II (4.0 cr)

**Classical Physics Sequence**

- PHYS 5011 - Classical Physics I (4.0 cr)
- PHYS 5012 - Classical Physics II (4.0 cr)

**Plan A**

The 20 course credits required for the Plan A include 8 credits in a required sequence, and 12 credits taken in the major or in a related field, including in a minor. Ten thesis credits also are required.

**PHYS 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B**

The 30 course credits required for the Plan B include 8 credits in a required sequence, at least 16 credits taken in the major or in a related field, including in a minor, and up to 4 credits of PHYS 8500 Plan B Project credits.

**PHYS 8500** - Plan B Project (4.0 cr)

**Plan C**

The Plan C requires 30 course credits, including the required sequences listed above (16 credits) and PHYS 5201 (3 credits). The remaining 11 credits may be taken in the major field or in a related field, including in a minor.

**PHYS 5201** - Thermal and Statistical Physics (3.0 cr)

**Electives**

Students may choose courses from this list or consult with their advisor for additional options.

**Atomic Physics and Optics**

- PHYS 8161 - Atomic and Molecular Structure (3.0 cr)

**Biophysics and Medical Physics**

- PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHYS 5401</td>
<td>Physiological Physics</td>
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<tr>
<td>PHYS 5402</td>
<td>Radiological Physics</td>
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<td>PHYS 8311</td>
<td>Biological Physics of Single Molecules</td>
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<td>PHYS 8312</td>
<td>Biological Physics of Macroscopic Systems</td>
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<td>PHYS 8300</td>
<td>Seminar: Biological and Medical Physics.</td>
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<td><strong>Condensed Matter Physics</strong></td>
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<td>PHYS 4211</td>
<td>Introduction to Solid-State Physics</td>
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<td>PHYS 5701</td>
<td>Solid-State Physics for Engineers and Scientists</td>
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<td>PHYS 8702</td>
<td>Statistical Mechanics and Transport Theory</td>
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<td>Advanced Topics in Condensed Matter Physics</td>
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<td>PHYS 4511</td>
<td>Introduction to Nuclear and Particle Physics</td>
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<td>PHYS 8011</td>
<td>Quantum Field Theory I</td>
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<td>Special Topics in Quantum Field Theory</td>
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<td><strong>Mathematical, Advanced Quantum, and Computational Physics</strong></td>
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<td>Analytical and Numerical Methods of Physics II</td>
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<td>PHYS 8991</td>
<td>Advanced Quantum Mechanics</td>
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<td>Symmetry and Its Application to Physical Problems</td>
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<tr>
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<td>Introduction to Space Physics</td>
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<td>PHYS 4621</td>
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<td>Advanced Topics in Space and Plasma Physics</td>
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<td>PHYS 8600</td>
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<td>General Relativity and Cosmology I</td>
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<tr>
<td>PHYS 8502</td>
<td>General Relativity and Cosmology II</td>
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<tr>
<td>PHYS 8200</td>
<td>Seminar: Cosmology and High Energy Astrophysics</td>
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<td><strong>Physics Education</strong></td>
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<tr>
<td>PHYS 5072</td>
<td>Best Practices in College Physics Teaching</td>
<td>1.0 - 3.0 cr</td>
</tr>
<tr>
<td>PHYS 8100</td>
<td>Seminar: Problems of Physics Teaching and Higher Education</td>
<td>1.0 cr</td>
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Information current as of December 20, 2016
Twin Cities Campus
Physics Minor
School of Physics & Astronomy
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: grad@physics.umn.edu
Website: http://www.physics.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires a minimum of 6 credits in PHYS courses (including 5001 or 5012).
The doctoral minor requires a minimum of 12 credits in PHYS courses (including 5001 and 5002-or-5011 and 5012).

The following courses cannot be used to satisfy the requirements: Physics 4001, 4002, 4101, 4201, and 4303.

Elective Course Options
PHYS subject requirements can be met through a combination of any of the classes listed below (minimum 2 credits for MS minor after required course and minimum 4 credits for PhD minor after required courses)
Take 2 or more credit(s) from the following:
Atomic Physics and Optics
- PHYS 8161 - Atomic and Molecular Structure (3.0 cr)
- Biophysics and Medical Physics
- PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
or PHYS 5401 - Physiological Physics (4.0 cr)
or PHYS 5402 - Radiological Physics (4.0 cr)
or PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
or PHYS 8312 - Biological Physics of Macroscopic Systems (3.0 cr)
or PHYS 8300 - Seminar: Biological and Medical Physics. (1.0 cr)

**Condensed Matter Physics**
• PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
or PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
or PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
or PHYS 8711 - Solid-State Physics I (3.0 cr)
or PHYS 8712 - Solid-State Physics II (3.0 cr)
or PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)
or PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)

**Elementary Particle Physics**
• PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
or PHYS 8011 - Quantum Field Theory I (3.0 cr)
or PHYS 8012 - Quantum Field Theory II (3.0 cr)
or PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
or PHYS 8891 - Elementary Particle Physics I (3.0 cr)
or PHYS 8892 - Elementary Particle Physics II (3.0 cr)
or PHYS 8911 - Introduction to Supersymmetry (3.0 cr)
or PHYS 8950 - Advanced Topics in Elementary Particle Physics (3.0 cr)
or PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)

**Mathematical, Advanced Quantum, and Computational Physics**
• PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
or PHYS 5042 - Analytical and Numerical Methods of Physics II (4.0 cr)
or PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
or PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)

** Nuclear Physics**
• PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)
or PHYS 8801 - Nuclear Physics I (3.0 cr)
or PHYS 8802 - Nuclear Physics II (3.0 cr)
or PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)

** Plasma and Space Physics**
• PHYS 4611 - Introduction to Space Physics (3.0 cr)
or PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
or PHYS 8601 - Plasma Physics I (3.0 cr)
or PHYS 8602 - Plasma Physics II (3.0 cr)
or PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
or PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)
or PHYS 8600 - Seminar: Space Physics (1.0 cr)

** Relativity and Cosmology**
• PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
or PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
or PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
or PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)

** Physics Education**
• PHYS 5072 - Best Practices in College Physics Teaching (1.0 - 3.0 cr)
or PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)

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**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**
Students must complete a minimum of 6 credits in physics including either Physics 5001 or 5011.

**Required Courses**
- PHYS 5001 - Quantum Mechanics I (4.0 cr)
  - or PHYS 5011 - Classical Physics I (4.0 cr)

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Students must complete a minimum of 12 credits in physics, including either the classical physics sequence or the quantum mechanics sequence.

**Required Courses**

**Quantum Mechanics Sequence**
- PHYS 5001 - Quantum Mechanics I (4.0 cr)
- PHYS 5002 - Quantum Mechanics II (4.0 cr)

**or Classical Physics Sequence**
- PHYS 5011 - Classical Physics I (4.0 cr)
- PHYS 5012 - Classical Physics II (4.0 cr)
**Twin Cities Campus**  
**Physics Ph.D.**  
School of Physics & Astronomy  
College of Science and Engineering

Link to a list of faculty for this program.

**Contact Information:**  
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)  
Email: grad@physics.umn.edu  
Website: [http://www.physics.umn.edu/grad](http://www.physics.umn.edu/grad)

- Program Type: Doctorate  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 64  
- This program does not require summer semesters for timely completion.  
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:  
Teaching assistantships and a few fellowships are available upon admittance to the School of Physics and Astronomy.

Applicants are required to submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; and a clearly written statement of career interests, goals, and objectives. Submission of GRE scores is strongly recommended. Fall semester entry is strongly recommended for all students. Application by December 15 is strongly encouraged to ensure priority consideration for fellowships awarded for the next academic year. Additional application information is available at [http://www.physics.umn.edu/grad/physics/application.html](http://www.physics.umn.edu/grad/physics/application.html)

**Special Application Requirements:**  
Courses at the upper division level in the core areas of classical mechanics, electricity and magnetism, quantum mechanics, and statistical and thermal physics are required. It is advisable to have taken an upper division course in experimental methods in physics.

International applicants must submit score(s) from one of the following tests:  
- **TOEFL**  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 55  
- **IELTS**  
  - Total Score: 6.5
- **MELAB**  
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
40 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy the requirements.

Students whose financial support comes from TA assignments are also required to complete 3 credits of PHYS 5072 over two semesters. These credits count towards elective requirements.

Required orientation: During the two weeks before the beginning of fall semester, new graduate students are expected to participate in the department orientation program. This includes TA orientation sessions, which are required if a student's financial support comes from TA assignments.

Requirement for international students: International students who want to teach as TAs must take CSE TALK, a workshop on American teaching culture and language skills, prior to the department orientation described above and achieve an ELP (English Language Proficiency) rating of 1. This includes passing an English test, which is given in late July and August. Students who do not achieve an ELP of 1 must take an English training course geared to their level of skills, such as GRAD 5105, GRAD 5102, or Foundations. These courses are given during the academic year and are required until the student achieves an ELP of 1.

Required Courses

PHYS 5001 - Quantum Mechanics I (4.0 cr)
PHYS 5002 - Quantum Mechanics II (4.0 cr)
PHYS 5011 - Classical Physics I (4.0 cr)
PHYS 5012 - Classical Physics II (4.0 cr)
PHYS 5201 - Thermal and Statistical Physics (3.0 cr)

Seminars
Take 2 or more course(s) totaling 2 or more credit(s) from the following:
• PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)
• PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)
• PHYS 8300 - Seminar: Biological and Medical Physics. (1.0 cr)
• PHYS 8600 - Seminar: Space Physics (1.0 cr)
• PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)
• PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)
• PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)

Electives
Students may choose courses from this list or consult with their advisor for additional options.
Take 19 or more credit(s) from the following:

Atomic Physics and Optics
• PHYS 8161 - Atomic and Molecular Structure (3.0 cr)

Biophysics and Medical Physics
• PHYS 5081 - Introduction to Biopolymer Physics (3.0 cr)
PHYS 5401 - Physiological Physics (4.0 cr)
PHYS 5402 - Radiological Physics (4.0 cr)
PHYS 8311 - Biological Physics of Single Molecules (3.0 cr)
PHYS 8312 - Biological Physics of Macroscopic Systems (3.0 cr)
PHYS 8300 - Seminar: Biological and Medical Physics. (1.0 cr)

Condensed Matter Physics
• PHYS 4211 - Introduction to Solid-State Physics (3.0 cr)
PHYS 5701 - Solid-State Physics for Engineers and Scientists (4.0 cr)
PHYS 8702 - Statistical Mechanics and Transport Theory (3.0 cr)
PHYS 8711 - Solid-State Physics I (3.0 cr)
PHYS 8712 - Solid-State Physics II (3.0 cr)
PHYS 8750 - Advanced Topics in Condensed Matter Physics (3.0 cr)
PHYS 8700 - Seminar: Condensed Matter Physics (1.0 cr)

• Elementary Particle Physics
  • PHYS 4511 - Introduction to Nuclear and Particle Physics (3.0 cr)
  • PHYS 8011 - Quantum Field Theory I (3.0 cr)
  • PHYS 8012 - Quantum Field Theory II (3.0 cr)
  • PHYS 8013 - Special Topics in Quantum Field Theory (3.0 cr)
  • PHYS 8901 - Elementary Particle Physics I (3.0 cr)
  • PHYS 8902 - Elementary Particle Physics II (3.0 cr)
  • PHYS 8911 - Introduction to Supersymmetry (3.0 cr)
  • PHYS 8950 - Advanced Topics in Elementary Particle Physics (3.0 cr)
  • PHYS 8900 - Seminar: Elementary Particle Physics (1.0 cr)

• Mathematical, Advanced Quantum, and Computational Physics
  • PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
  • PHYS 5042 - Analytical and Numerical Methods of Physics II (4.0 cr)
  • PHYS 8001 - Advanced Quantum Mechanics (3.0 cr)
  • PHYS 8301 - Symmetry and Its Application to Physical Problems (3.0 cr)

• Nuclear Physics
  • PHYS 8801 - Nuclear Physics I (3.0 cr)
  • PHYS 8802 - Nuclear Physics II (3.0 cr)
  • PHYS 8850 - Advanced Topics in Nuclear Physics (3.0 cr)
  • PHYS 8800 - Seminar: Nuclear Physics (1.0 cr)

• Plasma and Space Physics
  • PHYS 4611 - Introduction to Space Physics (3.0 cr)
  • PHYS 4621 - Introduction to Plasma Physics (3.0 cr)
  • PHYS 8601 - Plasma Physics I (3.0 cr)
  • PHYS 8602 - Plasma Physics II (3.0 cr)
  • PHYS 8611 - Cosmic Rays and Plasma Astrophysics (3.0 cr)
  • PHYS 8650 - Advanced Topics in Space and Plasma Physics (3.0 cr)
  • PHYS 8600 - Seminar: Space Physics (1.0 cr)

• Relativity and Cosmology
  • PHYS 5022 - Relativity, Cosmology, and the Universe (4.0 cr)
  • PHYS 8501 - General Relativity and Cosmology I (3.0 cr)
  • PHYS 8502 - General Relativity and Cosmology II (3.0 cr)
  • PHYS 8200 - Seminar: Cosmology and High Energy Astrophysics (1.0 cr)

• Physics Education
  • PHYS 5072 - Best Practices in College Physics Teaching (1.0 - 3.0 cr)
  • PHYS 8100 - Seminar: Problems of Physics Teaching and Higher Education (1.0 cr)

Thesis Credits
Take 24 credits (maximum 14 credits per term) after passing preliminary oral exam.
PHYS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Quaternary Paleoecology Minor
Department of Earth Sciences
College of Science and Engineering

Twin Cities Campus

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Quaternary Paleoecology Graduate Program, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive SE, Minneapolis, MN 55455 (612-624-7881; fax: 612-625-3819)
Email: qpminor@umn.edu
Website: http://lrc.geo.umn.edu/qpminor/index.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The faculty of the graduate minor in quaternary paleoecology (QP) hold appointments in several departments. Students in this unique program benefit from the broad range of expertise and experience available at a large research university. From their coursework in the minor, graduate students learn techniques and approaches from other areas that can be applied to their own research.

The minor is available to master's (MA and MS) and doctoral students.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students must be enrolled in a graduate program (master's or doctoral) at the University of Minnesota.

Special Application Requirements:
Students apply by sending a letter of application to the director of graduate studies (qpminor@umn.edu) as well as a letter of endorsement from their major adviser. Application may be made at any time.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students develop their curricula in consultation with their major advisors and the director of Graduate Studies in the Quaternary Paleoecology program. Students choose courses from relevant fields outside their major field.

Minor Courses
Courses may be chosen from the following list; other courses may be used with approval from your advisor and the director of Graduate Studies.

ANTH 4077 - Neanderthals: Biology and Culture of Humanity's Nearest Relative (3.0 cr)
ANTH 4329 - Primate Ecology and Social Behavior (3.0 cr)
ANTH 5009 - Human Behavioral Biology (3.0 cr)
ANTH 5015W - Biology, Evolution, and Cultural Development of Language [SOCS, WI] (3.0 cr)
ANTH 5041 - Ecological Anthropology (3.0 cr)
ANTH 5269 - Analysis of Stone Tool Technology (4.0 cr)
ANTH 5401 - The Human Fossil Record (3.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Doctoral
Twin Cities Campus
Scientific Computation M.S.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Scientific Computation Program, University of Minnesota, 151 Amundson Hall, 421 Washington Ave S.E., Minneapolis, MN 55455 (612-625-6345; fax: 612-626-7246)
Email: wentz002@umn.edu
Website: http://www.scicomp.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate degree program in scientific computation encompasses course work and research on the fundamental principles necessary to use intensive computation to support research in the physical, biological, and social sciences and engineering. There is a special emphasis on research issues, state-of-the-art methods, and the application of these methods to outstanding problems in science, engineering, and other fields that use scientific computation, numerical analysis and algorithm development, symbolic and logic analysis, high-performance computing tools, supercomputing and heterogeneous networks, and visualization.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in a field that uses scientific computation is required for admission.

Other requirements to be completed before admission:
All application materials must be submitted electronically through the online Graduate Admissions system. Three letters of recommendation and a statement of research and career goals are required for all applications. GRE General Test scores are required for consideration of financial support and recommended for all applicants. International applicants are required to submit TOEFL scores.

January 1 is the application deadline for applicants who wish to be considered for financial aid. Applications received after January 1 will be considered on a space and funds available basis.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The program is offered under Plan A (thesis), which requires a minimum of 20 course credits and 10 thesis credits. The course credits must include at least 6 credits from the scientific computation core and at least 6 credits in a minor. The remaining 8 credits may be taken as additional graduate-level courses in the core or in subjects that support computational science.

Many minor programs have greater requirements in terms of credits for a Masters minor; in such cases the greater requirements will be in effect.

Core Courses

Core courses may be chosen from the following list; other courses with a significant computation component may be used with approval of the Director of Graduate Studies.

AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
CEGE 8361 - Engineering Model Fitting (3.0 cr)
CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
CHEM 8021 - Computational Chemistry (4.0 cr)
CHEM 8541 - Dynamics (4.0 cr)
CHEM 8551 - Quantum Mechanics I (4.0 cr)
CHEM 8552 - Quantum Mechanics II (4.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5403 - Computational Complexity (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EPSY 8221 - Psychological Scaling (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
HINF 5430 - Health Informatics I (3.0 cr)
HINF 5431 - Health Informatics II (3.0 cr)

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HINF 8434 - Medical Decision Support Techniques (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5705 - Enumerative Combinatorics (4.0 cr)
MATH 5707 - Graph Theory and Non-Enumerative Combinatorics (4.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8450 - Topics in Numerical Analysis (1.0 - 3.0 cr)
MATH 8571 - Theory of Evolutionary Equations (3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8229 - Finite Element Methods for Computational Mechanics: Transient/Dynamic Problems (4.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 5042 - Analytical and Numerical Methods of Physics II (4.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
SCIC 8001 - Parallel High-Performance Computing (3.0 cr)
SCIC 8011 - Scientific Visualization (3.0 cr)
SCIC 8021 - Advanced Numerical Methods (3.0 cr)
SCIC 8031 - Modeling, Optimization, and Statistics (3.0 cr)
SCIC 8041 - Computational Aspects of Finite Element Methods (3.0 cr)
SCIC 8095 - Problems in Scientific Computation (1.0 - 3.0 cr)
SCIC 8190 - Supercomputer Research Seminar (1.0 cr)
SCIC 8253 - Computational Nanomechanics (3.0 cr)
SCIC 8851 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
SCIC 8854 - Scientific Computation Directed Research (1.0 - 4.0 cr)
STAT 8701 - Computational Statistical Methods (3.0 cr)
STAT 8711 - Statistical Computing (3.0 cr)

Thesis Credits
Take 10 thesis credits.
SCIC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Scientific Computation Minor
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Scientific Computation Program, University of Minnesota, 151 Amundson Hall, 421 Washington Ave SE, Minneapolis, MN 55455 (612-625-6345; fax: 612-626-7246)
Email: wentz002@umn.edu
Website: http://www.scicomp.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate degree program in scientific computation encompasses course work and research on the fundamental principles necessary to use intensive computation to support research in the physical, biological, and social sciences and engineering. There is a special emphasis on research issues, state-of-the-art methods, and the application of these methods to outstanding problems in science, engineering, and other fields that use scientific computation, numerical analysis and algorithm development, symbolic and logic analysis, high-performance computing tools, supercomputing and heterogeneous networks, and visualization.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minor requires the approval of the Scientific Computation director of graduate studies.

Courses used for the minor must be taken on the A/F grading scale. Credits may not be from courses in the student's major field.

Core Coursework
All students take 6 credits from the following list. Other courses with a significant computation component, with approval of the Scientific Computation director of graduate studies, may be chosen to fulfill the core course requirement.

- AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
- CEGE 8361 - Engineering Model Fitting (3.0 cr)
- CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
- CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
- CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
- CHEM 8021 - Computational Chemistry (4.0 cr)
- CHEM 8541 - Dynamics (4.0 cr)
- CHEM 8551 - Quantum Mechanics I (4.0 cr)
- CHEM 8552 - Quantum Mechanics II (4.0 cr)
CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
CSCI 5403 - Computational Complexity (3.0 cr)
CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
CSCI 5561 - Computer Vision (3.0 cr)
CSCI 5607 - Fundamentals of Computer Graphics I (3.0 cr)
CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
CSCI 5609 - Visualization (3.0 cr)
CSCI 5707 - Principles of Database Systems (3.0 cr)
CSCI 5801 - Software Engineering I (3.0 cr)
CSCI 5802 - Software Engineering II (3.0 cr)
CSCI 8314 - Sparse Matrix Computations (3.0 cr)
CSCI 8725 - Databases for Bioinformatics (3.0 cr)
EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
EE 5531 - Probability and Stochastic Processes (3.0 cr)
EE 5561 - Image Processing and Applications (3.0 cr)
EE 8231 - Optimization Theory (3.0 cr)
EPSY 8221 - Psychological Scaling (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
HINF 5430 - Health Informatics I (3.0 cr)
HINF 5431 - Health Informatics II (3.0 cr)
HINF 8434 - Medical Decision Support Techniques (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 8451 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5705 - Enumerative Combinatorics (4.0 cr)
MATH 5707 - Graph Theory and Non-Enumerative Combinatorics (4.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8450 - Topics in Numerical Analysis (1.0 - 3.0 cr)
MATH 8571 - Theory of Evolutionary Equations (3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 8226 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8229 - Finite Element Methods for Computational Mechanics: Transient/Dynamic Problems (4.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 5042 - Analytical and Numerical Methods of Physics II (4.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
SCIC 8001 - Parallel High-Performance Computing (3.0 cr)
SCIC 8011 - Scientific Visualization (3.0 cr)
SCIC 8021 - Advanced Numerical Methods (3.0 cr)
SCIC 8031 - Modeling, Optimization, and Statistics (3.0 cr)
SCIC 8041 - Computational Aspects of Finite Element Methods (3.0 cr)
SCIC 8095 - Problems in Scientific Computation (1.0 - 3.0 cr)
SCIC 8190 - Supercomputer Research Seminar (1.0 cr)
SCIC 8253 - Computational Nanomechanics (3.0 cr)
SCIC 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
SCIC 8594 - Scientific Computation Directed Research (1.0 - 4.0 cr)
STAT 8701 - Computational Statistical Methods (3.0 cr)
STAT 8711 - Statistical Computing (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Master's students complete the 6-credit core curriculum.

Doctoral
Doctoral students complete the core curriculum plus 6 additional credits, in consultation with the Scientific Computation director of graduate studies. Courses can be chosen from the list of core coursework, or from fields that support computational science.
Twin Cities Campus
Scientific Computation Ph.D.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Scientific Computation Program, University of Minnesota, 151 Amundson Hall, 421 Washington Ave S.E., Minneapolis, MN 55455 (612-625-6345; fax: 612-626-7246)
Email: wentz002@umn.edu
Website: http://www.scicomp.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 48
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate degree program in scientific computation encompasses course work and research on the fundamental principles necessary to use intensive computation to support research in the physical, biological, and social sciences and engineering. There is a special emphasis on research issues, state-of-the-art methods, and the application of these methods to outstanding problems in science, engineering, and other fields that use scientific computation, numerical analysis and algorithm development, symbolic and logic analysis, high-performance computing tools, supercomputing and heterogeneous networks, and visualization.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in a field that uses scientific computation is required for admission.

Other requirements to be completed before admission:
All application materials must be submitted electronically through the online Graduate Admissions system. Three letters of recommendation and a statement of research and career goals are required for all applications. GRE General Test scores are required for consideration of financial support and recommended for all applicants. International applicants are required to submit TOEFL scores.

January 1 is the application deadline for applicants who wish to be considered for financial aid. Applications received after January 1 will be considered on a space and funds available basis.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
• Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires 24 course credits, including a minimum of 12 credits in core courses, and 24 thesis credits. The remaining 12 course credits may be taken from the core list, in a minor, or in subjects that support computational science, and should give the degree plan an interdisciplinary character.

Core Courses
Core courses may be chosen from the following list; other courses with a significant computation component may be used with approval of the Director of Graduate Studies.

- AEM 8251 - Finite-Volume Methods in Computational Fluid Dynamics (3.0 cr)
- CEGE 8022 - Numerical Methods for Free and Moving Boundary Problems (3.0 cr)
- CEGE 8361 - Engineering Model Fitting (3.0 cr)
- CEGE 8401 - Fundamentals of Finite Element Method (3.0 cr)
- CEGE 8402 - Nonlinear Finite Element Analysis (3.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
- CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
- CHEM 8021 - Computational Chemistry (4.0 cr)
- CHEM 8541 - Dynamics (4.0 cr)
- CHEM 8551 - Quantum Mechanics I (4.0 cr)
- CHEM 8552 - Quantum Mechanics II (4.0 cr)
- CHEM 8561 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics I (4.0 cr)
- CHEM 8562 - Thermodynamics, Statistical Mechanics, and Reaction Dynamics II (4.0 cr)
- CSCI 5302 - Analysis of Numerical Algorithms (3.0 cr)
- CSCI 5304 - Computational Aspects of Matrix Theory (3.0 cr)
- CSCI 5403 - Computational Complexity (3.0 cr)
- CSCI 5421 - Advanced Algorithms and Data Structures (3.0 cr)
- CSCI 5451 - Introduction to Parallel Computing: Architectures, Algorithms, and Programming (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
- CSCI 5561 - Computer Vision (3.0 cr)
- CSCI 5607 - Fundamentals of Computer Graphics 1 (3.0 cr)
- CSCI 5608 - Fundamentals of Computer Graphics II (3.0 cr)
- CSCI 5609 - Visualization (3.0 cr)
- CSCI 5707 - Principles of Database Systems (3.0 cr)
- CSCI 5801 - Software Engineering I (3.0 cr)
- CSCI 5802 - Software Engineering II (3.0 cr)
- CSCI 8314 - Sparse Matrix Computations (3.0 cr)
- CSCI 8725 - Databases for Bioinformatics (3.0 cr)
- EE 5239 - Introduction to Nonlinear Optimization (3.0 cr)
- EE 5531 - Probability and Stochastic Processes (3.0 cr)
- EE 5561 - Image Processing and Applications (3.0 cr)
- EE 8231 - Optimization Theory (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
- EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
- ESCI 5201 - Time-Series Analysis of Geological Phenomena (3.0 cr)
- HINF 5430 - Health Informatics I (3.0 cr)
- HINF 5431 - Health Informatics II (3.0 cr)
- HINF 8434 - Medical Decision Support Techniques (3.0 cr)
IE 5531 - Engineering Optimization I (4.0 cr)
LING 5801 - Introduction to Computational Linguistics (3.0 cr)
MATH 5467 - Introduction to the Mathematics of Image and Data Analysis (4.0 cr)
MATH 5485 - Introduction to Numerical Methods I (4.0 cr)
MATH 5486 - Introduction To Numerical Methods II (4.0 cr)
MATH 5535 - Dynamical Systems and Chaos (4.0 cr)
MATH 5587 - Elementary Partial Differential Equations I (4.0 cr)
MATH 5588 - Elementary Partial Differential Equations II (4.0 cr)
MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
MATH 5705 - Enumerative Combinatorics (4.0 cr)
MATH 5707 - Graph Theory and Non-enumerative Combinatorics (4.0 cr)
MATH 8441 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8442 - Numerical Analysis and Scientific Computing (3.0 cr)
MATH 8445 - Numerical Analysis of Differential Equations (3.0 cr)
MATH 8450 - Topics in Numerical Analysis (1.0 - 3.0 cr)
ME 5228 - Introduction to Finite Element Modeling, Analysis, and Design (4.0 cr)
ME 5351 - Computational Heat Transfer (4.0 cr)
ME 8228 - Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications (4.0 cr)
ME 8229 - Finite Element Methods for Computational Mechanics: Transient/Dynamic Problems (4.0 cr)
ME 8345 - Computational Heat Transfer and Fluid Flow (3.0 cr)
NSC 5202 - Theoretical Neuroscience: Systems and Information Processing (3.0 cr)
PHYS 5041 - Mathematical Methods for Physics (4.0 cr)
PHYS 5042 - Analytical and Numerical Methods of Physics II (4.0 cr)
PSY 5036W - Computational Vision [WI] (3.0 cr)
PSY 5038W - Introduction to Neural Networks [WI] (3.0 cr)
PSY 5960 - Topics in Psychology (1.0 - 4.0 cr)
SCIC 8001 - Parallel High-Performance Computing (3.0 cr)
SCIC 8011 - Scientific Visualization (3.0 cr)
SCIC 8021 - Advanced Numerical Methods (3.0 cr)
SCIC 8031 - Modeling, Optimization, and Statistics (3.0 cr)
SCIC 8041 - Computational Aspects of Finite Element Methods (3.0 cr)
SCIC 8095 - Problems in Scientific Computation (1.0 - 3.0 cr)
SCIC 8190 - Supercomputer Research Seminar (1.0 cr)
SCIC 8253 - Computational Nanomechanics (3.0 cr)
SCIC 8551 - Multiscale Methods for Bridging Length and Time Scales (3.0 cr)
STAT 8701 - Computational Statistical Methods (3.0 cr)
STAT 8711 - Statistical Computing (3.0 cr)

Thesis Credits
Take 24 credits after passing preliminary oral exam
SCIC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Security Technologies M.S.S.T.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Security Technologies Graduate Program, Technological Leadership Institute, University of Minnesota,
290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455 (612-624-5474; fax: 612-624-7510)
Email: tliss@umn.edu
Website: http://www.tli.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 32
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Security Technologies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in security technologies (MSST) shapes tomorrow's analytical and risk management policy makers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. During the 14-month program and through a multidisciplinary systems approach, the program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. Through elective courses, students also choose a learning track in either security systems technologies or security risk management. Students can further specialize through a range of elective courses. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a related field, e.g. in biological or physical sciences, engineering, computer science, mathematics, statistics, social sciences, or public policy.

Other requirements to be completed before admission:
Applicants should have one year of calculus, probability/statistics, or two science or engineering courses.

Special Application Requirements:
Applications are accepted on a rolling basis for the program's start in the summer of each year. Additional information is available at http://tli.umn.edu/graduate/msst/prospective_students.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan B:** Plan B requires 26 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B project is an independent applied investigation on a relevant issue in security technologies or homeland security.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

The MSST program requires 32 credits in the fields of systems risk analysis, engineering (hardware and software), emerging technologies, economics, human factors, law, food and bio safety, and public policy to teach and investigate security technologies and address pertinent issues. The 32 credits consist of 24 credits in MSST core courses, 2 credits for the capstone course, and 6 credits in electives outside the major.

**Core Courses**

Take 0.5 credits of ST 8440

- **ST 8109 - Cybersecurity Foundations - Technology, Risk & Communication (2.0 cr)**
- **ST 8110 - Security Science and Technology Foundations (3.0 cr)**
- **ST 8111 - Methods, Theory, and Applications (2.5 cr)**
- **ST 8113 - Information and Cyber Security (2.0 cr)**
- **ST 8220 - Vulnerability, Risk and Threat Assessment and Management (3.0 cr)**
- **ST 8221 - Communications of Risk and Security (1.0 cr)**
- **ST 8330 - Critical Infrastructure Protections (3.0 cr)**
- **ST 8331 - Dynamic Systems Modeling and Simulation Tools (2.0 cr)**
- **ST 8440 - Security Practicum (0.5 - 2.0 cr)**
- **ST 8510 - Psychology/Behavior Intelligence for Homeland Security (2.0 cr)**
- **ST 8511 - Public Policy (1.0 cr)**
- **ST 8512 - Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics (2.0 cr)**

**Capstone Project**

Take a total of 2 credits

- **ST 8620 - Capstone (0.5 - 2.0 cr)**

**Electives**

Other courses may be selected in consultation with the director of graduate studies.

Take 6 or more credit(s) from the following:

- **ST 8200 - Special Topics in Security Technologies (0.5 cr)**
- **ST 8441 - Internship (optional) (0.5 cr)**
- **CI 5301 - Foundations of Computer Applications for Business and Education (3.0 cr)**
- **CSCI 5221 - Foundations of Advanced Networking (3.0 cr)**
- **CSCI 5271 - Introduction to Computer Security (3.0 cr)**
- **CSCI 5471 - Modern Cryptography (3.0 cr)**
- **CSCI 8715 - Spatial Databases and Applications (3.0 cr)**
- **ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)**
- **FNRM 5131 - Geographical Information Systems (GIS) for Natural Resources (4.0 cr)**
- **GEOG 5561 - Principles of Geographic Information Science (4.0 cr)**
- **GEOG 5563 - Advanced Geographic Information Science (3.0 cr)**
- **GEOG 5564 - Urban Geographic Information Science and Analysis (3.0 cr)**
- **GIS 5574 - Web GIS and Services (3.0 cr)**
- **GIS 5577 - Spatial Database Design and Administration (3.0 cr)**
- **IDSC 6040 - Information Technology Management (2.0 cr)**
- **IDSC 6050 - Information Technologies and Solutions (2.0 cr)**
- **IDSC 6423 - Enterprise Systems (2.0 cr)**
- **IDSC 6444 - Business Intelligence (2.0 cr)**
- **IDSC 6481 - Managerial Decision Making (2.0 cr)**
• IDSC 8003 - Accounting and Information Systems (4.0 cr)
• LAW 6022 - LL.M. Legal Writing and Legal Skills II (2.0 cr)
• LAW 6103 - Data Privacy Law (3.0 cr)
• LAW 6241 - First Amendment Law (3.0 cr)
• LAW 6606 - Administrative Law (3.0 cr)
• LAW 6705 - Information Governance (2.0 cr)
• LAW 6806 - Seminar: International Humanitarian Law (2.0 - 3.0 cr)
• LAW 6832 - Seminar: Cyber-Security - Spies, Lies and Prying Eyes (2.0 cr)
• MATH 5248 - Cryptology and Number Theory (4.0 cr)
• MATH 5251 - Error-Correcting Codes, Spies, Lies and Prying Eyes (4.0 cr)
• MGMT 6004 - Negotiation Strategies (2.0 cr)
• MGMT 6034 - Strategic Leadership (2.0 cr)
• MGMT 6084 - Management of Groups (2.0 cr)
• MGMT 6402 - Integrative Leadership: From Theory to Practice (3.0 cr)
• OLPD 5310 - Data-Driven Decision Making I (1.0 cr)
• OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
• OLPD 5619 - Planning and Decision-Making Skills (1.0 cr)
• OLPD 6402 - Integrative Leadership Seminar (3.0 cr)
• PA 5011 - Management of Organizations (3.0 cr)
• PA 5105 - Integrative Leadership Seminar (3.0 cr)
• PA 5405 - Public Policy Implementation (3.0 cr)
• PA 5701 - Science and State (3.0 cr)
• PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
• PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
• PA 5822 - International Security (3.0 cr)
• PA 6201 - Environment and Infrastructure Planning (4.0 cr)
• PA 6821 - National Security Policy (3.0 cr)
• POL 5885 - International Conflict and Security (3.0 cr)
• POL 8402 - International Security (3.0 cr)
• PUBH 5231 - Emergency Preparedness: A Public Health Perspective (2.0 cr)
• PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
• PUBH 6112 - Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals (2.0 cr)
• PUBH 6123 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6571 - Leading Performance Improvement in Health Care (2.0 cr)
• PUBH 6702 - Integrative Leadership Seminar (3.0 cr)
• PUBH 7214 - Principles of Risk Communication (1.0 cr)
• PUBH 7221 - Planning for Urgent Threats (1.0 cr)
• PUBH 7223 - Concepts of Disaster Behavioral Health (1.0 cr)
• PUBH 7225 - Communication and Information Technology Tools for Public Health Emergency Response (1.0 cr)
• PUBH 7227 - Incident Management Systems: The Public Health Role (1.0 cr)
• PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)
• PUBH 7233 - Food System Defense: Vulnerabilities in the Food System (1.5 cr)
• PUBH 7242 - War and Public Health (1.0 cr)
• SCO 6059 - Quality Management and Lean Six Sigma (4.0 cr)
• SCO 8892 - Readings in Operations and Management Science (1.0 - 8.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
• VMED 5920 - Food Defense: Prepare, Respond, Recover (3.0 cr)
• WRIT 5001 - Introduction to Graduate Studies in Scientific and Technical Communication (3.0 cr)
• WRIT 5112 - Information Design: Theory and Practice (3.0 cr)
• WRIT 5561 - Editing and Style for Technical Communicators (3.0 cr)

Special Topics Electives
The following electives are topics courses. Only the approved topic titles below may be used.
• CSCI 5980 - Computation Geo-Informatics (3 credits)
• HIST 5900 - European Nationalism and National Identity (3 credits)
• IDSC 6490 - Information-Based Goods in the Network Economy (2 credits)
• PA 5190 - Managing Conflict: Negotiation (3 credits)
• PA 5890 - International Crisis Simulation (1 credit)
• PA 5920 - Action-Oriented Strategy Mapping (1 credit)
• PA 5920 - Assessing Leadership Capability (1 credit)
• PA 5920 - Stakeholder/SWOT Analysis and Casual Mapping (0.5 credits)
• PA 8790 - Risk Analysis for Science and Technology Policy (3 credits)
• PUBH 7200 - Best Practices in Emergency Response (1 credit)
• PUBH 7200 - Data Driven Decision-Making (1 credit)
• PUBH 7200 - Design for Disaster (1 credit)
PUBH 7200 - Disaster 101 (1 credit)
PUBH 7200 - Epidemiology of Foodborne Pathogens (1 credit)
PUBH 7200 - Farm to Table Study Program (2 credits)
PUBH 7200 - Food Defense: Vulnerabilities in Food System and How to Close Them (1 credit)
PUBH 7200 - Food Facility Bio-Security: Cleaning and Sanitation for Food Facilities (1 credit)
PUBH 7200 - Food Systems Biosecurity Action Planning (1.5 credits)
PUBH 7200 - Using Risk Analysis Tools: Estimating Food Safety Risks on the Farm to Table Continuum (1 credit)
Twin Cities Campus  
Security Technologies Minor  
Technological Leadership Institute  
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:  
Security Technologies Graduate Program, Technological Leadership Institute, University of Minnesota,  
290 McNamara Alumni Center, 200 Oak Street SE, Minneapolis MN 55455 (612-624-5474; fax: 612-624-7510)  
Email: tliss@umn.edu  
Website: http://www.tli.umn.edu

• Program Type: Graduate minor related to major  
• Requirements for this program are current for Fall 2016  
• Length of program in credits (Masters): 7  
• Length of program in credits (Doctorate): 12  
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The security technologies graduate program shapes tomorrow's analytical and risk management policy makers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. Through a multidisciplinary systems approach, the program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. Through elective courses, students choose a learning track in either security systems technologies or security risk management. Students can further specialize through a range of elective courses. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants for the minor must be enrolled in a degree program at the University of Minnesota and must be interviewed for admission (in person or by telephone) by the DGS or designate, except in rare circumstances where this requirement may be waived.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters

Minor Courses
Take 7 or more credit(s) from the following:
• ST 8109 - Cybersecurity Foundations - Technology, Risk & Communication (2.0 cr)  
• ST 8110 - Security Science and Technology Foundations (3.0 cr)
- ST 8111 - Methods, Theory, and Applications (2.5 cr)
- ST 8113 - Information and Cyber Security (2.0 cr)
- ST 8200 - Special Topics in Security Technologies (0.5 cr)
- ST 8220 - Vulnerability, Risk and Threat Assessment and Management (3.0 cr)
- ST 8221 - Communications of Risk and Security (1.0 cr)
- ST 8330 - Critical Infrastructure Protections (3.0 cr)
- ST 8331 - Dynamic Systems Modeling and Simulation Tools (2.0 cr)
- ST 8440 - Security Practicum (0.5 - 2.0 cr)
- ST 8510 - Psychology/Behavior Intelligence for Homeland Security (2.0 cr)
- ST 8511 - Public Policy (1.0 cr)
- ST 8512 - Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics (2.0 cr)
- ST 8661 - Securing Cyberspace (Fundamentals) (3.0 cr)

Doctoral

Minor Courses
Take 12 or more credit(s) from the following:
- ST 8109 - Cybersecurity Foundations - Technology, Risk & Communication (2.0 cr)
- ST 8110 - Security Science and Technology Foundations (3.0 cr)
- ST 8111 - Methods, Theory, and Applications (2.5 cr)
- ST 8113 - Information and Cyber Security (2.0 cr)
- ST 8200 - Special Topics in Security Technologies (0.5 cr)
- ST 8220 - Vulnerability, Risk and Threat Assessment and Management (3.0 cr)
- ST 8221 - Communications of Risk and Security (1.0 cr)
- ST 8330 - Critical Infrastructure Protections (3.0 cr)
- ST 8331 - Dynamic Systems Modeling and Simulation Tools (2.0 cr)
- ST 8440 - Security Practicum (0.5 - 2.0 cr)
- ST 8510 - Psychology/Behavior Intelligence for Homeland Security (2.0 cr)
- ST 8511 - Public Policy (1.0 cr)
- ST 8512 - Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics (2.0 cr)
- ST 8661 - Securing Cyberspace (Fundamentals) (3.0 cr)
Twin Cities Campus
Software Engineering M.S.S.E.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
MSSE Program, Department of Computer Science and Engineering, College of Science and Engineering, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-1381; fax: 612-625-0572)
Email: msse@cs.umn.edu
Website: http://www.msse.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Software Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Software Engineering (M.S.S.E.) program provides a thorough understanding of the fundamental issues related to software development and the software development process. The MSSE curriculum provides a solid grounding in theoretical methods, principles, and tools, and an examination of fundamental software development issues and processes. These concepts are explored using realistic and relevant case examples and projects to ensure that the theory works in practice. The M.S.S.E. program is an interdisciplinary program administered by the College of Science and Engineering's Department of Computer Science and Engineering.

The program is offered in a format designed for full-time working professionals. Students take courses one day per week (alternating Fridays and Saturdays) and move through the curriculum as a cohort, taking all classes together for four semesters.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Prospective students should have an undergraduate degree in computer science or a closely related field.

Other requirements to be completed before admission:
Students with degrees in other fields may be considered for admission based on relevant work experience.

Prospective applicants must have a minimum of one year of professional experience working in the software industry.

Because the M.S.S.E. program is designed for full-time working professionals, international applicants typically hold an H-1B visa.

Special Application Requirements:
The early application deadline is March 31. The final deadline is July 1. Applications are accepted for fall semester only. Additional information is available at http://www.msse.umn.edu/how-to-apply

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
IELTS
- Total Score: 6.5
MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S.S.E. requires 30 credits. The curriculum is fixed for the first three semesters. The fourth semester offers electives, including an optional independent project. Students take eight core courses, two industrial seminar courses, and 1-2 elective courses. The project requirement can be met by a combination of class projects or by an independent project elective.

Core Courses

For SENG 5199, only the topic title listed below may count toward program requirements.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>SENG 5707</td>
<td>The Principles of Database Systems (3.0 cr)</td>
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<tr>
<td>SENG 5801</td>
<td>Software Engineering I: Overview, Requirements,</td>
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<td></td>
<td>and Modeling (3.0 cr)</td>
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<tr>
<td>SENG 5802</td>
<td>Software Engineering II: Software Design (3.0 cr)</td>
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<tr>
<td>SENG 5811</td>
<td>Software Testing and Verification (2.0 cr)</td>
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<tr>
<td>SENG 5851</td>
<td>Software Project Management (3.0 cr)</td>
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<tr>
<td>SENG 5852</td>
<td>Quality Assurance and Process Improvement (3.0 cr)</td>
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<tr>
<td>SENG 5861</td>
<td>Introduction to Software Architecture (3.0 cr)</td>
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<tr>
<td>SENG 5115</td>
<td>Graphical User Interface Design, Evaluation, and</td>
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<td></td>
<td>Implementation (3.0 cr)</td>
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<tr>
<td>or SENG</td>
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<tr>
<td></td>
<td>5199 - Graphical User Interface Design, Evaluation, and Implementation</td>
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</tbody>
</table>

Industrial Seminar

Take twice for a total of 2 credits

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENG 5899</td>
<td>Software Engineering Seminar</td>
<td>1.0 cr</td>
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</tbody>
</table>

Electives

Choose 5-6 credits in SENG electives in consultation with adviser
Twin Cities Campus
Stream Restoration Science and Engineering Postbaccalaureate Certificate
CSENG Civil, Envrn & Geo-Eng (CEGE)
College of Science and Engineering

Contact Information:
Stream Restoration Graduate Certificate Program, National Center for Earth-surface Dynamics, Saint Anthony Falls Laboratory, 2 Third Avenue SE, Minneapolis, MN 55414 (612-624-4606; fax: 612-624-0066)
Email: volle001@umn.edu
Website: http://www.nced.umn.edu/srcp

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Stream Rest. Science & Engineering PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in stream restoration science and engineering is a three-semester program producing graduates who understand how to blend engineering, physical, biological, and social sciences in prioritizing, designing, implementing, and evaluating stream restoration projects. Two courses, including an introduction to stream restoration and a restoration design experience are required. The remaining courses are chosen from a specified list of relevant courses taught across a number of University departments.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a field related to ecology, civil engineering, or environmental and earth sciences from an accredited US institution or its foreign equivalent.

Other requirements to be completed before admission:
In addition to the University's online application form, students must submit a program application and one letter of reference. The SRSE program application form and directions for submission can be found at http://nced.umn.edu/apply-certificate-program-stream-restoration.

Applications are accepted throughout the year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
Foundation Course
The foundation course is also offered as EEB/ESCI 8601. Students pursuing a degree in earth sciences, civil engineering, or ecology, evolution and behavior should register for the foundation course under a designator other than that of their major.

CEGE 8601 - Introduction to Stream Restoration (3.0 cr)

Elective Coursework
Take 11 or more credit(s) from the following:
River and Floodplain Science and Engineering
Take 1 or more course(s) from the following:
- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4511 - Hydraulic Structures (3.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- ESCI 4701 - Geomorphology (4.0 cr)

River and Floodplain Ecology
- CEGE 8508 - Ecological Fluid Mechanics (4.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)

Water Quality
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- CEGE 8541 - Aquatic Chemistry (3.0 cr)
- CEGE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- CEGE 8562 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
- ESCI 4702 - General Hydrogeology (3.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)

Water Policy and Management
Take at most 4 credit(s) from the following:
- ESPM 4295W - GIS in Environmental Science and Management [WI] (4.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
- WRS 5101 - Water Policy (3.0 cr)

Capstone Course
The capstone course is also offered as EEB/ESCI 8602. Students pursuing a degree in earth sciences, civil engineering, or ecology, evolution and behavior should register for the capstone course under a designator other than that of their major.

CEGE 8602 - Stream Restoration Practice (2.0 cr)
Twin Cities Campus

Accountancy M.Acc

Accounting

Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Master Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue S, Minneapolis, MN 55455 (612-624-7511; fax: 612-626-7795)
Email: macct@umn.edu
Website: http://www.carlsonschool.umn.edu/master-accountancy

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Accountancy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master's of Accountancy (MAcc) program offers a 30-credit track for students with a degree in accounting or finance. It provides these students with an opportunity to enhance their management skills with graduate-level courses in accounting, finance, taxation, information systems, and supply chain and operations. Completing the MAcc program enables them to meet the 150 semester hour requirement for CPA certification. In addition, it provides finance majors the opportunity to take accounting courses, required to sit for the CPA examination, that were not taken for their bachelor's degree.

The MAcc program also offers a 48-credit track to students with a bachelor's degree in an academic discipline other than accounting. The eight required core courses include the necessary accounting courses needed to sit for the CPA examination.

Elective courses in the MAcc program cover a broad range of topics in accounting, taxation, finance, supply chain and operations, and information systems. The curriculum has been designed and developed by Carlson School of Management faculty with extensive input and ongoing consultation with executives from the professional community. This ensures relevant, practical, and challenging courses that enhance the students' professional development.

Students may choose to complete the program on a full-time or part-time basis. The majority of the courses are offered in the evenings (Monday-Thursday, 5:45-9:05 p.m.).

Program Delivery

This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Other requirements to be completed before admission:
All applicants must have a bachelor's degree from an accredited college or university and a cumulative undergraduate grade point average of 3.0 (on a 4.0 scale) or higher.

Applicants with a bachelor's degree in accounting (or equivalent coursework) or finance are generally eligible for the 30-credit MAcc program.

Students who have a bachelor's degree in an academic discipline other than accounting or finance are eligible to apply for the MAcc program and take the 48-credit track. The following courses (or equivalents) are prerequisites to the MAcc courses: IDSC 3001 Information Systems, FINA 3001 Finance Fundamentals, ACCT 2050 Financial Accounting, ACCT 3001 Management Accounting, ACCT 5101 Intermediate Accounting I. They can be taken after being admitted to the MAcc program but do not apply to the 48-credit requirement. Coursework will be evaluated after applying.

Special Application Requirements:

Summer/Fall application deadline: February 1 priority, followed by rolling admission until program is full.
Spring application deadline: October 1 priority, followed by rolling admission until program is full.
Applicants must submit all application materials through the University's admission system. Application materials include:

Three letters of recommendation from persons qualified to evaluate most recent work and potential for graduate study.

A GMAT score that is not more than five years old is required. The GMAT score must be sent directly from GMAT to be considered official. Admitted Carlson School of Management undergraduate students will have the GMAT requirement waived.

For international students, the results from one of the following English language tests are required: TOEFL, IELTS, MELAB. TOEFL scores must be received directly from TOEFL. IELTS and MELAB scores must be received directly from the testing center.

For additional application details, review the M.Acc. admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C**: Plan C requires 30 to 48 major credits and up to null credits outside the major. This is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

The MAcc program requires either 30 or 48 credits, depending on bachelor's degree. The 30-credit program includes 12 required credits from three core courses. The 48-credit program includes 30 required credits from eight core courses. Both programs also require 18 elective credits from a designated pool of courses in accounting, taxation, finance, information and decision sciences, and supply chain and operations.

Students in the 30-credit MAcc program are required to have completed the following courses (or equivalent courses) in their undergraduate program or in their MAcc program. If required to take any of these courses in the MAcc program, the number of elective credits is reduced by that number of credits.

- ACCT 5102 - Intermediate Accounting II, 4 cr
- ACCT 5125W - Auditing Principles and Procedures [WI] (4.0 cr)
- ACCT 5135 - Fundamentals of Federal Income Tax, 4 cr
- BLAW 3058/6158 - The Law of Contracts and Agency, 4 cr

**Required Courses for 30-Credit MAcc Program**

Students with an undergraduate degree in accounting or finance will complete the 30-credit MAcc program and take three required core courses (12 credits) in addition to 18 credits of electives.

- ACCT 6601 - Internal Control (4.0 cr)
- ACCT 6602 - Securities and Exchange Commission (SEC) and Standard Setting (4.0 cr)
- IDSC 6003 - Accounting and Information Systems (4.0 cr)

**Required Courses for 48-Credit MAcc Program**

Students with an undergraduate degree in a field other than accounting or finance will complete the 48-credit MAcc program and take eight required core courses (30 credits) in addition to 18 credits of electives.

- ACCT 5102 - Intermediate Accounting II (4.0 cr)
- ACCT 5125W - Auditing Principles and Procedures [WI] (4.0 cr)
- ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
- ACCT 5201 - Intermediate Management Accounting (2.0 cr)
- BLAW 6158 - The Law of Contracts and Agency (4.0 cr)
- ACCT 6601 - Internal Control (4.0 cr)
- ACCT 6602 - Securities and Exchange Commission (SEC) and Standard Setting (4.0 cr)
- IDSC 6003 - Accounting and Information Systems (4.0 cr)

**Elective Courses (18 credits)**

Take 18 - 20 credit(s) from the following:

- ACCT 5126 - Internal Auditing (2.0 cr)
- ACCT 5180 - Consolidations and Advanced Reporting (2.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACCT 5201</td>
<td>Intermediate Management Accounting (2.0 cr)</td>
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<tr>
<td>ACCT 5236</td>
<td>Introduction to Taxation of Business (2.0 cr)</td>
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<tr>
<td>ACCT 5310</td>
<td>International Accounting (2.0 cr)</td>
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<tr>
<td>ACCT 5420</td>
<td>MAcc directed study (1.0 - 4.0 cr)</td>
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<tr>
<td>ACCT 6603</td>
<td>Advanced Auditing (4.0 cr)</td>
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<tr>
<td>ACCT 6604</td>
<td>Advanced Management Accounting (2.0 cr)</td>
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<tr>
<td>ACCT 6605</td>
<td>Negotiations for Financial Executives (2.0 cr)</td>
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<tr>
<td>FINA 6121</td>
<td>Debt Markets, Interest Rates, and Hedging (2.0 cr)</td>
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<tr>
<td>FINA 6241</td>
<td>Corporate Finance Analysis and Decisions (4.0 cr)</td>
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<tr>
<td>FINA 6242</td>
<td>Advanced Corporate Finance Analysis and Decisions (4.0 cr)</td>
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<tr>
<td>FINA 6322</td>
<td>Financial Modeling (2.0 cr)</td>
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<tr>
<td>FINA 6341</td>
<td>World Economy (4.0 cr)</td>
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<tr>
<td>FINA 6522</td>
<td>Introduction to Derivatives and Financial Risk Management (2.0 cr)</td>
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<tr>
<td>FINA 6621</td>
<td>International Financial Management (2.0 cr)</td>
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<tr>
<td>IDSC 6423</td>
<td>Enterprise Systems (2.0 cr)</td>
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<tr>
<td>MBA 6120</td>
<td>Data Analysis and Statistics for Managers (3.0 cr)</td>
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<tr>
<td>MBT 5200</td>
<td>Tax Accounting Methods and Periods (4.0 cr)</td>
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<tr>
<td>MBT 5220</td>
<td>Tax Research, Communication, and Practice (4.0 cr)</td>
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<td>MBT 5230</td>
<td>Corporate Taxation I (2.0 cr)</td>
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<td>MBT 5346</td>
<td>ASC 740 Computations and Analysis (2.0 cr)</td>
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<td>MBT 5370</td>
<td>Taxation of Property Transactions (2.0 cr)</td>
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<td>MBT 5382</td>
<td>Transfer Pricing (2.0 cr)</td>
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<tr>
<td>SCO 6041</td>
<td>Project Management (2.0 cr)</td>
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<tr>
<td>SCO 6056</td>
<td>Managing Supply Chain Operations (4.0 cr)</td>
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</tbody>
</table>
Twin Cities Campus
Business Administration M.B.A.
Graduate Business Career Center
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
M.B.A. Programs Office, 1-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-625-5555; fax: 612-626-7582)
Email: mba@umn.edu
Website: http://www.carlsonschool.umn.edu/MBA

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48 to 65
- This program does not require summer semesters for timely completion.
- Degree: Master of Business Administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

At the Carlson School, students tailor their education to meet their career objectives. Supported by outstanding faculty, cutting-edge coursework, and extensive networking opportunities, students compile an impressive record of professional achievements even before they graduate.

The Carlson School offers several pathways to the master of business administration degree: the full-time MBA, the part-time MBA, the industry MBA, and the executive MBA. Dual degree programs are only available through the full-time MBA program. Please visit our website at http://www.carlsonschool.umn.edu/mba/ for more information.

The Carlson School's China executive MBA program is offered through a partnership between the Carlson School and Lingnan (University) College of Sun Yat-sen University. The Carlson School's Vienna executive MBA program is offered jointly with the Vienna University of Economics and Business (WU). For additional information on these two programs, please contact cgi@umn.edu.

Accreditation
This program is accredited by AACSB International.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
Please review the Admissions Checklist online for detailed admissions requirements.

Special Application Requirements:
Applicants must have an acceptable score on the GMAT or GRE. In addition, international students must have an acceptable score on the Test of English as a Foreign Language (TOEFL), the International Language Testing System (IELTS), or the Pearson Test of English Academic (PTE).

Candidates will be required to apply and be admitted to both degree programs separately.

Applicants must submit their test score(s) from the following:
- GMAT
- Pearson Test of English Academic (PTE Academic)
International applicants must submit score(s) from one of the following tests:

• TOEFL
• IELTS

Key to test abbreviations (GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 48 to 65 major credits and up to null credits outside the major. The is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Joint- or Dual-degree Coursework: The Full-Time MBA program offers the following dual degree program options: MS-Applied Economics/MBA: up to 18 credits in common allowed; MS-Business Analytics/MBA: up to 22 credits in common allowed; MA-HRIR/MBA: up to 24 credits in common allowed; MHA/MBA: up to 24 credits in common allowed; MPP/MBA: up to 24 credits in common allowed; JD/MBA: up to 24 credits in common allowed; MD/MBA: up to 24 credits in common allowed; and PharmD/MBA: up to 24 credits in common allowed. For full complete Dual Degree information, visit http://carlsonschool.umn.edu/degrees/master-business-administration/dual-degrees Student may take a total of 24 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Full-Time Master of Business Administration

The Carlson full-time MBA program offers an intense curriculum that gives students a distinct edge. They start by taking coordinated core courses that provide a sound foundation in essential managerial disciplines, while at the same time, customizing their education to fit their career paths. The full-time program involves a rigorous time commitment. While the amount of time spent on campus varies from 30-50 hours per week, all students are expected to complete the degree in two years with a minimum of 65 credits.

FT MBA Core Courses

MBA 6030 - Financial Accounting (3.0 cr)
MBA 6120 - Data Analysis and Statistics for Managers (3.0 cr)
MBA 6140 - Managerial Economics (0.0 - 2.0 cr)
MBA 6210 - Marketing Management (3.0 cr)
MBA 6220 - Operations Management (3.0 cr)
MBA 6230 - Financial Management (3.0 cr)
MBA 6240 - Competing in a Data-Driven Digital Age (2.0 cr)
MBA 6300 - Strategic Management (3.0 cr)
MBA 6315 - The Ethical Environment of Business (2.0 cr)

Leadership Requirement

The total leadership credit requirement is 4 credits. MBA 6108 is completed throughout the first year for 1 credit, and MBA 6112 is completed throughout the second year for 1 credit. MBA 6110 is completed in spring of the first year for a total of 2 credits.

Take exactly 4 credit(s) from the following:

• MBA 6108 - Leading Self (0.0 - 1.0 cr)
• MBA 6110 - Leading Others (2.0 cr)
• MBA 6112 - Leading Organizations (0.0 - 0.5 cr)

Enterprise Requirement

All full-time MBA students are required to participate in one Enterprise program throughout their time in the program.

Take exactly 9 credit(s) from the following:

• MBA 6501 - Carlson Funds Enterprise: Growth (2.0 - 4.0 cr)
• MBA 6502 - Carlson Funds Enterprise: Fixed Income (2.0 - 4.0 cr)
• MBA 6503 - Carlson Ventures Enterprise (2.0 - 4.0 cr)
• MBA 6504 - Carlson Consulting Enterprise (2.0 - 4.0 cr)
• MBA 6505 - Carlson Brand Enterprise (2.0 - 4.0 cr)
International Experience

All full-time MBA students must participate in an international study abroad program or complete a course on campus that has been designated to meet this requirement. A minimum of 4 credits is required to fulfill this requirement.

Take 1 or more course(s) totaling 4 or more credit(s) from the following:

- IBUS 5140 - Vienna Summer Program in International Business (Graduate) (0.0 - 18.0 cr)
- IBUS 5150 - India Seminar: Managing in a Global Environment (4.0 cr)
- IBUS 5260 - Integrated Corporate Reporting and the Triple Bottom Line (4.0 cr)
- IBUS 5300 - International Business: Graduate Exchange BLOCK (0.0 - 18.0 cr)
- IBUS 5301 - Graduate Exchange in International Business - BLOCK (0.0 - 18.0 cr)
- IBUS 5302 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5303 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5304 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5305 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5306 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5307 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5308 - International Business: Graduate Exchange (0.0 - 18.0 cr)
- IBUS 5400 - Global Business Practicum (4.0 cr)
- IBUS 5605 - Shanghai Summer Program in International Business (Graduate) (0.0 - 18.0 cr)
- IBUS 6401 - Marketing in the Mayhem: Why Chile Thrives and How Argentina Tries (4.0 cr)
- IBUS 6402 - Economic Diversification: Moving Beyond Oil in UAE and Oman (4.0 cr)
- IBUS 6997 - MILI Global Valuation Lab (4.0 cr)
- IDSC 6465 - Global Sourcing of IT and IT Enabled Services (4.0 cr)
- MGMT 6305 - The International Environment of Business (4.0 cr)
- MKTG 6072 - International Marketing (4.0 cr)
- SCO 6081 - Global Operations Strategy (4.0 cr)
- MILI 6997 - MILI Global Valuation Lab (4.0 cr)

Full-Time MBA Electives

Electives not on this list must be approved by MBA Programs Office in order to count for degree requirements.

Take 24 or more credit(s) from the following:

- ACCT 5180 - Consolidations and Advanced Reporting (2.0 cr)
- ACCT 6100 - Financial Statement Analysis (4.0 cr)
- ACCT 6160 - (Inactive) (2.0 cr)
- BLAW 6158 - The Law of Contracts and Agency (4.0 cr)
- ENTR 6020 - Business Formation (4.0 cr)
- ENTR 6021 - Preparing and Implementing the Business Plan (2.0 cr)
- ENTR 6036 - Managing the Growing Business (2.0 cr)
- ENTR 6037 - Corporate Venturing (2.0 cr)
- ENTR 6041 - Initiating New Product Design and Business Development (2.0 - 4.0 cr)
- ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
- ENTR 6090 - Topics in Entrepreneurship (2.0 - 4.0 cr)
- FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
- FINA 6122 - Financial Management of Depository Institutions (2.0 cr)
- FINA 6222 - Mergers and Acquisitions (2.0 cr)
- FINA 6241 - Corporate Finance Analysis and Decisions (4.0 cr)
- FINA 6242 - Advanced Corporate Finance Analysis and Decisions (4.0 cr)
- FINA 6321 - Portfolio Analysis and Management (2.0 cr)
- FINA 6322 - Financial Modeling (2.0 cr)
- FINA 6323 - Advanced Financial Modeling (2.0 cr)
- FINA 6324 - Securitization Markets (2.0 cr)
- FINA 6325 - Behavioral Finance (2.0 cr)
- FINA 6341 - World Economy (4.0 cr)
- FINA 6422 - Mergers and Acquisitions (2.0 - 4.0 cr)
- FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
- FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
- FINA 6621 - International Financial Management (2.0 cr)
- IDSC 6050 - Information Technologies and Solutions (2.0 cr)
- IDSC 6233 - Enterprise Systems (2.0 cr)
- IDSC 6435 - Business Process Excellence (2.0 cr)
- IDSC 6442 - E-Sourcing and E-Auctions (2.0 cr)
- IDSC 6444 - Business Intelligence (2.0 cr)
- IDSC 6446 - Advanced Business Intelligence (2.0 cr)
- IDSC 6455 - Web 2.0: The Business of Social Media (2.0 cr)
- IDSC 6465 - Global Sourcing of IT and IT Enabled Services (4.0 cr)
- IDSC 6471 - Knowledge Management (2.0 cr)
- IDSC 6481 - Managerial Decision Making (2.0 cr)
Part-Time Master of Business Administration

The Carlson part-time MBA curriculum, which can be completed online, includes core courses that offer an in-depth study of the foundational and functional areas of business. Advanced electives, international study options, and specializations allow students to tailor a program that meets their long-term career goals. To graduate, students must earn 48-57 credits. The number of credits a student must complete is determined at the time of admission and is based on prior coursework and/or waiver exams taken prior to the
Core Courses
Courses listed in recommended sequence.
MBA 6300 - Strategic Management (3.0 cr)
MBA 6120 - Data Analysis and Statistics for Managers (3.0 cr)
MBA 6030 - Financial Accounting (3.0 cr)
MBA 6220 - Operations Management (3.0 cr)
MBA 6230 - Financial Management (3.0 cr)
MBA 610 - Marketing Management (3.0 cr)
MBA 6035 - Managerial Accounting (3.0 cr)
MBA 611 - Leading Others (2.0 cr)
MBA 6315 - The Ethical Environment of Business (2.0 cr)

IT Requirement
Choose 1 of the following (if both taken, 1 will count as elective)
Take 1 or more course(s) from the following:
• IDSC 6040 - Information Technology Management (2.0 cr)
• IDSC 6050 - Information Technologies and Solutions (2.0 cr)

Economics Requirement
Choose 1 of the following (if both taken, 1 will count as elective). If choosing MBA 6140, it must be taken for 2 credits.
Take 1 or more course(s) from the following:
• MBA 6140 - Managerial Economics (0.0 - 2.0 cr)
• FINA 6341 - World Economy (4.0 cr)

International Experience
Choose 1 of the following (if more than 1 course completed, remainder will count as elective credit(s)):
Take 4 or more credit(s) from the following:
• MGMT 6205 - The International Environment of Business (4.0 cr)
• IDSC 6465 - Global Sourcing of IT and IT Enabled Services (4.0 cr)
• SCO 6081 - Global Operations Strategy (4.0 cr)
• MKTG 6072 - International Marketing (4.0 cr)
• MILI 6997 - MILI Global Valuation Lab (4.0 cr)
• IBUS 5140 - Vienna Summer Program in International Business (Graduate) (0.0 - 18.0 cr)
• IBUS 5150 - India Seminar: Managing in a Global Environment (4.0 cr)
• IBUS 5260 - Integrated Corporate Reporting and the Triple Bottom Line (4.0 cr)
• IBUS 5400 - Global Business Practicum (4.0 cr)
• IBUS 5605 - Shanghai Summer Program in International Business (Graduate) (0.0 - 18.0 cr)
• IBUS 6997 - MILI Global Valuation Lab (4.0 cr)
• IBUS 6082 - Economic Diversification: Moving Beyond Oil in UAE and Oman (4.0 cr)
• IBUS 5300 - International Business: Graduate Exchange BLOCK (0.0 - 18.0 cr)
• IBUS 5301 - Graduate Exchange in International Business - BLOCK (0.0 - 18.0 cr)
• IBUS 5302 - International Business: Graduate Exchange (0.0 - 18.0 cr)
• IBUS 5303 - International Business: Graduate Exchange (0.0 - 18.0 cr)
• IBUS 5304 - International Business: Graduate Exchange (0.0 - 18.0 cr)
• IBUS 5305 - International Business: Graduate Exchange (0.0 - 18.0 cr)
• IBUS 5306 - International Business: Graduate Exchange (0.0 - 18.0 cr)
• IBUS 5307 - International Business: Graduate Exchange (0.0 - 18.0 cr)
• IBUS 5308 - International Business: Graduate Exchange (0.0 - 18.0 cr)

Electives
Electives not on this list must be approved by MBA Programs Office to count towards degree requirements.
Take 24 or more credit(s) from the following:
• ACCT 5180 - Consolidations and Advanced Reporting (2.0 cr)
• ACCT 6000 - Financial Statement Analysis (4.0 cr)
• ACCT 6160 [inactive](2.0 cr)
• BLAW 6158 - The Law of Contracts and Agency (4.0 cr)
• ENTR 6020 - Business Formation (4.0 cr)
• ENTR 6021 - Preparing and Implementing the Business Plan (2.0 cr)
• ENTR 6036 - Managing the Growing Business (2.0 cr)
• ENTR 6037 - Corporate Venturing (2.0 cr)
• ENTR 6041 - Initiating New Product Design and Business Development (2.0 - 4.0 cr)
• ENTR 6042 - Implementing New Product Design and Business Development (4.0 cr)
• ENTR 6090 - Topics in Entrepreneurship (2.0 - 4.0 cr)
• FINA 6121 - Debt Markets, Interest Rates, and Hedging (2.0 cr)
• FINA 6122 - Financial Management of Depository Institutions (2.0 cr)
• FINA 6222 - Mergers and Acquisitions (2.0 cr)
• FINA 6241 - Corporate Finance Analysis and Decisions (4.0 cr)
FINA 6242 - Advanced Corporate Finance Analysis and Decisions (4.0 cr)
FINA 6321 - Portfolio Analysis and Management (2.0 cr)
FINA 6322 - Financial Modeling (2.0 cr)
FINA 6323 - Advanced Financial Modeling (2.0 cr)
FINA 6324 - Securitization Markets (2.0 cr)
FINA 6325 - Behavioral Finance (2.0 cr)
FINA 6341 - World Economy (4.0 cr)
FINA 6422 - Mergers and Acquisitions (2.0 - 4.0 cr)
FINA 6522 - Introduction to Derivatives and Financial Risk Management (2.0 cr)
FINA 6529 - Advanced Topics in Fixed Income and Derivatives (2.0 cr)
FINA 6621 - International Financial Management (2.0 cr)
HRIR 6465 - Leadership and Personal Development (2.0 cr)
IDSC 6040 - Information Technology Management (2.0 cr)
IDSC 6050 - Information Technologies and Solutions (2.0 cr)
IDSC 6423 - Enterprise Systems (2.0 cr)
IDSC 6435 - Business Process Excellence (2.0 cr)
IDSC 6442 - E-Sourcing and E-Auctions (2.0 cr)
IDSC 6444 - Business Intelligence (2.0 cr)
IDSC 6446 - Advanced Business Intelligence (2.0 cr)
IDSC 6455 - Web 2.0: The Business of Social Media (2.0 cr)
IDSC 6465 - Global Sourcing of IT and IT Enabled Services (4.0 cr)
IDSC 6471 - Knowledge Management (2.0 cr)
IDSC 6481 - Managerial Decision Making (2.0 cr)
MBA 6990 - MBA Topics (2.0 cr)
MCOM 5500 - Enhancing Your Executive Image in Business Communications (2.0 cr)
MCOM 5510 - Persuasive Writing in Business (2.0 cr)
MCOM 5530 - Strategies and Skills for Managerial Presentations (2.0 cr)
MGMT 6004 - Negotiation Strategies (2.0 cr)
MGMT 6031 - Industry Analysis and Competitive Strategy (4.0 cr)
MGMT 6032 - Strategic Alliances (2.0 cr)
MGMT 6033 - Managing the Strategy Process (2.0 cr)
MGMT 6034 - Strategic Leadership (2.0 cr)
MGMT 6035 - Complex and Cross-Cultural Negotiations (2.0 cr)
MGMT 6040 - International Strategy and Organization (2.0 cr)
MGMT 6050 - Management of Innovation and Change (2.0 cr)
MGMT 6084 - Management of Groups (2.0 cr)
MGMT 6085 - Corporate Strategy (4.0 cr)
MGMT 6100 - Topics in Management (2.0 - 4.0 cr)
MGMT 6305 - The International Environment of Business (4.0 cr)
MGMT 6402 - Integrative Leadership: From Theory to Practice (3.0 cr)
MGMT 6410 - Corporate Responsibility (2.0 cr)
MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
MILI 6421 - Topics: Medical Industry (2.0 cr)
MILI 6562 - Information Technology in Health Care (2.0 cr)
MILI 6589 - Medical Technology Evaluation and Market Research (2.0 cr)
MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
MILI 6990 - The Health Care Marketplace (2.0 cr)
MILI 6991 - Anatomy and Physiology for Managers (2.0 cr)
MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
MILI 6997 - MILI Global Valuation Lab (4.0 cr)
MKTG 6051 - Marketing Research (4.0 cr)
MKTG 6055 - Buyer Behavior (4.0 cr)
MKTG 6072 - International Marketing (4.0 cr)
MKTG 6073 - Technology Marketing (2.0 cr)
MKTG 6075 - Pricing Strategy (4.0 cr)
MKTG 6078 - Advertising & Promotion (4.0 cr)
MKTG 6082 - Brand Management (4.0 cr)
MKTG 6084 - Persuasion and Influence (2.0 cr)
MKTG 6085 - Harnessing Consumer Irrationality (2.0 cr)
MKTG 6086 - Digital Marketing (2.0 cr)
MKTG 6088 - Strategic Marketing (2.0 cr)
MKTG 6090 - Marketing Topics (1.0 - 4.0 cr)
SCO 6041 - Project Management (2.0 cr)
SCO 6045 - Strategic Sourcing (2.0 cr)
- SCO 6048 - Logistics and Transportation (2.0 cr)
- SCO 6051 - Service Management (2.0 cr)
- SCO 6056 - Managing Supply Chain Operations (4.0 cr)
- SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
- SCO 6081 - Global Operations Strategy (4.0 cr)
- SCO 6090 - Sales, Inventory, and Operations Planning (2.0 cr)
- SCO 6091 - Process Improvement Methods (2.0 cr)
- SCO 6092 - Supply Chain Quality and Security (2.0 cr)
- SCO 6094 - Responsible Supply Chain Management (2.0 cr)
- SCO 6095 - Supply Chain Management in the Food and Agribusiness Sector (2.0 cr)
- SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
- SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)
- SCO 6192 - Supply Chain Finance (2.0 cr)
- SCO 6850 - Topics in Operations and Management Science (2.0 - 4.0 cr)

Carlson Executive Master of Business Administration
The Carlson executive MBA is built on a foundation of time-tested business principles. By emphasizing a global perspective, the rigorous curriculum helps students develop a deeper understanding of theory and practice. Each class moves through the program together as a cohort, following set schedules. From orientation to graduation, it takes about 21 months to complete the program. Classes are held Fridays and Saturdays, predominantly on alternate weekends, 7:30 a.m. to 4:30 p.m., and do not meet during the summer.

CEMBA Program Requirements
The CEMBA program has a 49.5 credit program requirement.
- CMBA 5810 - Introduction to Statistics and Business Analytics (3.0 cr)
- CMBA 5811 - Financial Accounting (3.0 cr)
- CMBA 5812 - Organizational Behavior (3.0 cr)
- CMBA 5813 - Competing In The Digital Age (1.5 cr)
- CMBA 5814 - Economics (1.5 cr)
- CMBA 5815 - Marketing Management (3.0 cr)
- CMBA 5816 - Strategic Management (3.0 cr)
- CMBA 5817 - Financial Management (3.0 cr)
- CMBA 5818 - Supply Chain and Operations (3.0 cr)
- CMBA 5820 - Negotiation Strategies: Creative Solutions for Difficult Problems (3.0 cr)
- CMBA 5821 - Managerial Accounting (3.0 cr)
- CMBA 5822 - Leadership (1.5 cr)
- CMBA 5823 - Competing Globally (3.0 cr)
- CMBA 5824 - Corporate Responsibility & Ethics (1.5 cr)
- CMBA 5825 - Strategic Marketing (3.0 cr)
- CMBA 5826 - Corporate Strategy (1.5 cr)
- CMBA 5827 - Advanced Financial Management (3.0 cr)
- CMBA 5828 - International Residency - Study Abroad (1.5 cr)
- CMBA 5829 - International Residency Global Virtual Team Project (1.5 cr)
Choose 2 courses from the following:
- Take exactly 2 course(s) from the following:
  - CMBA 5830 - Advanced Management Topic Elective (1.5 cr)
  - CMBA 5831 - Advanced Management Topic Elective (1.5 cr)
  - CMBA 5832 - Advanced Management Topic Elective (1.5 cr)
  - CMBA 5833 - Advanced Management Topics Elective (1.5 cr)

Industry Master of Business Administration
The Industry MBA is a one-year, predominantly online program designed for working professionals to obtain the fundamental business knowledge crucial for leading careers in the complex, rapidly evolving and highly regulated healthcare, energy, technology and finance industries. Courses will be taught by our nationally renowned expert faculty and executive-level professionals. Targeting the Washington DC area, this 48 credit program will deliver sophisticated management and leadership education for students immersed in legislative and policy matters.

Industry MBA Course Requirements
Take exactly 48 credit(s) from the following:
- IMBA 6004 - Negotiations (2.0 cr)
- IMBA 6030 - Financial Accounting (3.0 cr)
- IMBA 6110 - Leading Others (2.0 cr)
- IMBA 6120 - Data Analysis & Statistics (3.0 cr)
- IMBA 6140 - Managerial Economics (3.0 cr)
- IMBA 6210 - Marketing Management (3.0 cr)
• IMBA 6220 - Supply Chain Management (3.0 cr)
• IMBA 6230 - Financial Management (3.0 cr)
• IMBA 6240 - Data Analytics (3.0 cr)
• IMBA 6300 - Strategic Management (3.0 cr)
• IMBA 6315 - The Ethical Environment of Business (2.0 cr)
• IMBA 6401 - Industry Overview & Business Law (2.0 cr)
• IMBA 6402 - Industry Vertical: Technology (2.0 cr)
• IMBA 6403 - Industry Vertical: Energy (2.0 cr)
• IMBA 6404 - Industry Vertical: Finance (2.0 cr)
• IMBA 6405 - Industry Vertical: Health (2.0 cr)
• IMBA 6500 - Virtual Team Project (4.0 cr)
• IMBA 6501 - Industry MBA Capstone (4.0 cr)

China Executive M.B.A.

China Executive MBA Courses
51 credits required.
CHMB 5800 - Organizational Behavior (3.0 cr)
CHMB 5801 - Financial Accounting (3.0 cr)
CHMB 5802 - Statistics and Decision Making (3.0 cr)
CHMB 5803 - Operations Management (3.0 cr)
CHMB 5804 - Managerial Accounting (3.0 cr)
CHMB 5805 - Financial Management (3.0 cr)
CHMB 5806 - Marketing Management (3.0 cr)
CHMB 5807 - Business Strategy (3.0 cr)
CHMB 5808 - Strategic Marketing (3.0 cr)
CHMB 5809 - Advanced Financial Management (3.0 cr)
CHMB 5810 - International Environment (1.5 cr)
CHMB 5811 - Information Technology Management (3.0 cr)
CHMB 5813 - Ethics and Leadership (3.0 cr)
CHMB 5815 - International Human Resources Management (3.0 cr)
CHMB 5816 - International Residency (6.0 cr)
CHMB 5817 - China’s Economy (1.5 cr)
CHMB 5818 - Law and Business (3.0 cr)

Vienna Masters of Business Administration

Vienna MBA Coursework Requirements
58 credits required
VMBA 5700 - Managerial Accounting (4.0 cr)
VMBA 5701 - Data Analysis and Decision Making (4.0 cr)
VMBA 5702 - Financial Management (4.0 cr)
VMBA 5703 - Marketing Management (4.0 cr)
VMBA 5704 - Managing People and Organizations (4.0 cr)
VMBA 5705 - Operations Management (4.0 cr)
VMBA 5706 - Business, Government, and Macroeconomics (4.0 cr)
VMBA 5707 - Economics in Transition (4.0 cr)
VMBA 5709 - Info Tech Mgmt (4.0 cr)
VMBA 5711 - Managing Globalization (Guangzhou) (4.0 cr)
VMBA 5712 - Strategies for a Global Company: an Integrative Perspective (6.0 cr)
VMBA 5713 - Negotiations and Conflict Management (4.0 cr)
VMBA 5714 - Financial Accounting (4.0 cr)
VMBA 5715 - Corporate and Entrepreneurial Strategy (4.0 cr)

India
Twin Cities Campus

Business Administration Minor
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
PhD Program in Business Administration, Carlson School of Management, Suite 4-205, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-0875 or 612-624-5065; fax 612-624-8221)
Email: brons003@umn.edu
Website: http://carlsonschool.umn.edu/degrees/phd

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 16
- This program does not require summer semesters for timely completion.
- None.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The PhD program in business administration offers full-time advanced graduate education for students seeking academic placement at leading universities or research-oriented positions in business or government. The program is for individuals who have the intellectual capacity for advanced study, enjoy independent research and analytical thinking, and who wish to master a discipline within business administration.

Non-business administration doctoral students working toward a minor within the business administration program must complete a cohesive program of study in one of seven areas of specialization: accounting; finance; information and decision sciences (including the management information systems and decision science subfields); marketing; supply chain and operations; strategic management and entrepreneurship (covering the subfields of strategy, international management and entrepreneurship), and work and organizations (covering the subfields of industrial-organizational psychology, organizational behavior, personnel and labor economics, and industrial relations).

Accreditation
This program is accredited by AACSB International

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
University of Minnesota PhD student in a field other than business administration.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

For each of the seven areas of concentration, a minimum of 16 credits is required. Coursework is selected in consultation with the PhD program office or the PhD coordinator of the student's chosen concentration area. Courses should be 8xxx-level, although up to 8 credits of 5xxx- and 7xxx-level coursework can be taken with the approval of the PhD and master's program offices.

Areas of Concentration

Accounting
Take 16 or more credit(s) from the following:

- **ACCT 8800** - Empirical Research: Topics I (2.0 cr)
- **ACCT 8801** - Empirical Research-Valuation (4.0 cr)
- **ACCT 8802** - Empirical Research - Capital Markets I (2.0 cr)
- **ACCT 8803** - Empirical Research: Capital Markets II (2.0 cr)
- **ACCT 8804** - Empirical Research Topics II (2.0 cr)
- **ACCT 8811** - Information Economics I (4.0 cr)
- **ACCT 8812** - Information Economics II (4.0 cr)
- **ACCT 8831** - Analytical Research Topics I (2.0 cr)
- **ACCT 8832** - Analytical Research Topics II (2.0 cr)

-OR-

**Finance**
Take 16 or more credit(s) from the following:

- **FINA 8802** - Theory of Capital Markets I: Discrete Time (2.0 cr)
- **FINA 8803** - Theory of Capital Markets II: Continuous Time (2.0 cr)
- **FINA 8804** - Advanced Continuous Time Finance (2.0 cr)
- **FINA 8810** - Topics in Asset Pricing (2.0 cr)
- **FINA 8812** - Corporate Finance I (2.0 cr)
- **FINA 8813** - Corporate Finance II (2.0 cr)
- **FINA 8820** - Topics in Corporate Finance (2.0 cr)
- **FINA 8822** - Empirical Methods in Finance (2.0 cr)
- **FINA 8823** - Empirical Corporate Finance (2.0 cr)
- **FINA 8890** - Seminar: Finance Topics (2.0 - 4.0 cr)

-OR-

**Information and Decision Sciences**
Take 16 or more credit(s) from the following:

- **IDSC 8511** - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
- **IDSC 8521** - System Development (3.0 cr)
- **IDSC 8531** - Organizational Theory and Research in Information Systems (3.0 cr)
- **IDSC 8541** - Introduction to Economics of Information Systems (3.0 cr)
- **IDSC 8721** - Behavioral Decision Theory (3.0 cr)
- **IDSC 8801** - Research Seminar in Information and Decision Sciences (2.0 cr)

-OR-

**Marketing**
Take 16 or more credit(s) from the following:

- **MKTG 8809** - Consumer Behavior Research Methods (2.0 cr)
- **MKTG 8810** - Consumer Behavior Special Topics (2.0 cr)
- **MKTG 8811** - Consumer Attitudes and Persuasion I (2.0 cr)
- **MKTG 8812** - Consumer Attitudes and Persuasion II (2.0 cr)
- **MKTG 8813** - Consumer Judgment and Decision Making I (2.0 cr)
- **MKTG 8814** - Consumer Judgment and Decision Making II (2.0 cr)
- **MKTG 8831** - Seminar: Inter-Organizational Relations (4.0 cr)
- **MKTG 8842** - Quantitative Modeling I (2.0 - 4.0 cr)
- **MKTG 8843** - Quantitative Modeling II (2.0 cr)
- **MKTG 8851** - Seminar: Marketing Management and Strategy I (2.0 cr)
- **MKTG 8852** - Marketing Management & Strategy II (2.0 cr)
- **MKTG 8890** - Seminar: Marketing Topics (1.0 - 4.0 cr)

-OR-

**Strategic Management and Entrepreneurship**
Take 16 or more credit(s) from the following:

- **MGMT 8101** - Theory Building and Research Design (4.0 cr)
- **MGMT 8202** - Seminar in International Management (4.0 cr)
- **MGMT 8301** - Seminar in Organizational Behavior (4.0 cr)
- **MGMT 8302** - Seminar in Organizations Theory (4.0 cr)
- **MGMT 8401** - Seminar in Strategy Content (2.0 - 4.0 cr)
- **MGMT 8402** - Seminar in Strategy Process (4.0 cr)
- **MGMT 8501** - Seminar in Entrepreneurship (4.0 cr)

-OR-

**Supply Chain and Operations**
Take 16 or more credit(s) from the following:

- SCO 8651 - Experimental Design (3.0 cr)
- SCO 8652 - Regression Analysis (3.0 cr)
- SCO 8711 - Research in Operations Strategy (3.0 cr)
- SCO 8721 - Management of Technological Operations (3.0 cr)
- SCO 8735 - Supply Chain Management (3.0 cr)
- SCO 8745 - Research on Quality Management (3.0 cr)
- SCO 8755 - Behavioral Operations (3.0 cr)

-OR-

Work and Organizations
Take 16 or more credit(s) from the following:

- HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
- HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
- HRIR 8803 - Core Seminar: Fundamentals of HR Research (4.0 cr)
- HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
- HRIR 8820 - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
- HRIR 8825 - Research Practicum/Workshop (1.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Doctoral
Twin Cities Campus
Business Administration Ph.D.
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Carlson School of Management, Business Administration PhD Program, Suite 4-205, 321 19th Avenue South, Minneapolis, MN 55455
(612-624-0875; fax: 612-624-8221)
Email: brons003@umn.edu
Website: http://carlsonschool.umn.edu/degrees/phd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64 to 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program offers full-time advanced graduate education for students seeking academic placement at leading universities or research-oriented positions in business or government. The program is for individuals who have the intellectual capacity for advanced study, enjoy independent research and analytical thinking, and who wish to master a discipline within business administration.

Students choose to concentrate in one of seven areas of specialization: accounting; finance; information and decision sciences (including the management information systems and decision science subfields); marketing; supply chain and operations; strategic management and entrepreneurship (covering the subfields of strategy, entrepreneurship, and international management); and work and organizations (including the subfields of industrial-organizational psychology, organizational behavior, personnel and organizational economics, and industrial relations).

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB)

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have completed a four-year undergraduate degree in any relevant field of study.

Other requirements to be completed before admission:
Admission depends on the applicant's grades, test scores (GMAT or GRE), and strength of both the letters of recommendation and the statement of purpose.

Preferred minimum test scores are 650 on the GMAT; 1380 total of the verbal and quantitative sections of GRE General tests taken prior to August 2011, or 320 total on the revised GRE general test (August 2011 and after).

Special Application Requirements:
Applicants should submit the following items to the Carlson School of Management Ph.D. program office: (1) an official copy of the GMAT or GRE scores taken within the last five years; and (2) official TOEFL or IELTS scores (international applicants only) from a test taken within the last two years. All other application materials (official application, application fee, statement of purpose, resume/vita, three letters of recommendation and transcripts) should be entered directly or uploaded into the ApplyYourself online application system. The application deadline for all areas of concentration is December 15 each year for fall admission consideration. Applications are evaluated on a rolling basis beginning early in January. Admission decisions continue until available positions are filled.

Applicants must submit their test score(s) from the following:
• GRE
• GMAT  
  - Total score: 650

International applicants must submit score(s) from one of the following tests:
• TOEFL  
  - Internet Based - Total Score: 100  
  - Internet Based - Speaking Score: 25  
  - Paper Based - Total Score: 600
• IELTS  
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 to 28 credits are required in the major.
16 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Degree requirements vary by area of concentration. Each student's coursework is determined in consultation with an advisor. Some areas may require a first-year examination or presentation.

Areas of Concentration

Accounting
Students pursuing the accounting concentration work under one of two accounting research paradigms: analytic or empirical.

Required Accounting Coursework
Take all of the following for 24 credits:
• ACCT 8800 - Empirical Research: Topics I (2.0 cr)
• ACCT 8801 - Empirical Research: Valuation (4.0 cr)
• ACCT 8802 - Empirical Research - Capital Markets I (2.0 cr)
• ACCT 8803 - Empirical Research: Capital Markets II (2.0 cr)
• ACCT 8804 - Empirical Research Topics II (2.0 cr)
• ACCT 8811 - Information Economics I (4.0 cr)
• ACCT 8812 - Information Economics II (4.0 cr)
• ACCT 8831 - Analytical Research Topics I (2.0 cr)
• ACCT 8832 - Analytical Research Topics II (2.0 cr)

Supporting/Methodology Coursework
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.
Take 16 or more credit(s) from the following:
• APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
• APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
• APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
• APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
• ECON 8001 - Microeconomic Analysis (2.0 cr)
• ECON 8002 - Microeconomic Analysis (2.0 cr)
• ECON 8003 - Microeconomic Analysis (2.0 cr)
• ECON 8004 - Microeconomic Analysis (2.0 cr)
• ECON 8205 - Applied Econometrics (2.0 cr)
• FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
• FINA 8812 - Corporate Finance I (2.0 cr)
• FINA 8813 - Corporate Finance II (2.0 cr)
• FINA 8822 - Empirical Methods in Finance (2.0 cr)
• FINA 8823 - Empirical Corporate Finance (2.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 8101 - Theory of Statistics I (3.0 cr)
• ACCT 8892 - Readings in Accounting (1.0 - 8.0 cr)
• ACCT 8894 - Research in Accounting (1.0 - 8.0 cr)

Thesis Credits
Take at least 24 doctoral thesis credits.
BA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

-OR-

Finance
Finance is viewed as a subfield of economics. Students achieve a strong foundation in economic theory and empirical methods.

Required Finance Coursework
Take at least 20 credits from the following list. FINA 8810, 8820, and 8890 may be taken more than once.
FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
FINA 8804 - Advanced Continuous Time Finance (2.0 cr)
FINA 8810 - Topics in Asset Pricing (2.0 cr)
FINA 8812 - Corporate Finance I (2.0 cr)
FINA 8813 - Corporate Finance II (2.0 cr).
FINA 8820 - Topics in Corporate Finance (2.0 cr)
FINA 8822 - Empirical Methods in Finance (2.0 cr)
FINA 8823 - Empirical Corporate Finance (2.0 cr)
FINA 8890 - Seminar: Finance Topics (2.0 - 4.0 cr)

Additional Required Finance Coursework (8 credits required)
Take one of the following sequences of economics courses:

8001-04 sequence
ECON 8001 - Microeconomic Analysis (2.0 cr)
ECON 8002 - Microeconomic Analysis (2.0 cr)
ECON 8003 - Microeconomic Analysis (2.0 cr)
ECON 8004 - Microeconomic Analysis (2.0 cr)
cr 8011-04 Sequence
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8102 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)

Supporting/Methdology Coursework (16 credit minimum)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.
Take 16 or more credit(s) from the following:
• ACCT 8812 - Information Economics II (4.0 cr)
• ACCT 8831 - Analytical Research Topics I (2.0 cr)
• ACCT 8832 - Analytical Research Topics II (2.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• ECON 8001 - Microeconomic Analysis (2.0 cr)
• ECON 8002 - Microeconomic Analysis (2.0 cr)
• ECON 8003 - Microeconomic Analysis (2.0 cr)
• ECON 8004 - Microeconomic Analysis (2.0 cr)
• ECON 8101 - Microeconomic Theory (2.0 cr)
• ECON 8102 - Microeconomic Theory (2.0 cr)
• ECON 8103 - Microeconomic Theory (2.0 cr)
• ECON 8104 - Microeconomic Theory (2.0 cr)
• ECON 8105 - Macroeconomic Theory (2.0 cr)
• ECON 8106 - Macroeconomic Theory (2.0 cr)
• ECON 8107 - Macroeconomic Theory (2.0 cr)
• ECON 8108 - Macroeconomic Theory (2.0 cr)
•ECON 8181 - Advanced Topics in Microeconomics (2.0 cr)
•ECON 8182 - Advanced Topics in Microeconomics (2.0 cr)
•ECON 8185 - Advanced Topics in Macroeconomics (2.0 cr)
•ECON 8191 - Workshop in Mathematical Economics (1.0 - 3.0 cr)
•ECON 8201 - Econometric Analysis (2.0 cr)
•ECON 8205 - Applied Econometrics (2.0 cr)
•ECON 8206 - Applied Econometrics (2.0 cr)
•ECON 8207 - Applied Econometrics (2.0 cr)
•ECON 8208 - Applied Econometrics (2.0 cr)
•ECON 8211 - Econometrics (2.0 cr)
•ECON 8212 - Econometrics (2.0 cr)
•ECON 8501 - Wages and Employment (2.0 cr)
•ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
•ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
•ECON 8701 - Monetary Economics (2.0 cr)
•ECON 8702 - Monetary Economics (2.0 cr)
•ECON 8704 - Financial Economics (2.0 cr)
•ECON 8705 - Financial Economics (2.0 cr)
•MATH 8601 - Real Analysis (3.0 cr)
•FINA 8892 - Independent Study in Finance (1.0 - 8.0 cr)
•FINA 8894 - Directed Research in Finance (1.0 - 8.0 cr)

**Thesis Credits (24 credits minimum)**

Take at least 24 doctoral thesis credits.

BA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

-OR-

**Information and Decision Sciences**

Students complete all offered IDSc PhD seminars, including the topics course 8801, which should be taken at least twice (total of 19 IDSc PhD credits). Other major area credits include APEC 8211 and 8212 (8 credits).

**Required IDSc PhD Coursework (19 credits minimum)**

Take all of the following courses. IDSC 8801 must be taken at least twice.

IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
IDSC 8521 - System Development (3.0 cr)
IDSC 8531 - Organizational Theory and Research in Information Systems (3.0 cr)
IDSC 8541 - Introduction to Economics of Information Systems (3.0 cr)
IDSC 8721 - Behavioral Decision Theory (3.0 cr)
IDSC 8801 - Research Seminar in Information and Decision Sciences (2.0 cr)

**Additional IDSc Required Coursework (8 credits minimum)**

Take the following APEC methodology courses for a total of 8 credits:

APEC 8211 - Econometric Analysis I (4.0 cr)
APEC 8212 - Econometric Analysis II (4.0 cr)

**Supporting/Methodology Coursework (16 credits minimum)**

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.

Take 16 or more credit(s) from the following:

•APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
•APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
•APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
•APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
•CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
•CSCI 8551 - Intelligent Agents (3.0 cr)
•CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
•CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
•ECON 8581 - Advanced Topics in Labor Economics (2.0 cr)
•ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
•ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
•EPSY 8262 - Statistical Methods in Education II (3.0 cr)
•EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
•EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
•EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
•EPSY 8291 - Advanced Statistical Computing and Data Analysis (3.0 cr)
•MGMT 8101 - Theory Building and Research Design (4.0 cr)
•MGMT 8301 - Seminar in Organizational Behavior (4.0 cr)
•MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
•PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
•PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
• PSY 5993 - Research Laboratory in Psychology (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
• PUBH 6470 - SAS Procedures and Data Analysis (3.0 cr)
• PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
• PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
• SCO 8652 - Regression Analysis (3.0 cr)
• SCO 8721 - Management of Technological Operations (3.0 cr)
• IDSC 8892 - Readings in Information and Decision Sciences (1.0 - 8.0 cr)
• IDSC 8894 - Graduate Research in Information and Decision Sciences (1.0 - 8.0 cr)

**Thesis Credits (24 credits minimum)**
Take at least 24 doctoral thesis credits.

**BA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**

- OR -

**Marketing**
Students pursuing the marketing concentration focus on one of two tracks: consumer behavior or marketing quantitative/marketing strategy.

**Consumer Behavior Concentration (24 credits minimum)**
Take all of the following courses, including at least 8 credits of MKTG 8810, for a total of 18 credits. In addition, take at least 6 credits from the quantitative/marketing strategy concentration course list.

Take 18 or more credit(s) from the following:
• MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
• MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
• MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
• MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
• MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
• MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)

or

**Quantitative/Marketing Strategy Concentration (24 credits minimum)**
Take 12 credits, which can include up to 4 credits of MKTG 8890, from the following list. In addition, take at least 12 credits from the consumer behavior concentration course list.

Take 12 or more credit(s) from the following:
• MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
• MKTG 8842 - Quantitative Modeling I (2.0 - 4.0 cr)
• MKTG 8843 - Quantitative Modeling II (2.0 cr)
• MKTG 8851 - Seminar: Marketing Management and Strategy I (2.0 cr)
• MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
• MKTG 8890 - Seminar: Marketing Topics (1.0 - 4.0 cr)

**Supporting/Methodology Coursework (16 credits minimum)**
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.

ACCT 8811 - Information Economics I (4.0 cr)
ACCT 8831 - Analytical Research Topics I (2.0 cr)
APEC 8211 - Econometric Analysis I (4.0 cr)
APEC 8212 - Econometric Analysis II (4.0 cr)
CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
ECON 8001 - Microeconomic Analysis (2.0 cr)
ECON 8002 - Microeconomic Analysis (2.0 cr)
ECON 8003 - Microeconomic Analysis (2.0 cr)
ECON 8004 - Microeconomic Analysis (2.0 cr)
ECON 8101 - Microeconomic Theory (2.0 cr)
ECON 8103 - Microeconomic Theory (2.0 cr)
ECON 8104 - Microeconomic Theory (2.0 cr)
ECON 8118 - Noncooperative Game Theory (2.0 cr)
ECON 8119 - Cooperative Game Theory (2.0 cr)
ECON 8191 - Workshop in Mathematical Economics (1.0 - 3.0 cr)
ECON 8205 - Applied Econometrics (2.0 cr)
ECON 8206 - Applied Econometrics (2.0 cr)
ECON 8207 - Applied Econometrics (2.0 cr)
ECON 8208 - Applied Econometrics (2.0 cr)
ECON 8211 - Econometrics (2.0 cr)
ECON 8212 - Econometrics (2.0 cr)
ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>EPSY 5245</td>
<td>Advanced Survey Data Analysis for Categorical and Rating Scale Data</td>
<td>1.0 cr</td>
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<tr>
<td>EPSY 5261</td>
<td>Introductory Statistical Methods</td>
<td>3.0 cr</td>
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<td>EPSY 5262</td>
<td>Intermediate Statistical Methods</td>
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<td>Statistical Methods in Education I</td>
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<td>EPSY 8262</td>
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<td>EPSY 8264</td>
<td>Advanced Multiple Regression Analysis</td>
<td>3.0 cr</td>
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<td>Applied Multivariate Analysis</td>
<td>3.0 cr</td>
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<td>IDSC 8721</td>
<td>Behavioral Decision Theory</td>
<td>3.0 cr</td>
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<td>MSBA 6440</td>
<td>Data-Driven Experimentation and Measurement</td>
<td>3.0 cr</td>
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<td>PSY 5202</td>
<td>Attitudes and Social Behavior</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 5204</td>
<td>Psychology of Interpersonal Relationships</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PSY 5207</td>
<td>Personality and Social Behavior</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>PSY 5862</td>
<td>Psychological Measurement: Theory and Methods</td>
<td>3.0 cr</td>
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<td>PSY 8203</td>
<td>Impression Management</td>
<td>3.0 cr</td>
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<td>PSY 8208</td>
<td>Social Psychology: The Self</td>
<td>3.0 cr</td>
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<td>PSY 8209</td>
<td>Research Methods in Social Psychology</td>
<td>3.0 cr</td>
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<tr>
<td>PSY 8935</td>
<td>Readings in Behavioral Genetics and Individual Differences Psychology</td>
<td>1.0 cr</td>
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<td>PSY 8960</td>
<td>Graduate Seminar in Psychology</td>
<td>1.0 - 4.0 cr</td>
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<td>STAT 5021</td>
<td>Statistical Analysis</td>
<td>4.0 cr</td>
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<tr>
<td>STAT 5303</td>
<td>Designing Experiments</td>
<td>4.0 cr</td>
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<td>MKTG 8892</td>
<td>Readings in Marketing</td>
<td>1.0 - 8.0 cr</td>
</tr>
<tr>
<td>MKTG 8894</td>
<td>Graduate Research in Marketing</td>
<td>1.0 - 8.0 cr</td>
</tr>
</tbody>
</table>

**Thesis Credits**

Take at least 24 doctoral thesis credits.

BA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**OR**

Supply Chain and Operations

Students complete coursework in the areas of operations and supply chain management.

**Required SCO Coursework (25 credits minimum)**

Take the following courses for a total of 25 credits:

- SCO 8651 - Experimental Design (3.0 cr)
- SCO 8652 - Regression Analysis (3.0 cr)
- SCO 8711 - Research in Operations Strategy (3.0 cr)
- SCO 8721 - Management of Technological Operations (3.0 cr)
- SCO 8735 - Supply Chain Management (3.0 cr)
- SCO 8745 - Research on Quality Management (3.0 cr)
- SCO 8755 - Behavioral Operations (3.0 cr)
- MGMT 8101 - Theory Building and Research Design (4.0 cr)

**Supporting/Methodology Coursework (16 credits minimum)**

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.

Take 16 or more credit(s) from the following:

- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- APEC 8602 - Economics of the Environment (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
- MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
- MKTG 8842 - Quantitative Modeling I (2.0 - 4.0 cr)
- MKTG 8843 - Quantitative Modeling II (2.0 cr)
- PA 5032 - Regression Analysis (2.0 cr)
- PA 5033 - Multivariate Techniques (2.0 cr)
- PUBH 7405 - Biostatistics: Regression (4.0 cr)
- PUBH 7406 - Advanced Regression and Design (4.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
- PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
- SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5701 - Statistical Computing (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8311 - Linear Models (4.0 cr)
• SCO 8892 - Readings in Operations and Management Science (1.0 - 8.0 cr)
• SCO 8894 - Graduate Research in Operations and Management Science (1.0 - 8.0 cr)

Thesis Credits (24 credits minimum)
Take at least 24 doctoral thesis credits.
BA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

-OR-

Strategic Management and Entrepreneurship
Students focus on leadership, strategy, and entrepreneurship connecting the external worlds of competition and collaboration.

Required SME Coursework (12 credits minimum)
Take all of the following courses, including 4 credits of MGMT 8401.
• MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
• MGMT 8401 - Seminar in Strategy Content (2.0 - 4.0 cr)
• MGMT 8402 - Seminar in Strategy Process (4.0 cr)

Additional Required Coursework (11 credits)
Take 11 or more credit(s) from the following:
• APEC 8211 - Econometric Analysis I (4.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• MGMT 8101 - Theory Building and Research Design (4.0 cr)

SME Electives (4 credits)
Take one of the following courses:
• MGMT 8202 - Seminar in International Management (4.0 cr)
or
• MGMT 8501 - Seminar in Entrepreneurship (4.0 cr)

Supporting/Methodology Coursework (16 credits minimum)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.
Take 16 or more credit(s) from the following:
• APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
• APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
• APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
• FINA 8823 - Empirical Corporate Finance (2.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• HINF 5502 - Programming Essentials Python 3 (1.0 cr)
• MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
• MGMT 8892 - Readings in Management Theory and Administration (1.0 - 8.0 cr)
• MGMT 8894 - Graduate Research in Management Theory and Administration (1.0 - 8.0 cr)
• MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
• PA 8302 - Applied Policy Analysis (4.0 cr)
• POL 8106 - Quantitative Political Science I (3.0 cr)
• PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
• PUBH 8811 - Research Methods in Health Care (3.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
• SOC 8701 - Sociological Theory (4.0 cr)
• SOC 8721 - Theories of Social Psychology (3.0 cr)
• SOC 8735 - Sociology of Culture (3.0 cr)
• SOC 8801 - Sociological Research Methods (4.0 cr)
• SOC 8811 - Advanced Social Statistics (4.0 cr)
• SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)

Thesis Credits (24 credits minimum)
Take at least 24 doctoral thesis credits.
**Work and Organizations**

Students complete multidisciplinary coursework covering organizational behavior, human resource management, organizational economics, personnel economics, labor relations, and related areas.

**Required WOrg Coursework (24-28 credits)**

Take 24-28 credits from the following list. Take HRIR 8820 2-4 times for a total of 4-8 credits. Take HRIR 8825 4 times for a total of 4 credits.

Take 24 - 26 credit(s) from the following:

- **HRIR 8801** - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
- **HRIR 8802** - Core Seminar: Organizational Behavior (4.0 cr)
- **HRIR 8803** - Core Seminar: Fundamentals of HR Research (4.0 cr)
- **HRIR 8812** - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
- **HRIR 8820** - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
- **HRIR 8825** - Research Practicum/Workshop (1.0 cr)
- **PSY 5862** - Psychological Measurement: Theory and Methods (3.0 cr)

**Supporting/Methodology Coursework (16 credits minimum)**

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.

Take 16 or more credit(s) from the following:

- **APEC 8003** - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- **APEC 8211** - Econometric Analysis I (4.0 cr)
- **APEC 8212** - Econometric Analysis II (4.0 cr)
- **APEC 8501** - Labor Economics I (2.0 cr)
- **APEC 8502** - Labor Economics II (2.0 cr)
- **CSOM 8101** - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- **ECON 8205** - Applied Econometrics (2.0 cr)
- **ECON 8206** - Applied Econometrics (2.0 cr)
- **EPSY 5247** - Qualitative Methods in Educational Psychology (3.0 cr)
- **EPSY 5261** - Introductory Statistical Methods (3.0 cr)
- **EPSY 8264** - Advanced Multiple Regression Analysis (3.0 cr)
- **EPSY 8266** - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- **EPSY 8268** - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- **EPSY 8282** - Statistical Analysis of Longitudinal Data (3.0 cr)
- **MGMT 8101** - Theory Building and Research Design (4.0 cr)
- **MGMT 8301** - Seminar in Organizational Behavior (4.0 cr)
- **PSY 8208** - Social Psychology: The Self (3.0 cr)
- **PSY 8664** - Personality Assessment (3.0 cr)
- **PSY 8701** - Seminar in Industrial and Organizational Psychology I (3.0 cr)
- **PSY 8702** - Seminar in Industrial and Organizational Psychology II (3.0 cr)
- **PSY 8960** - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- **PUBH 6724** - The Health Care System and Public Health (3.0 cr)
- **PUBH 6832** - Economics of the Health Care System (3.0 cr)
- **PUBH 6861** - Health Insurance (2.0 cr)
- **SOC 8590** - Topics in Life Course Sociology (3.0 cr)
- **HRIR 8991** - Independent Study in Human Resources and Industrial Relations (1.0 - 8.0 cr)

**Thesis Credits (24 credits minimum)**

Take at least 24 doctoral thesis credits.

- **BA 8888** - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Business Analytics M.S.
Information & Decision Sciences
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Phone: 612-301-1191

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 45
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. in Business Analytics program provides a strong foundation in data analytics by bringing together a diverse body of knowledge from consumer behavior, risk management, operations research, optimization, information systems, computer science, applied statistics, and decision theory for the purpose of data-driven business decision making in both public and private sectors.

Students who graduate from this 45-credit program will have the deep quantitative capabilities and technical expertise to create business and social value by extracting useful insights and applying them in a variety of career settings. The Business Analytics M.S. can be completed in one year of full-time study, or in three years part-time.

Accreditation
This program is accredited by This program is STEM approved.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Other requirements to be completed before admission:
- Completion of some programming courses preferred.
- Applicants must have completed at least one semester college-level Calculus course with a grade of "C" or better (or grade equivalent).
- Work experience is not required, but preferred.

Special Application Requirements:
Applicants must submit all application materials through the University's admissions system. Application materials include:
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (IELTS).
- Names and contact information for three references in the online application.
- A personal statement of career goals, and objectives for pursuing a Business Analytics M.S. degree. The personal statement questions are the following: Briefly describe your short-term and long-term career goals. Why are you choosing to pursue a Business Analytics M.S. degree at this time in your career, and what are you hoping to accomplish by doing so? Why are you interested in pursuing a Business Analytics M.S. degree at the Carlson School of Management? What do you feel makes you a strong candidate for the program? How will you contribute to the Business Analytics M.S. Program overall? Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Applicants may choose to submit an essay to comment on any item(s) in their application they consider worthy of further explanation.
- Applicants may be required to complete an admissions interview, which are by invitation only.
Applicants must submit their test score(s) from the following:
- GRE
- GMAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 45 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** Students will engage in an experiential learning application of the analytics methodologies, techniques, and tools learned throughout the program to a real-world problem. The final project will consist of the development and presentation of results, interpretations, insights, and recommendations.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Some business/basic technical requirements can be waived for students with degrees in related business areas/computer science.

**Business/Management Fundamentals (12 credits)**
- Financial Accounting (3 cr)
- Data Analysis and Statistics for Managers (3 cr)
- Analytics for Competitive Advantage (3 cr)
- At least one of the following:
  - Marketing Management (3 cr)
  - Operations Management (3 cr)
  - Strategic Management (3 cr)
  - Financial Management (3 cr)

**Technical Fundamentals (12 credits)**
- Programming & Application Development (3 cr)
- Data Management, Databases, and Data Warehousing (3 cr)
- Harvesting Big Data (3 cr)
- Project Management, Leadership, Communications & Team Dynamics (3 cr)

**Specialty Courses (15 credits)**
- Exploratory Data Analytics & Visualization (3 cr)
- Predictive Analytics (3 cr)
- Advanced Issues in Business Analytics (3 cr)
- Data-Driven Experimentation and Measurement (3 cr)
- Modeling and Heuristics for Decision Making Support (3 cr)
**Twin Cities Campus**

**Business Research M.S.**

*Curtis L. Carlson School of Management - Adm*

*Curtis L. Carlson School of Management*

Link to a list of faculty for this program.

**Contact Information:**
Business Administration PhD Program, Suite 4-205, 321-19th Avenue South, Minneapolis, MN 55455 (Phone: 612-624-0875; Fax: 612-624-8221)
Email: brons003@umn.edu
Website: [http://www.carlsonschool.umn.edu/phd-ba/](http://www.carlsonschool.umn.edu/phd-ba/)

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 40 to 44
- This program does not require summer semesters for timely completion.
- No
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The business research MS is a terminal master's degree option restricted to eligible business administration PhD students who do not complete the doctoral degree. Applications to the business research MS are not otherwise considered.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants must be current business administration PhD students who have completed all required core, concentration, and supporting coursework for the doctoral degree. The preliminary written examination must have been passed at the master's level, based on a set of criteria approved by the Carlson School PhD Committee comprising members from all seven areas of concentration.

Applicants must submit their test score(s) from the following:
- **GRE**
  - General Test - Verbal Reasoning: 160
  - General Test - Quantitative Reasoning: 160
- **GMAT**
  - Total score: 650

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (GRE, GMAT, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 24 to 28 major credits and 16 credits outside the major. There is no final exam.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.3 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

**Areas of Concentration**

Students select one of seven areas of concentration. Concentration areas may require a first-year examination/presentation in addition to other program requirements.

**Accounting**

Students pursuing the accounting concentration must work under one of two accounting research paradigms: analytic or empirical.

**Required Accounting Coursework (24 credits minimum)**

Take the following 24 credits:

- ACCT 8800 - Empirical Research: Topics I (2.0 cr)
- ACCT 8801 - Empirical Research-Valuation (4.0 cr)
- ACCT 8802 - Empirical Research - Capital Markets I (2.0 cr)
- ACCT 8803 - Empirical Research: Capital Markets II (2.0 cr)
- ACCT 8804 - Empirical Research Topics II (2.0 cr)
- ACCT 8811 - Information Economics I (4.0 cr)
- ACCT 8812 - Information Economics II (4.0 cr)
- ACCT 8831 - Analytical Research Topics I (2.0 cr)
- ACCT 8832 - Analytical Research Topics II (2.0 cr)

**Supporting/Methodology Coursework (16 credits minimum)**

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.

Take 16 or more credit(s) from the following:

- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- ECON 8001 - Microeconomic Analysis (2.0 cr)
- ECON 8002 - Microeconomic Analysis (2.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
- FINA 8812 - Corporate Finance I (2.0 cr)
- FINA 8813 - Corporate Finance II (2.0 cr)
- FINA 8822 - Empirical Methods in Finance (2.0 cr)
- FINA 8823 - Empirical Corporate Finance (2.0 cr)
- MATH 4603 - Advanced Calculus I (4.0 cr)
- MATH 4604 - Advanced Calculus II (4.0 cr)
- MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- STAT 5102 - Theory of Statistics II (4.0 cr)
- STAT 6101 - Theory of Statistics I (3.0 cr)
- ACCT 8892 - Readings in Accounting (1.0 - 8.0 cr)
- ACCT 8894 - Research in Accounting (1.0 - 8.0 cr)

-OR-

**Finance**

Finance is viewed as a subfield of economics. Students achieve a strong foundation in economic theory and empirical methods.

**Required Finance Coursework (20 credits minimum)**

Take at least 20 credits from the following list. FINA 8810, 8820, and 8890 may be taken more than once.

- FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
- FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
- FINA 8804 - Advanced Continuous Time Finance (2.0 cr)
- FINA 8810 - Topics in Asset Pricing (2.0 cr)
- FINA 8812 - Corporate Finance I (2.0 cr)
- FINA 8813 - Corporate Finance II (2.0 cr)
- FINA 8820 - Topics in Corporate Finance (2.0 cr)
FINA 8822 - Empirical Methods in Finance (2.0 cr)
FINA 8823 - Empirical Corporate Finance (2.0 cr)
FINA 8890 - Seminar: Finance Topics (2.0 - 4.0 cr)

Additional Required Finance Coursework (8 credits required)

Take one of the following sequence of economics courses:

8001-04 Sequence
- ECON 8001 - Microeconomic Analysis (2.0 cr)
- ECON 8002 - Microeconomic Analysis (2.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)

or 8101-04 Sequence
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)

Supporting/Methodology Coursework (16 credits minimum)

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.

Take 16 or more credit(s) from the following:

- ACCT 8812 - Information Economics II (4.0 cr)
- ACCT 8831 - Analytical Research Topics I (2.0 cr)
- ACCT 8832 - Analytical Research Topics II (2.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- ECON 8001 - Microeconomic Analysis (2.0 cr)
- ECON 8002 - Microeconomic Analysis (2.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)
- ECON 8105 - Macroeconomic Theory (2.0 cr)
- ECON 8106 - Macroeconomic Theory (2.0 cr)
- ECON 8107 - Macroeconomic Theory (2.0 cr)
- ECON 8108 - Macroeconomic Theory (2.0 cr)
- ECON 8118 - Advanced Topics in Microeconomics (2.0 cr)
- ECON 8132 - Advanced Topics in Microeconomics (2.0 cr)
- ECON 8185 - Advanced Topics in Macroeconomics (2.0 cr)
- ECON 8191 - Workshop in Mathematical Economics (1.0 - 3.0 cr)
- ECON 8201 - Econometric Analysis (2.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)
- ECON 8211 - Econometrics (2.0 cr)
- ECON 8212 - Econometrics (2.0 cr)
- ECON 8501 - Wages and Employment (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8701 - Monetary Economics (2.0 cr)
- ECON 8702 - Monetary Economics (2.0 cr)
- ECON 8704 - Financial Economics (2.0 cr)
- ECON 8705 - Financial Economics (2.0 cr)
- MATH 8601 - Real Analysis (3.0 cr)
- FINA 8892 - Independent Study in Finance (1.0 - 8.0 cr)
- FINA 8894 - Directed Research in Finance (1.0 - 8.0 cr)

- OR -

Information and Decision Sciences

Students conduct theoretical and empirical research that addresses the role, impact, and development of IT innovations from a business perspective in business process, organizational, and market contexts.

Required IDSc Coursework (19 credits minimum)

Take all of the following courses. IDSC 8801 must be taken at least twice.

IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (3.0 cr)
IDSC 8521 - System Development (3.0 cr)
IDSC 8531 - Organizational Theory and Research in Information Systems (3.0 cr)
IDSC 8541 - Introduction to Economics of Information Systems (3.0 cr)
IDSC 8721 - Behavioral Decision Theory (3.0 cr)
IDSC 8801 - Research Seminar in Information and Decision Sciences (2.0 cr)

Additional IDSc Required Coursework (8 credits)
Take the following APEC methodology courses for a total of 8 credits:
APEC 8211 - Econometric Analysis I (4.0 cr)
APEC 8212 - Econometric Analysis II (4.0 cr)

Supporting/Methodology Coursework (16 credits minimum)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.
Take 16 or more credit(s) from the following:
- APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
- APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
- CSCI 8551 - Intelligent Agents (3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- ECON 8581 - Advanced Topics in Labor Economics (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8281 - Advanced Statistical Computing and Data Analysis (3.0 cr)
- MGMT 8101 - Theory Building and Research Design (4.0 cr)
- MGMT 8301 - Seminar in Organizational Behavior (4.0 cr)
- MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
- PSY 5018H - Mathematical Models of Human Behavior (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 5993 - Research Laboratory in Psychology (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- PUBH 6470 - SAS Procedures and Data Anaysis (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- SCO 8652 - Regression Analysis (3.0 cr)
- SCO 8721 - Management of Technological Operations (3.0 cr)
- IDSC 8890 - Readings in Information and Decision Sciences (1.0 - 4.0 cr)
- IDSC 8894 - Graduate Research in Information and Decision Sciences (1.0 - 8.0 cr)

-OR-

Marketing
Students pursuing the marketing concentration choose one of two focus areas: consumer behavior or quantitative marketing strategy.

Consumer Behavior Concentration (24 credits minimum)
Take all of the following courses, including at least 8 credits of MKTG 8810, for a total of 18 credits. In addition, take at least 6 credits from the quantitative/marketing strategy concentration course list.
Take 18 or more credit(s) from the following:
- MKTG 8809 - Consumer Behavior Research Methods (2.0 cr)
- MKTG 8810 - Consumer Behavior Special Topics (2.0 cr)
- MKTG 8811 - Consumer Attitudes and Persuasion I (2.0 cr)
- MKTG 8812 - Consumer Attitudes and Persuasion II (2.0 cr)
- MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
- MKTG 8814 - Consumer Judgment and Decision Making II (2.0 cr)

or Quantitative/Marketing Strategy Concentration (24 credits minimum)
Take 12 credits, which can include up to 4 credits of MKTG 8890, from the following list. In addition, take at least 12 credits from the consumer behavior concentration course list.
Take 12 or more credit(s) from the following:
- MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
- MKTG 8842 - Quantitative Modeling I (2.0 - 4.0 cr)
- MKTG 8843 - Quantitative Modeling II (2.0 cr)
- MKTG 8851 - Seminar: Marketing Management and Strategy I (2.0 cr)
• MKTG 8852 - Marketing Management & Strategy II (2.0 cr)
• MKTG 8890 - Seminar: Marketing Topics (1.0 - 4.0 cr)

Supporting/Methodology Coursework (16 credits minimum)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.

- ACCT 8811 - Information Economics I (4.0 cr)
- ACCT 8831 - Analytical Research Topics I (2.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- ECON 8001 - Microeconomic Analysis (2.0 cr)
- ECON 8002 - Microeconomic Analysis (2.0 cr)
- ECON 8003 - Microeconomic Analysis (2.0 cr)
- ECON 8004 - Microeconomic Analysis (2.0 cr)
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Noncooperative Game Theory (2.0 cr)
- ECON 8118 - Cooperative Game Theory (2.0 cr)
- ECON 8119 - Workshop in Mathematical Economics (1.0 - 3.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- ECON 8207 - Applied Econometrics (2.0 cr)
- ECON 8208 - Applied Econometrics (2.0 cr)
- ECON 8211 - Econometrics (2.0 cr)
- ECON 8212 - Econometrics (2.0 cr)
- ECON 8601 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8602 - Industrial Organization and Government Regulation (2.0 cr)
- ECON 8603 - Industrial Organization and Government Regulation (2.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5245 - Advanced Survey Data Analysis for Categorical and Rating Scale Data (1.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
- EPSY 8261 - Statistical Methods in Education I (3.0 cr)
- EPSY 8262 - Statistical Methods in Education II (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- IDSC 8721 - Behavioral Decision Theory (3.0 cr)
- MSBA 6440 - Data-Driven Experimentation and Measurement (3.0 cr)
- PSY 5202 - Attitudes and Social Behavior (3.0 cr)
- PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
- PSY 5207 - Personality and Social Behavior (3.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
- PSY 8203 - Impression Management (3.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)
- PSY 8209 - Research Methods in Social Psychology (3.0 cr)
- PSY 8935 - Readings in Behavioral Genetics and Individual Differences Psychology (1.0 cr)
- PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- STAT 5303 - Designing Experiments (4.0 cr)
- MKTG 8892 - Readings in Marketing (1.0 - 8.0 cr)
- MKTG 8894 - Graduate Research in Marketing (1.0 - 8.0 cr)

-OR-

Supply Chain and Operations
Students complete coursework in the areas of operations and supply chain management.

Required SCO Coursework (25 credits minimum)
Take the following courses for a total of 25 credits:

- SCO 8651 - Experimental Design (3.0 cr)
- SCO 8652 - Regression Analysis (3.0 cr)
- SCO 8711 - Research in Operations Strategy (3.0 cr)
- SCO 8721 - Management of Technological Operations (3.0 cr)
- SCO 8735 - Supply Chain Management (3.0 cr)
- SCO 8745 - Research on Quality Management (3.0 cr)
- SCO 8755 - Behavioral Operations (3.0 cr)
- MGMT 8101 - Theory Building and Research Design (4.0 cr)
Supporting/Methodology Coursework (16 credits minimum)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.
Take 16 or more credit(s) from the following:
• APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• APEC 8602 - Economics of the Environment (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
• MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
• MKTG 8842 - Quantitative Modeling I (2.0 - 4.0 cr)
• MKTG 8843 - Quantitative Modeling II (2.0 cr)
• PA 5032 - Regression Analysis (2.0 cr)
• PA 5033 - Multivariate Techniques (2.0 cr)
• PUBH 7405 - Biostatistics: Regression (4.0 cr)
• PUBH 7406 - Advanced Regression and Design (4.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
• PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
• PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
• SOC 5811 - Social Statistics for Graduate Students [MATH] (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)
• STAT 5101 - Theory of Statistics I (4.0 cr)
• STAT 5102 - Theory of Statistics II (4.0 cr)
• STAT 5302 - Applied Regression Analysis (4.0 cr)
• STAT 5421 - Analysis of Categorical Data (3.0 cr)
• STAT 5701 - Statistical Computing (3.0 cr)
• STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)
• STAT 8311 - Linear Models (4.0 cr)
• SCO 8892 - Readings in Operations and Management Science (1.0 - 8.0 cr)
• SCO 8894 - Graduate Research in Operations and Management Science (1.0 - 8.0 cr)

-OR-

Strategic Management and Entrepreneurship
Students focus on leadership, strategy, and entrepreneurship connecting the external worlds of competition and collaboration.
Required SME Coursework (12 credits minimum)
Take all of the following courses, including 4 credits of MGMT 8401.
• MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
• MGMT 8401 - Seminar in Strategy Content (2.0 - 4.0 cr)
• MGMT 8402 - Seminar in Strategy Process (4.0 cr)
Additional Required Coursework (11 credits)
At least 7 credits from the following list, and 4 elective credits, are required.
Take 7 or more credit(s) from the following:
• APEC 8211 - Econometric Analysis I (4.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• MGMT 8101 - Theory Building and Research Design (4.0 cr)
SME Electives (4 credits)
Take one of the following courses:
• MGMT 8202 - Seminar in International Management (4.0 cr)
or MGMT 8501 - Seminar in Entrepreneurship (4.0 cr)
Supporting/Methodology Coursework (16 credits minimum)
Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested courses are listed below.
Take 16 or more credit(s) from the following:
• APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
• APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
• APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
• APEC 8211 - Econometric Analysis I (4.0 cr)
• APEC 8212 - Econometric Analysis II (4.0 cr)
• CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
• CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
-EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
-EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
-FINA 8823 - Empirical Corporate Finance (2.0 cr)
-HINF 5502 - Programming Essentials Python 3 (1.0 cr)
-MATH 5651 - Basic Theory of Probability and Statistics (4.0 cr)
-MGMT 8892 - Readings in Management Theory and Administration (1.0 - 8.0 cr)
-MGMT 8894 - Graduate Research in Management Theory and Administration (1.0 - 8.0 cr)
-MKTG 8831 - Seminar: Inter-Organizational Relations (4.0 cr)
-PA 8302 - Applied Policy Analysis (4.0 cr)
-POL 8106 - Quantitative Political Science I (3.0 cr)
-PUBH 8804 - Advanced Quantitative Methods Seminar (3.0 cr)
-PUBH 8811 - Research Methods in Health Care (3.0 cr)
-SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
-SOC 8701 - Sociological Theory (4.0 cr)
-SOC 8721 - Theories of Social Psychology (3.0 cr)
-SOC 8735 - Sociology of Culture (3.0 cr)
-SOC 8801 - Sociological Research Methods (4.0 cr)
-SOC 8811 - Advanced Social Statistics (4.0 cr)
-SOC 8890 - Advanced Topics in Research Methods (2.0 - 3.0 cr)
-STAT 8051 - Advanced Regression Techniques: linear, nonlinear and nonparametric methods (3.0 cr)

OR

Work and Organizations

Students complete multidisciplinary coursework covering organizational behavior, human resource management, organizational economics, personnel economics, labor relations, and related areas.

Required WOrg Coursework (24-28 credits minimum)

Take 24-28 credits from the following list. Take HRIR 8820 2-4 times for a total of 4-8 credits. Take HRIR 8825 4 times for a total of 4 credits.

Take 24 - 28 credit(s) from the following:
- HRIR 8801 - Core Seminar: Fundamentals of Economic Analysis for Work and Organizations (4.0 cr)
- HRIR 8802 - Core Seminar: Organizational Behavior (4.0 cr)
- HRIR 8803 - Core Seminar: Fundamentals of HR Research (4.0 cr)
- HRIR 8812 - Core Seminar: Research Methods in Work and Organizations (4.0 cr)
- HRIR 8820 - Seminar: Special Topics in Work and Organizations Research (2.0 cr)
- HRIR 8825 - Research Practicum/Workshop (1.0 cr)
- PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)

Supporting/Methodology Coursework (16 credits minimum)

Courses must be chosen in consultation with the advisor or PhD coordinator. Suggested coursework is listed below.

Take 16 or more credit(s) from the following:

- APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
- APEC 8211 - Econometric Analysis I (4.0 cr)
- APEC 8212 - Econometric Analysis II (4.0 cr)
- APEC 8501 - Labor Economics I (2.0 cr)
- APEC 8502 - Labor Economics II (2.0 cr)
- CSOM 8101 - Methods and Topics in Applied Economics (2.0 - 4.0 cr)
- ECON 8205 - Applied Econometrics (2.0 cr)
- ECON 8206 - Applied Econometrics (2.0 cr)
- EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
- EPSY 5261 - Introductory Statistical Methods (3.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- MGMT 8101 - Theory Building and Research Design (4.0 cr)
- MGMT 8301 - Seminar in Organizational Behavior (4.0 cr)
- PSY 8208 - Social Psychology: The Self (3.0 cr)
- PSY 8664 - Personality Assessment (3.0 cr)
- PSY 8701 - Seminar in Industrial and Organizational Psychology I (3.0 cr)
- PSY 8702 - Seminar in Industrial and Organizational Psychology II (3.0 cr)
- PSY 8860 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6832 - Economics of the Health Care System (3.0 cr)
- PUBH 6861 - Health Insurance (2.0 cr)
- SOC 8590 - Topics in Life Course Sociology (3.0 cr)
- HRIR 8991 - Independent Study in Human Resources and Industrial Relations (1.0 - 8.0 cr)
Twin Cities Campus
Business Taxation M.B.T.
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Masters Programs in Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-7511; fax: 612-626-7795).
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/master-business-taxation

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Business Taxation

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

As one of the premier graduate tax programs in the nation, the Carlson School Master of Business Taxation (MBT) program helps students acquire a conceptual understanding of taxation, and develop technical competence in the practical application of the rules of taxation in business. In addition, courses in government and economic tax policy, tax negotiations, and tax technology and analytics provide breadth to complement the technical tax courses.

The program gives students a chance to learn from world-class faculty who are distinguished professionals with extensive real-life experience. The faculty have in-depth knowledge of the tax industry and work closely with the Twin Cities business community. Combining rigorous coursework and top faculty from the tax community brings a broad perspective into the relationship between tax and business issues, which helps prepare graduates for greater responsibilities in business management and consulting.

Courses are offered in the evenings (Monday-Thursday, 5:45-9:05 p.m.), accommodating both part-time and full-time students. Historically, more than 80 percent of students are employed in the business community and take courses on a part-time basis. To free tax professionals from coursework responsibilities during the busiest part of tax season, no courses meet during the spring semester from early March through April 15.

Students enrolled part-time can expect to complete the program in approximately three years. Students enrolled full-time can complete the program in a shorter period.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
_required prerequisites
Introduction to Accounting
- ACCT 2050 - Introduction to Financial Reporting (4.0 cr)
or equivalent course taken at another institution

Introduction to Federal Income Tax
- ACCT 5135 - Fundamentals of Federal Income Tax (4.0 cr)
or equivalent course at another institution

Other requirements to be completed before admission:
Applicants must have a bachelor's degree from an accredited college or university.

The following required prerequisite courses may be taken after being admitted to the MBT program but must be taken before being eligible to take any MBT courses.

Special Application Requirements:
Fall application deadline: June 15
Spring application deadline: October 15
Summer application deadline: March 15

Applicants must submit all application materials through the University’s admission system.

A GMAT or LSAT (Law School Admission Test) score that is not more than five years old is required. The GMAT score must be sent directly from GMAT to be considered official. The GMAT requirement will be waived for domestic students in the following cases: 1) applicant has a CPA license (either active or inactive), 2) applicant has at least two years of relevant U.S. based tax-related work experience within the prior five years, or 3) applicant is a Carlson School accounting graduate within the prior five years. In order for the waiver to apply, the applicant must have a minimum 3.0 undergraduate GPA from an accredited university.

Applicants may submit their copy of their LSAT score to the MBT office.

For international applicants, the results from one of the following English language tests are required: TOEFL, IELTS, MELAB. TOEFL scores must be received directly from TOEFL. IELTS and MELAB scores must be received directly from the testing center.

For additional application details, review the M.B.T. admissions webpages.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The MBT program requires 30 credits, including 12 required credits in specified courses and 18 elective credits. ACCT 2050 Introduction to Financial Reporting and ACCT 5135 Fundamentals of Federal Income Tax or equivalent courses are prerequisites to taking MBT courses. Students without these prerequisites may be admitted to the program, but these prerequisites must be completed before MBT courses are taken.

BLAW 3058 The Law of Contracts and Agency: All students are required to have completed this course or an equivalent college-level course at some point in their academic career before graduating with an MBT degree.

Required Business Taxation Courses (12 credits)
MBT 5220 - Tax Research, Communication, and Practice (4.0 cr)
MBT 5200 - Tax Accounting Methods and Periods (4.0 cr)
MBT 5230 - Corporate Taxation I (2.0 cr)
MBT 5500 - Business, Government, and Economic Tax Policy (2.0 cr)

Elective Business Taxation Courses (18 credits)
In some cases, other graduate-level courses may be taken in place of an MBT elective course with prior approval from the MBT director.

Take exactly 18 credit(s) from the following:
- MBT 5223 - Tax-exempt Organizations (2.0 cr)
- MBT 5226 - Negotiation Techniques in Taxation (2.0 cr)
- MBT 5323 - Mergers and Acquisitions I (2.0 cr)
- MBT 5333 - Tax Aspects of Consolidated Returns (2.0 cr)
- MBT 5335 - Taxation of the Small Business Corporation (2.0 cr)
- MBT 5340 - Taxation of Partners and Partnerships (2.0 cr)
- MBT 5346 - ASC 740 Computations and Analysis (2.0 cr)
- MBT 5347 - Tax Technology and Analytics Fundamentals (2.0 cr)
- MBT 5348 - Advanced ASC 740 Concepts (2.0 cr)
- MBT 5350 - Wealth Transfer I (Estates and Gifts) (2.0 cr)
- MBT 5353 - Trusts and Estates (2.0 cr)
- MBT 5360 - State and Local Taxation (2.0 cr)
- MBT 5363 - Compensation and Benefits (2.0 cr)
• MBT 5370 - Taxation of Property Transactions (2.0 cr)
• MBT 5380 - Tax Aspects of International Business I (2.0 cr)
• MBT 5381 - Tax Aspects of International Business II (2.0 cr)
• MBT 5382 - Transfer Pricing (2.0 cr)
Twin Cities Campus
Finance M.S.
Finance
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Phone: 612-625-5555

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 39
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The 39-credit master of science program in finance provides students with an advanced understanding of the tools and methods used in businesses and in financial markets. The program focuses on combining financial theory with quantitative and computational methods and real-world applications. Students who graduate from this one-year, full-time graduate program will be able to analyze and interpret complex financial data and communicate its implications. Successful applicants begin their M.S. studies in summer (June).

Accreditation
This program is accredited by AACSB International. The M.S. program in Finance is STEM designated.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
- University level courses in calculus and statistics are required.
- Linear algebra is recommended, but not required.
- Work experience is not required, but preferred.

Special Application Requirements:
Applicants must submit all application materials through the University's admissions system. Application materials include:
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (IELTS).
- Three letters of recommendations need to be submitted through the online application.
- A personal statement of career goals, and objectives for pursuing a M.S. Finance degree. The personal statement questions are the following: Briefly describe your short-term and long-term career goals. Why are you choosing to pursue an M.S. in Finance at this time in your career, and what are you hoping to accomplish by doing so? Why are you interested in pursuing an M.S. degree in Finance at the Carlson School of Management? What do you feel makes you a strong candidate for the program? How will you contribute to the M.S. in Finance program overall? Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Applicants may choose to submit an essay to comment on any item(s) in their application they consider worthy of further explanation.
- Applicants may be required to complete an admissions interview, which are by invitation only.

Applicants must submit their test score(s) from the following:
• GRE
• GMAT

International applicants must submit score(s) from one of the following tests:
• TOEFL
IELTS

Key to **test abbreviations**(GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 39 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

**Required Courses: Summer (11 credits)**

- MSF 6421 - Computing for Finance: Excel/VBA I & II (4.0 cr)
- MSF 6221 - Fundamentals of Finance I (2.0 cr)
- MSF 6222 - Fundamentals of Finance II (2.0 cr)
- MSF 6031 - Financial Accounting (3.0 cr)

**Required Courses: Fall (16 credits)**

- MSF 6422 - Financial Econometrics and Computational Methods I (2.0 cr)
- MSF 6223 - Fundamentals of Finance III (2.0 cr)
- MSF 6022 - Financial Statement Analysis (2.0 cr)
- MSF 6021 - Communications for Finance (2.0 cr)
- MSF 6423 - Financial Econometrics and Computational Methods II (2.0 cr)
- MSF 6621 - Finance within the Macroeconomy (2.0 cr)
- MSF 6121 - Fixed Income and Securities (2.0 cr)

**Required Courses: Spring (8 credits)**

- MSF 6821 - Experiential Learning I: Corporate Valuation (2.0 cr)
- MSF 6522 - Derivatives and Risk Management (2.0 cr)
- MSF 6321 - Quantitative Portfolio Analysis (2.0 cr)
- MSF 6822 - Experiential Learning II: Financial Data Analysis (2.0 cr)

**Electives (4 credits)**

Students can select from the following electives or graduate courses offered by other departments in the business school upon approval.

- FINA 6325 - Behavioral Finance (2.0 cr)
- FINA 6621 - International Financial Management (2.0 cr)
- FINA 6222 - Mergers and Acquisitions (2.0 cr)
- FINA 6122 - Financial Management of Depository Institutions (2.0 cr)
- FINA 6324 - Securitization Markets (2.0 cr)
- FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)

**Non-Credit Courses**

Noncredit 1: On occasion, external speakers will be brought in to enhance the experiential learning component of the M.S. finance program. Students are required to attend such meetings, and their participation will be assessed on a pass/fail basis.

Noncredit 2: Students will be required to pass the online ethics module from the Chartered Financial Analyst Institute by the end of the summer. Successful completion will be a requirement of the Fundamentals of Finance II course.
Twin Cities Campus
Human Resources and Industrial Relations M.A.
CSOM Work & Organizations, Industrial Relations Center
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Center for Human Resources and Labor Studies, Suite 3-300 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-2500; fax: 612-624-8360)
Email: hrirgrad@umn.edu
Website: http://www.csom.umn.edu/master-human-resources

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human resources and industrial relations (HRIR) students study the employment relationship. Teaching and research are guided by the belief that the employment relationship must be investigated through the lenses of different disciplines using systems thinking. The professional master of arts degree is for individuals interested in private and public sector careers in human resource management, labor relations, and related fields.

The curriculum is structured around the core HRIR areas of staffing, training, and development; compensation and benefits; and labor relations and collective bargaining. It is rooted in key concepts from the social and behavioral sciences and business, such as organizational behavior and theory, labor market analysis, leadership, and strategy. Quantitative analysis of employment problems and issues are also included. Master's candidates are encouraged to choose electives to support a generalist orientation with key business knowledge.

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Entering students have undergraduate degrees in many subjects ranging from the fine arts to engineering. The most common undergraduate majors of incoming students are in the areas of psychology, business, economics, human resource development, and speech communication.

An undergraduate course in microeconomics must be completed with a grade of at least C before enrolling.

Special Application Requirements:
Applicants must submit three letters of recommendation, a complete set of transcripts, a résumé, a personal statement and GRE or GMAT scores. Applicants whose native language is not English must also submit score results from the TOEFL or IELTS.

Students may enter the full-time M.A. program in the fall and the part-time M.A. program in either the fall or spring semesters. The application deadlines are June 15 for fall admission and October 15 for spring admission. The M.A. financial aid deadline for fall semester is February 1. Applicants are encouraged to apply early.

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5

Key to [test abbreviations](#) (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 40 major credits and 8 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The MA is offered as a coursework-only program with day (full-time) and evening (part-time) options. Major coursework includes 6001, 6111, 6301, 6401, 6441, 6501, 6701, 6801, and elective credits in HRIR. At least 8 credits must be earned in related fields. Commonly selected related fields include accounting, finance, operations management, managerial communications, economics, human resource development, law, psychology, public affairs, sociology, and research methods.

**Core Courses**

24 credits required
- HRIR 6001 - Business Principles for the HRIR Professional (4.0 cr)
- HRIR 6111 - Using Data and Metrics in Human Resources and Industrial Relations (4.0 cr)
- HRIR 6301 - Staffing, Training, and Development (4.0 cr)
- HRIR 6401 - Organizational Theory Foundations of High-Impact HRIR (2.0 cr)
- HRIR 6441 - Organizational Behavior Foundations of High-Impact HRIR (2.0 cr)
- HRIR 6501 - Compensation and Benefits (4.0 cr)
- HRIR 6701 - Labor Relations and Collective Bargaining (4.0 cr)

**Capstone**

- HRIR 6801 - HRIR in Practice: Strategy, Execution, and Ethics (2.0 cr)

**Economic Issues Analysis**

2 credits required
- HRIR 5655 - Public Policies on Work and Pay (3.0 cr)
  or HRIR 5662 - Personnel Economics (2.0 cr)

**Electives**

Take 20 or more credits including 2 or more sub-requirements(s) from the following:

**HRIR Electives**

Take 12 or more credits from the following:
- HRIR 5000 - Topics in Human Resources and Industrial Relations (2.0 cr)
- HRIR 5222 - Managing Diversity (2.0 cr)
- HRIR 5252 - Employment and Labor Law for the HRIR Professional (2.0 cr)
- HRIR 5442 - Employee Performance Management: Strategies, Systems, and Skills (2.0 cr)
- HRIR 5443 - Principles of Effective Coaching (2.0 cr)
- HRIR 6000 - Graduate Topics in Human Resources and Industrial Relations (1.0 - 8.0 cr)
- HRIR 6114 - Human Resource Information Systems (2.0 cr)
•HRIR 6223 - International Human Resource Management (2.0 cr)
•HRIR 6302 - Staffing and Selection: Strategic and Operational Concerns (2.0 cr)
•HRIR 6303 - Employee Training: Creating a Learning Organization (2.0 cr)
•HRIR 6304 - Employee Development: Creating a Competitive Advantage (2.0 cr)
•HRIR 6444 - Employee Motivation, Engagement, and Well-being (2.0 cr)
•HRIR 6465 - Leadership and Personal Development (2.0 cr)
•HRIR 6484 - Management of Groups (2.0 cr)
•HRIR 6502 - Compensation Theory and Applications (2.0 cr)
•HRIR 6503 - Employer-Sponsored Employee Benefit Programs (2.0 cr)
•HRIR 6504 - Executive Compensation (2.0 cr)
•HRIR 5992 - Independent Study in Human Resources and Industrial Relations (1.0 - 8.0 cr)

Related Field
Take 8 or more credit(s) from the following:
•MCOM 5400 - Managerial Communications for the HR Professional (2.0 cr)
•MBA 6030 - Financial Accounting (3.0 cr)
•MBA 6220 - Operations Management (3.0 cr)
•MBA 6230 - Financial Management (3.0 cr)
•MBA 6210 - Marketing Management (3.0 cr)
•MBA 6300 - Strategic Management (3.0 cr)
•MBA 6315 - The Ethical Environment of Business (2.0 cr)
•MCOM 5510 - Persuasive Writing in Business (2.0 cr)
•MCOM 5530 - Strategies and Skills for Managerial Presentations (2.0 cr)
•MGMT 6004 - Negotiation Strategies (2.0 cr)
•MGMT 6033 - Managing the Strategy Process (2.0 cr)
•MGMT 6040 - International Strategy and Organization (2.0 cr)
•MGMT 6050 - Management of Innovation and Change (2.0 cr)
•OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
•OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
•OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
•OLPD 5310 - Data-Driven Decision Making I (1.0 cr)
•OLPD 5611 - Facilitation and Meeting Skills (1.0 cr)
•OLPD 5616 - Training on the Internet (3.0 cr)
•OLPD 5619 - Planning and Decision-Making Skills (1.0 cr)
•OLPD 5816 - Distance Learning in Adult Education and Training (3.0 cr)
•OLPD 5822 - Work-Based Learning Practices (3.0 cr)
•OLPD 5829 - Course Development for Business and Industry (2.0 cr)
•EPSY 5432 - Foundations of Individual/Organizational Career Development (3.0 cr)
•IDSC 6471 - Knowledge Management (2.0 cr)
•IDSC 6040 - Information Technology Management (2.0 cr)
•IDSC 6481 - Managerial Decision Making (2.0 cr)
•LAW 6203 - Labor Law (2.0 cr)
•LAW 6631 - Employment Discrimination (3.0 cr)
•LAW 6632 - Employment Law (3.0 cr)
•LAW 6833 - Alternative Dispute Resolution (2.0 - 3.0 cr)
•LAW 6954 - Comparative Labor and Employment Law (2.0 cr)
•MILI 6992 - Healthcare Delivery Innovations: Optimizing Cost and Quality (2.0 cr)
•PA 5251 - Strategic Planning and Management (3.0 cr)
•PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
•PUBH 6102 - Issues in Environmental Health (2.0 cr)
•PUBH 6104 - Environmental Health Effects (2.0 cr)
•PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
•PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
•PUBH 6542 - Management of Health Care Organizations (3.0 cr)
•PUBH 6700 - Foundations of Public Health (3.0 cr)
•SCO 6041 - Project Management (2.0 cr)
•IBUS 5xxx
•IBUS 6xxx

Joint- or Dual-degree Coursework: MBA/MA-HRIR
Student may take a total of 24 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.
Twin Cities Campus
Supply Chain Management M.S.
Supply Chain & Operations
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Phone: 612-625-5555

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 32
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The one-year, 32-credit MS degree in supply chain management will provide students with an end-to-end view of supply chain and will develop both their strategic and analytical capabilities needed to manage supply chains. The hallmarks of this MS degree will include leadership development as a programmatic theme, global immersion, corporate social responsibility and the flexibility to focus on supply chain management in specific industry sectors that are foundational to the economy of the State of Minnesota such as health care and medical devices, food and agribusiness, and retail.

Accreditation
This program is accredited by AACSB. The M.S. in Supply Chain Management is STEM designated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Work experience is not required, but preferred.

Special Application Requirements:
Applicants must submit all application materials through the University's admissions system. Application materials include:
- A GMAT or GRE General Test that is not more than five years old, with an acceptable score.
- For international students, an acceptable score on the Test of English as a Foreign Language (TOEFL) International Language Testing System (IELTS).
- Three letters of recommendations need to be submitted through the online application.
- A personal statement of career goals, and objectives for pursuing a M.S. in Supply Chain Management at this time in your career, and what are you hoping to accomplish by doing so? Why are you interested in pursuing an M.S. degree in Supply Chain Management at the Carlson School of Management? What do you feel makes you a strong candidate for the program? How will you contribute to the M.S. in Supply Chain Management program overall? Applicants must submit a current resume that includes job responsibilities and accomplishments in the online application.
- Applicants may choose to submit an essay to comment on any item(s) in their application they consider worthy of further explanation.
- Applicants may be required to complete an admissions interview, which are by invitation only.

Applicants must submit their test score(s) from the following:
- GRE
- GMAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of December 20, 2016
Key to test abbreviations (GRE, GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 32 major credits and up to null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Core Courses: Fall (12 credits)
- SCO 6290 - Managing Supply Chain Operations (4.0 cr)
- SCO 6190 - Statistics (2.0 cr)
- SCO 6191 - Big Data Analytics in Supply Chains (2.0 cr)
- SCO 6098 - Operations Excellence via Lean Thinking (2.0 cr)
- SCO 6090 - Sales, Inventory, and Operations Planning (2.0 cr)

Core Courses: Spring (8 credits)
- SCO 6072 - Managing Technologies in the Supply Chain (2.0 cr)
- SCO 6094 - Responsible Supply Chain Management (2.0 cr)
- SCO 6045 - Strategic Sourcing (2.0 cr)
- SCO 6048 - Logistics and Transportation (2.0 cr)

Core Courses: Summer (6 credits)
- SCO 6192 - Supply Chain Finance (2.0 cr)
- SCO 6292 - Global Operations Capstone (4.0 cr)

Core Course: Leadership Development - All Year (Fall, Spring and Summer) (2 credits)
- SCO 6291 - Leadership Development (0.0 - 2.0 cr)

Spring Electives (4 credits)
- SCO 6095 - Supply Chain Management in the Food and Agribusiness Sector (2.0 cr)
- SCO 6096 - Supply Chain Management in the Health Care and Medical Devices Sector (2.0 cr)
- SCO 6097 - Supply Chain Management in the Retail Sector (2.0 cr)
- SCO 6041 - Project Management (2.0 cr)
- SCO 6092 - Supply Chain Quality and Security (2.0 cr)
- SCO 6093 - Negotiations in Supply Chain (2.0 cr)
Twin Cities Campus

Advanced Dental Therapy Postbaccalaureate Certificate
Dentistry Primary Care Administration
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
University of MN, School of Dentistry
515 Delaware St SE
9-436 Moos Health Sci
Minneapolis, MN  55455
612-626-5138
Email: heit0058@umn.edu
Website: http://dentistry.umn.edu/programs-admissions/dental-therapy/index.htm

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Advanced Dental Therapy PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Advanced Dental Therapy certificate is designed for dental therapists who have completed a baccalaureate or master degree in dental therapy from the University of Minnesota, School of Dentistry between the years 2011 and 2014. It focuses on acquiring the knowledge and skills mandated by the Minnesota Board of Dentistry to become eligible for advanced dental therapy certification.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
Bachelor Degree of Dental Therapy from the University of Minnesota.

Master Degree of Dental Therapy from the University of Minnesota.

Other requirements to be completed before admission:
Completion of a Bachelor of Science in Dental Therapy degree or Master of Dental Therapy degree at the University of Minnesota, School of Dentistry between 2011 thru 2014. Holds current credentials of Licensed Dental Therapist in the state of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The ADT Post-baccalaureate Certificate will be awarded after the completion of the specified 15 master's level credits, which include five didactic-based credits and 10 clinical-based credits. Students are required to maintain a minimum GPA of 3.00 and to achieve no less than a C grade in each course. Students must enroll in the Advance Dental Therapy Post-baccalaureate Certificate within five years following the completion of their dental therapy degree and must complete the course and clinic requirements within five years of enrollment.
Course Group 0
Didactic Courses
Take 3 or more course(s) totaling 5 or more credit(s) from the following:
• DT 5162 - Principles of Exodontia and Minor Oral Surgery (1.0 cr)
• DT 6321 - Treatment Planning (2.0 cr)
• DT 6341 - Advanced Dental Therapy Prep Lecture (2.0 cr)

Course Group 1
Clinical
DT 6340 - Advanced Dental Therapy Prep Clinic (10.0 cr)
Twin Cities Campus
Dental Hygiene M.S.D.H.
Dentistry Primary Care Administration
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
Division of Dental Hygiene, 9-372 Moos Tower, 515 Delaware Street SE, Minneapolis, MN 55455 (612-625-9121; fax: 612-625-1605)
Email: jaliv003@umn.edu
Website: http://www.dentistry.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33 to 40
- This program requires summer semesters for timely completion.
- Degree: Master of Science Dental Hygiene

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in dental hygiene program prepares leaders in the profession for practice, research, the healthcare industry, and academia.

The curriculum provides meaningful academic experiences for each graduate student based on his/her career goals and interest.

Courses in the management track will provide students with knowledge and skills necessary for careers in the healthcare industry such as sales, marketing and professional relations management, management of large dental clinics, practice management consulting, and entrepreneurship.

Courses in the education track will provide students with the knowledge and skills to teach didactic, clinic, and laboratory courses in dental hygiene programs; conduct research; and assume administrative positions.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Graduate of an accredited US institution or foreign equivalent dental hygiene program.

Other requirements to be completed before admission:
Baccalaureate degree; dental hygiene license; CPR certification; undergraduate statistics course.

Special Application Requirements:
Applicants must submit directly to the Admissions Committee a typed essay including short and long term goals and an explanation of why an advanced degree is of interest, a current resume including evidence of leadership and dental hygiene clinic experience, and three letters of reference. Rolling admissions; deadline July 15.

Applicants pursuing the management track must submit their GMAT score.

Applicants must submit their test score(s) from the following:
- GMAT
  - Total score: 500

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 94
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Key to test abbreviations (GMAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 23 to 26 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 40 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: Internship capstone project based on internship experiences.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

Students in both the management and dental hygiene education tracks will participate in the following five core courses: instructional strategies for effective teaching, research methods in health sciences, administrative leadership and professional development, statistics, and grant writing.

In addition to the core courses, management track students will complete the following courses: financial accounting, marketing management, operations management, and electives chosen from the MBA and Medical Industry Leadership Institute (MILI) curricula.

Dental hygiene education track students will participate in the following courses: the discipline of dental hygiene, curriculum and course development, dental hygiene supervised clinical teaching, dental hygiene clinic administration, teaching/learning with the internet, and dental hygiene supervised didactic teaching.

MSDH students pursuing the Plan A option must complete a thesis. Plan C students must complete an internship and capstone project.

MSDH Core Curriculum

- DH 5401 - Research Methods in Health Sciences (3.0 cr)
- DH 5407 - Instructional Strategies for Effective Teaching (2.0 cr)
- DH 5411 - Administrative Leadership and Professional Development (2.0 cr)
- DH 5421 - Grant Writing for Health Professionals (1.0 cr)

Statistics

- EPSY 5261 - Introductory Statistical Methods (3.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Dental Hygiene Education

This sub-plan is limited to students completing the program under Plan A.

Courses in the dental hygiene education track provide students with the knowledge and skills to teach didactic, clinic, and laboratory courses in dental hygiene programs; conduct research; and assume administrative positions.
Education Track Curriculum
DH 5403 - The Discipline of Dental Hygiene (2.0 cr)
DH 5405 - Curriculum and Course Development (2.0 cr)
DH 5409 - Dental Hygiene Clinic Administration (2.0 cr)
DH 5413 - Dental Hygiene Supervised Clinic Student Teaching (4.0 cr)
DH 5415 - Dental Hygiene Supervised Didactic Course Student Teaching (2.0 cr)

Thesis Credit
Student register for DH 8777 to fulfill their thesis requirement. For internal department documentation, thesis credits are coded as follows: DH 8773, DH 8775, DH 8776 and DH 8779.

DH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Management
This sub-plan is limited to students completing the program under Plan A or Plan C.

Courses in the management track provide students with the knowledge and skills necessary for healthcare industry careers such as sales, marketing and professional relations management, management of large dental clinics, practice management consulting, and entrepreneurship.

Management Track Curriculum
MBA 6030 - Financial Accounting (3.0 cr)
MBA 6210 - Marketing Management (3.0 cr)
MBA 6220 - Operations Management (3.0 cr)

Plan A Choice
DH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan C Choice
DH 5201 - Management Internship (5.0 cr)
DH 5203 - Capstone Project (3.0 cr)

MBA Electives
Plan A chooses 8 electives; Plan C chooses 12 elective credits. Not inclusive list.
Take 8 - 13 credit(s) from the following:
• ENTR 6020 - Business Formation (4.0 cr)
• HRIR 6301 - Staffing, Training, and Development (4.0 cr)
• MBA 6300 - Strategic Management (3.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6562 - Information Technology in Health Care (2.0 cr)
• MKTG 6051 - Marketing Research (4.0 cr)
Twin Cities Campus

Dental Therapy M.D.T.
Dentistry Primary Care Administration
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
Division of Dental Therapy, 9-436 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455
(612-625-4310; fax: 612-626-6096)
Email: atki0094@umn.edu
Website: http://www.dentistry.umn.edu/programs_admissions/DentalTherapyPrograms/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 91
- This program requires summer semesters for timely completion.
- Degree: Master of Dental Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.D.T. program blends a strong dental therapy education with the study of the biological, behavioral, and social sciences. It provides the didactic, laboratory, and clinical experiences required for the assessment and treatment of specified dental procedures. Dental therapy students learn alongside the dental and dental hygiene students with whom they will work with after graduation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor of science or bachelor of arts degree.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 92
  - Internet Based - Writing Score: 20
  - Internet Based - Reading Score: 20

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 91 major credits and up to null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required courses
- DT 5210 - Head and Neck Anatomy (1.0 cr)
- DT 5330 - Clinical Application I (3.0 cr)
- DT 5429 - Introduction to Psychomotor Skill Development (1.0 cr)
DT 5430 - Oral Anatomy (2.0 cr)
DT 5431 - Oral Anatomy Laboratory (3.0 cr)
DT 5521 - Foundations of Interprofessional Professionalism, Communication, and Collaboration (1.0 cr)
DT 5212 - Local Anesthesia and Pain Management (2.0 cr)
DT 5230 - Oral and Maxillofacial Radiology (2.0 cr)
DT 5250 - Oral Histology and Embryology (2.0 cr)
DT 5331 - Provider Patient Relationships (2.0 cr)
DT 5332 - Cariology and Applied Nutrition in Dental Therapy Care (3.0 cr)
DT 5410 - Applied Dental Biomaterials (1.0 cr)
DT 5110 - Periodontology I (1.0 cr)
DT 5130 - Preclinical Pediatric Dentistry (2.0 cr)
DT 5211 - Applied Pharmacology for the Dental Therapist (2.0 cr)
DT 5232 - Oral and Maxillofacial Radiology Preclinical Laboratory (0.0 cr)
DT 5251 - General and Oral Pathology (1.0 cr)
DT 5432 - Operative Dentistry I (2.0 cr)
DT 5433 - Operative Dentistry I Pre-Clinic Laboratory (2.0 cr)
DT 5140 - Preventive Pediatric Dental Clinic (1.0 cr)
DT 5231 - Oral and Maxillofacial Radiology II (1.0 cr)
DT 5333 - Dental Public Health and Academic Service Learning I (3.0 cr)
DT 5334W - Dental Therapy Care Process: Clinical Application II [WI] (4.0 cr)
DT 5336 - Ethics and Jurisprudence for the Dental Therapist (1.0 cr)
DT 5434 - Operative Dentistry II Lecture (1.0 cr)
DT 5471 - Prosthodontic Topics for Dental Therapy (2.0 cr)
DT 5335 - Dental Practice Management (2.0 cr)
DT 5337 - Dental Public Health and Service Learning II (2.0 cr)
DT 5338W - Research Methods in Dental Therapy [WI] (3.0 cr)
DT 5460 - Essentials of Clinical Care II for the Dental Therapist (5.0 - 10.0 cr)
DT 5141 - Clinical Pediatric Dentistry III (2.0 cr)
DT 5241 - Oral Radiology Clinic II (1.0 cr)
DT 5320 - Comprehensive Care Clinic (4.0 cr)
DT 5361 - Outreach Experiences II (2.0 cr)
DT 5443 - Operative Clinic III (4.0 cr)
DT 5435 - Operative Dentistry II for the Dental Therapist, Lab (1.0 cr)
Twin Cities Campus
Dentistry M.S.
School of Dentistry - Adm
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
M.S.-Dentistry Program, 15-136 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN  55455 (612-624-7934; fax: 612-624-0027)
Email: schwe008@umn.edu
Website: http://www.dentistry.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. program in dentistry prepares dentists with clinical expertise for positions of leadership in education, research, and program administration in the oral health field. A multidisciplinary faculty of dental educators, researchers, and clinicians teach the program, which is housed in the School of Dentistry. All students complete core coursework in teaching and evaluation of dentistry, research methods, and health care administration. Additional advanced coursework is offered in these same focus areas, as well as in selected clinical and oral science topics with multidisciplinary impact, including conscious sedation, craniofacial pain, geriatrics, oral biology, oral medicine and radiology, oral pathology, practice administration, and psychology. Students have flexibility in planning individualized programs to accommodate their specific areas of interest, and courses from other disciplines may be included for credit in the major area.

Students enrolled in an advanced clinical dental training program may be admitted to the dentistry graduate program for concurrent study, but must carefully plan their curriculum with their faculty adviser and the director of graduate studies so that their residency and M.S. programs are appropriately integrated and satisfy University registration requirements. Programs in the School of Dentistry that may enroll students for the M.S. degree include endodontics, orthodontics, pediatric dentistry, periodontics, and prosthodontics and TMJ disorders/orofacial pain.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DDS/DMD or equivalent from accredited US institution or recognized foreign school. Clinical residency enrollment and 3.0 GPA or rank in top quarter of graduating professional school class preferred.

Other requirements to be completed before admission:
Applicants must submit three letters of recommendation from individuals familiar with their academic capabilities. Also required is a brief essay (under 500 words) which relates the applicant's career goals to the goals of the program. Applications are received and reviewed throughout the year. Students may enter the program in any semester at the discretion of program faculty.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 80
  - Paper Based - Total Score: 600

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students pursuing either Plan A or Plan B must complete a minimum of 14 credits in the major, including four core courses in teaching and evaluation in dentistry, basic research methodology, introductory biostatistics, and fundamentals of health care administration. Courses from other disciplines may also be taken for credit in the major with the approval of the student's adviser and the director of graduate studies. All students must complete at least 6 credits outside the major field (either as a minor or related field credits), as well as program requirements for training in the Responsible Conduct of Research.
Twin Cities Campus

Oral Biology M.S.
School of Dentistry - Adm

School of Dentistry

Link to a list of faculty for this program.

Contact Information:
School of Dentistry, 17-164 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455 (612-625-5984; fax: 612-626-2651)
Email: oralbio@umn.edu
Website: http://www.oralbiology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary Oral Biology Program is offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. It gives students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics; epithelial biology and carcinogenesis; microbiology and immunology; sensory neuroscience; and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest; courses from other disciplines may be included as part of the major.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. in oral biology is intended for individuals who are currently involved in a research laboratory or program and are seeking to increase their scientific perspectives. This program generally requires a minimum of two years and a total of 30 credits. Students must complete the Plan A (with thesis) program, which requires a minimum of 14 credits in the major, including 4 credits of oral biology topics courses (8021-8028). Courses in the major may be taken from other disciplines with the approval of the adviser and the director of graduate studies. Registration and participation in the oral biology student seminar series (8030) is required each semester. Students must also complete a minor or related field program in an associated nonclinical discipline (minimum 6 credits) and 10 thesis credits. Students must conform to the University’s GPA requirements for master's degree students.
Twin Cities Campus

Oral Biology Minor

School of Dentistry - Adm

School of Dentistry

Link to a list of faculty for this program.

Contact Information:
School of Dentistry, 17-164 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455 (612-625-5984; fax 612-626-2651)
Email: oralbio@umn.edu
Website: http://www.oralbiology.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary Oral Biology program is offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. It gives students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics; epithelial biology and carcinogenesis; microbiology and immunology; sensory neuroscience; and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor in oral biology consists of 6 credits, at least two advanced courses in oral biology, and other coursework determined in consultation with the director of graduate studies.

A Ph.D. minor in oral biology consists of 12 credits, at least two advanced courses in oral biology, and other coursework in consultation with the director of graduate studies.
Twin Cities Campus
Oral Biology Ph.D.
School of Dentistry - Adm
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
School of Dentistry, 17-164 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455 (612-625-5984; fax:612-626-2651)
Email: oralbio@umn.edu
Website: http://www.oralbiology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 59 to 61
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary Graduate Program in Oral Biology is offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. It gives students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics; epithelial biology and carcinogenesis; microbiology and immunology; sensory neuroscience; and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest; courses from other disciplines may be included as part of the major.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit 1) scores from the General Test of the GRE, 2) three letters of recommendation from persons who can comment authoritatively about the applicant's potential for a research and academic career, 3) a clearly written personal statement (one to two pages) describing career goals, 4) an essay describing research aspirations (one to two pages), and 5) a résumé highlighting research experience and accomplishments. For D.D.S./Ph.D. applicants who are U.S. citizens, resident aliens, or Canadian citizens, U.S. or Canadian Dental Admission Test (DAT) scores at or above the national average will be accepted in lieu of the GRE. Applicants who have graduated from U.S. or Canadian dental or medical schools within three years of their application to the Ph.D. program may request that previous U.S. or Canadian DAT or MCAT scores be considered in lieu of the GRE.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
- Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
23 to 25 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. in oral biology is a four-year program. The first year consists primarily of a core curriculum specifically chosen for each student. The curriculum provides students with a working knowledge of the major concepts and research paradigms in their scientific area, a working vocabulary, and the basis for continued learning. During months 13-15, the student writes a major research thesis proposal, which is defended orally by month 16. The oral exam must capture the student's ability to think critically about the field and the application of logical experimental designs to test hypotheses and answer questions. Months 17-45 will focus on thesis research. Months 45-48 are used for dissertation writing. Students must also present a public seminar describing their thesis research (which is attended by the final oral exam committee) no later than 6 months before defense of the thesis. The dissertation is defended in month 48. Students are expected to complete a core curriculum of 23-25 credits including 8 credits of oral biology topics courses (8021-8028) and continued participation in the oral biology student seminar series (8030). Courses may be selected from departments and programs outside the oral biology program with the approval of the adviser and director of graduate studies. A minor (minimum 12 cr) in a nonclinical discipline and 24 thesis credits are also required. A cumulative GPA of at least 3.00 in both the major and minor is required. Only grades of A or B are acceptable in the core courses.

Joint- or Dual-degree Coursework: D.D.S./Ph.D. students typically complete all requirements for the Ph.D. program, except for the thesis defense, before entering the D.D.S. program. The Ph.D. and D.D.S. degrees may be awarded concurrently or separately.
Link to a list of faculty for this program.

Contact Information:
School of Architecture, College of Design, University of Minnesota, 145 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455
(612-624-7866; fax: 624-5743)
Website: http://arch.design.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 90
- This program does not require summer semesters for timely completion.
- Degree: Master of Architecture

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Architecture encompasses the making and study of the buildings and environments that we inhabit. The concerns of architecture involve a wide variety of areas of study, including the art of representing built projects through drawings and computer graphics; the technology of building structure, building materials, and natural and mechanical systems; the history, theory, and art of making, using, and understanding buildings as cultural artifacts for human use; and the practice of architecture in the context of sustainable environmental systems, urban form, and business economics. The School of Architecture offers one accredited professional degree, the Master of Architecture (M.Arch.), and a non-professional research degree, the Master of Science (M.S.) in architecture, with four potential tracks: heritage conservation and preservation, metropolitan design, research practices, and sustainable design.

The Master of Architecture degree is the accredited three-year professional program that prepares students for licensure and practice in the discipline of architecture as a speculative, analytic, and investigative endeavor. Through rigorous methods of inquiry developed in the design studio, lectures, and seminars students acquire the breadth of knowledge required of the professional architect, including: the techniques and processes of representation, communication, and analysis; the history and theory of making architecture and urban form for human use; and the technology, systems, processes, and economics of construction and practice. The 90-credit M.Arch. professional degree program is accredited by the National Architectural Accrediting Board (NAAB). A portfolio for admission is required.

The Master of Science in architecture is a nonprofessional degree offering advanced studies and research methods in heritage conservation and preservation, metropolitan design, research practices, or sustainable design. The nonprofessional M.S. in architecture seeks advanced students from architecture, building science, art history, geography, archaeology, landscape architecture, environmental design, or related disciplines to pursue multidisciplinary graduate study and research in sustainable building practices and historic preservation. The School of Architecture also offers a concurrent degree program that combines the M.Arch. professional degree and the M.S. in architecture. Students may take a total of 24 credits in common between the two academic programs. See information on the M.S. in architecture for degree requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
Program Requirements

Plan C: Plan C requires 90 major credits and up to null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The Master's Final Project is a 10-credit studio-based design exploration under the supervision of a studio faculty mentor.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The professional M.Arch. curriculum requires completion of a total of 90 credits (80 course credits and a 10-credit design studio Plan C Master's Final Project). M.Arch. students can expect to complete the program in six semesters (three years), including the Master's Final Project. Advanced placement into the second year is possible for students with a Bachelor of Science or other pre-professional degree and excellent English language proficiency. The fall semesters include integrated core curriculum of studio, building and environmental technologies, history-theory, or digital methods. The spring semesters are organized as half-semester elective modules in studio-like projects and seminars in urban/suburban-rural, building technology and sustainable practices, and history-theory-culture themes. May term study abroad options are available for qualified students in any summer semester.

Required courses
Note: ARCH 5550 will be renumbered and renamed Environmental Technology.

ARCH 5412 - Architecture: A Global and Cultural History (3.0 cr)
ARCH 5561 - Tech 1, Structures for Building (2.0 cr)
ARCH 5562 - Tech 2, Intro to Building Technology (2.0 cr)
ARCH 8251 - Graduate Architectural Design I (9.0 cr)
ARCH 5411 - Principles of Design Theory (3.0 cr)
ARCH 5563 - Tech 3: Advanced Building Technology Integrated Building Systems (0.0 - 2.0 cr)
ARCH 5564 - Tech 4: Building Structural Systems (0.0 - 2.0 cr)
ARCH 5621 - Professional Practice in Architecture (3.0 cr)
ARCH 8253 - Graduate Architectural Design III (9.0 cr)
ARCH 5550 - Topics in Technology (1.0 - 4.0 cr)
ARCH 8255 - Graduate Architectural Design V (6.0 cr)
ARCH 8299 - Master's Final Project (10.0 cr)

Project modules
Take 16 credits (four courses) of project modules.

ARCH 5250 - Advanced Topics in Design (1.0 - 6.0 cr)
or ARCH 8250 - Advanced Topics in Design (1.0 - 6.0 cr)

Catalysts
Take exactly 2 course(s) from the following:
• ARCH 5110 - Architecture as Catalyst (1.0 cr)

Arch electives
Take 18 credits of arch electives.
Arch 5xxx
or Arch 8xxx

Joint- or Dual-degree Coursework: M.Arch/M.S.-Architecture Student may take a total of 24 credits in common among the academic programs.
Twin Cities Campus
Architecture M.S.
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
School of Architecture, University of Minnesota, 145 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-624-7866; fax: 612-624-5743)
Email: archinfo@umn.edu
Website: http://arch.cdes.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Architecture offers four distinct master of science in architecture degrees:
1) MS in architecture, sustainable design track (plan A or B);
2) MS in architecture, heritage conservation and preservation track (plan A or B);
3) MS in architecture, metropolitan design track (plan A, B, or C); and,
4) MS in architecture, research practices concentration (plan C only).

Each of these master of science degree programs has its own unique application requirements, prerequisites, and curriculum structure. Prospective applicants are encouraged to consult the degree programs section of the School of Architecture website for additional information: http://arch.design.umn.edu. Students who successfully complete the a master of science in architecture degree are eligible to receive 936 hours of IDP credit that is 17% of the 5,600 hours of mandatory internship for registration as an architect. To receive the IDP credit, the MS degree must be earned after receiving the MArch degree. The MS metropolitan design track requires summer semester coursework. The other three MS programs do not require summer semester work.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Each of the master of science in architecture programs has its own unique application requirements, prerequisites, and curriculum structure. Prospective applicants are encouraged to consult the degree programs section of the School of Architecture website for additional information: http://arch.design.umn.edu.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS
• MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 27 to 28 major credits and 6 credits outside the major. The final exam is oral.

Plan C: Plan C requires 24 to 30 major credits and 0 to 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Research Practices Concentration (Optional)
The MS in architecture, research practices concentration (MS-RP) requires at least 30 credits, is offered only as a Plan C, and addresses two goals: providing a structured path to licensure totaling seven years and integrating research with practice.

Required Coursework
Take the following courses for a total of 18 credits:
- ARCH 5609 - Development and Implementation of Research (3.0 cr)
- ARCH 5621 - Professional Practice in Architecture (3.0 cr)
- ARCH 5651 - Building Stories (3.0 cr)
- ARCH 5666 - Research Practices Final Project: Research into Practice (4.0 cr)
- ARCH 5686 - Research Practices Final Project: Practice into Research (4.0 cr)
- ARCH 5687 - Research Practices Final Project: Representation of Case Studies (1.0 cr)

Required Practicum
Take exactly 2 course(s) from the following:
- ARCH 5630 - Practicum: Advanced Issues in Practice (3.0 cr)

Elective Coursework
Take two 3-credit electives, in consultation with the adviser or director of graduate studies, from architecture or non-architecture offerings.

Take exactly 2 course(s) from the following:
- Arch 5xxx
- Arch 8xxx
- xxxx 5xxx
- xxxx 6xxx
- xxxx 7xxx
- xxxx 8xxx

Joint- or Dual-degree Coursework: MArch/MSStudent may take a total of 24 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Sustainable Design
This sub-plan is limited to students completing the program under Plan A or Plan B.

The MS sustainable design program admits candidates from diverse design and environmental backgrounds. Candidates for the program include, practicing design professionals, architecture graduate students, engineering and environmental science professionals, and related disciplines. Ideal applicants will have a clear sustainable design research agenda, experience in environmental design or design production, and a desire to develop new knowledge in the sustainable design field.

The program's goals are to foster sustainable design education, research, and practice and to create a significant positive impact on sustainable design in the region and nation. It will achieve these goals by providing courses and research opportunities that:
- Promote excellence and innovations in regional and global ecological design practice and research.
- Contribute to the evolving and emerging sustainable design practice and research knowledge base, which includes ecological, environmental, social, and economic issues and impacts.
- Provide architectural designers and researchers with qualitative and quantitative knowledge, methods, and tools to implement sustainable design in professional practice.

Required Coursework
Take the following courses for a total of 12 credits:
- ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
ARCH 8567 - Site and Water Issues in Sustainable Design (3.0 cr)
ARCH 8563 - Energy and Indoor Environmental Quality Issues in Sustainable Design (3.0 cr)
ARCH 8565 - Materials Performance in Sustainable Building (3.0 cr)

Architecture Electives
Take at least 6 ARCH elective credits, in consultation with the advisor or director of Graduate Studies.

ARCH 5xxx
ARCH 8xxx

Electives Outside Architecture
Take at least 6 credits outside the major, in consultation with the advisor or director of Graduate Studies.

Plan A Requirements
Take 10 master's thesis credits.

ARCH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B Requirements
Take at least 10 additional credits, in consultation with the advisor or director of Graduate Studies.

Heritage Conservation & Preservation
This sub-plan is limited to students completing the program under Plan A or Plan B.

The MS in architecture heritage conservation and preservation offers courses and research opportunities in the study of the preservation of historic buildings, districts, and landscapes, as well as the design and management of cultural heritage sites. The program explores heritage on several distinct but related levels. It examines the materiality of heritage resources through documentation, diagnosis, and the design of treatment interventions. It also encourages critical analysis and assessment of the cultural values that underlie and define preservation policies, laws, and professional norms. Through fieldwork, case studies, and courses that investigate regional, national, and global heritage, the program focuses on the philosophy, policy, technology, economics, and social implications of heritage preservation.

Required Coursework
Take the following courses for a total of 6 credits:

ARCH 5671 - Historic Preservation (3.0 cr)
ARCH 5673 - Historic Property Research and Documentation (3.0 cr)

Heritage Conservation and Preservation Electives
Take 2 courses from the following list for at least 6 credits:

ARCH 5410 - Topics in Architectural History (3.0 cr)
ARCH 5411 - Principles of Design Theory (3.0 cr)
ARCH 5412 - Architecture: A Global and Cultural History (3.0 cr)
ARCH 5670 - Topics in Historic Preservation (1.0 - 3.0 cr)
ARCH 5672 - Historic Building Conservation (3.0 cr)
ARCH 5674 - World Heritage Conservation (3.0 cr)
ARCH 5676 - Economics of Heritage Preservation (3.0 cr)
ARCH 5677 - Preservation of the Vernacular Built Environment and Cultural Landscape (3.0 cr)

Architecture Electives
Take at least 6 ARCH elective credits, in consultation with the advisor or director of Graduate Studies.

ARCH 5xxx
ARCH 8xxx

Electives Outside Architecture
Take at least 6 credits outside the major, in consultation with the advisor or director of Graduate Studies.

XXXX 5xxx
XXXX 6xxx
XXXX 7xxx
XXXX 8xxx

Plan A Requirements
Take 10 master's thesis credits.

ARCH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B Requirements
Take an additional 9 to 10 credits, in consultation with the advisor or director of Graduate Studies.

Metropolitan Design
This sub-plan is limited to students completing the program under Plan A, Plan B, or Plan C.

The MS in metropolitan design is an advanced program intended for individuals who are keenly interested in the study of cities and their metropolitan regions. The MS-MD Program combines strong design instruction supported by applied research courses in urban design history and theory. The objective of the program is to train students to work across a large range of urban scales and become familiar
with the social, ecological, economic, and political interactions that eventually shape the quality of city living. The program is open to professionals from the design disciplines and provides concurrent options for graduate students enrolled in the MArch and MLA professional programs. Concurrent students must graduate from the MS-MD degree after they have successfully completed their professional programs.

**Required Coursework**
- Take the following courses for a total of 12 credits:
  - ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
  - ARCH 5721 - Case Studies in Urban Design (3.0 cr)
  - ARCH 8255 - Graduate Architectural Design V (6.0 cr)

**Electives Outside Architecture**
- Take at least 6 credits outside the major, in consultation with the advisor or director of Graduate Studies.

**Remaining Electives**
- Take elective credits from the following list, in consultation with the advisor or director of Graduate Studies, to meet minimum major and total course credit requirements:
  - ARCH 5410 - Topics in Architectural History (3.0 cr)
  - ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
  - ARCH 5731 - Territorial City (3.0 cr)
  - ARCH 5671 - Historic Preservation (3.0 cr)
  - ARCH 5361 - 3-D Computer Architectural Modeling and Design (3.0 cr)
  - ARCH 5750 - Topics in Urban Design (1.0 - 4.0 cr)
  - PA 5511 - Community Economic Development (3.0 cr)
  - PA 8203 - Neighborhood Revitalization Strategies and Theories (4.0 cr)
  - HSG 5467 - Housing and the Social Environment (4.0 cr)
  - HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
  - HSG 8463 - Housing: Race and Class (3.0 cr)
  - LA 5405 - Interdisciplinary Studies in Landscape Architecture (1.0 - 6.0 cr)
  - ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
  - LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
  - PA 5721 - Energy and Environmental Policy (3.0 cr)
  - PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
  - PA 5723 - Water Policy (3.0 cr)
  - PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)
  - PA 5211 - Land Use Planning (3.0 cr)
  - PA 5212 - Managing Urban Growth and Change (3.0 cr)
  - PA 5231 - Transit Planning and Management (3.0 cr)
  - PA 5261 - Housing Policy (3.0 cr)
  - PA 5802 - Global Economic Policy (3.0 cr)
  - PA 8202 - Networks and Places: Transportation, Land Use, and Design (4.0 cr)

**Plan A Requirements**
- Take 10 master's thesis credits.
  - ARCH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Design M.A.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 34
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify a track and degree objective. Formal tracks are:
Apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies)
Graphic design (including interactive design)
Housing studies
Interior design

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:
Application requirements: http://dha.design.umn.edu/programs/grad/admissions.html

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

Design Program Core Requirements

DES 8181 - Research Ethics (1.0 cr)

Related Field Coursework

Students are required to take a minimum of 6 credits in a related field. Courses are selected with the approval of the advisor and committee.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Apparel Studies

The apparel studies track advances both theoretical knowledge and applications for textile and apparel products and their relationship to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis.

Evaluation and Analysis Coursework

Students are required to take a minimum of 6 credits in evaluation and analysis. Students may take other courses with the approval of the advisor and committee.

DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Concentration

Dress, History, and Culture

Theory and Philosophy Coursework

Students take a minimum of 3 credits in this category.

DES 8164 - Innovation Theory and Analysis (3.0 cr)
or DES 8112 - Design Theory (3.0 cr)

Plan A Requirements

Take 8 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8266 - Behavioral Aspects of Dress (3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)

**Thesis credits**
Students take a minimum of 10 thesis credits.
- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**or Plan B Requirements**
All Plan B Master's students are required to register for DES 8222, Plan B Master's Project, the last semester of the program. Take 15 or more credit(s) from the following:
- DES 5165 - Design and Globalization (3.0 cr)
- APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
- DES 8112 - Design Theory (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)
- DES 8166 - Material Culture and Design (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- APST 8267 - Dress and Culture (3.0 cr)
- APST 8268 - Behavioral Aspects of Dress (3.0 cr)

**Plan B Master's Project**
Students take a minimum of 3 credits in this category.
- APST 8222 - Plan B Master's Project (3.0 cr)

**-OR-**

**Product Development**

**Theory and Philosophy Coursework**
Students take a minimum of 3 credits in this category.
- DES 8112 - Design Theory (3.0 cr)
- DES 8164 - Innovation Theory and Analysis (3.0 cr)

**Plan A Requirements**
Take 8 or more credit(s) from the following:
- DES 5185 - Human Factors in Design (3.0 cr)
- APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8114 - Design Studio (4.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- DES 8151 - Product Development (3.0 cr)
- DES 8166 - Material Culture and Design (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)

**Thesis Credits**
Students take a minimum of 10 thesis credits.
- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**or Plan B Requirements**
Plan B Master's students are required to take DES 8222, Master's Plan B Project, the final semester of the program. Take 15 or more credit(s) from the following:
- DES 5185 - Human Factors in Design (3.0 cr)
- APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8114 - Design Studio (4.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- DES 8151 - Product Development (3.0 cr)
- DES 8166 - Material Culture and Design (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)

**Plan B Master's Project**
Students take a minimum of 3 credits in this category.
Retail Merchandising and Consumer Studies

Theory and Philosophy Coursework
APST 8272 - Digital Consumers: Theories in Retail and Consumer Studies (3.0 cr)

Plan A Requirements
Take 8 or more credit(s) from the following:
• APST 5117 - Retail Environments and Human Behavior (3.0 cr)
• APST 5123 - Living in a Consumer Society (3.0 cr)
• APST 5124 - Consumers of Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)
• APST 8271 - Retailing: Strategic Perspectives (3.0 cr)

• Thesis Credits
Students take a minimum of 10 thesis credits.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B Requirements
Plan B Master's students are required to take APST 8222, Master's Plan B Project, the final semester of the program.
Take 15 or more credit(s) from the following:
• APST 5117 - Retail Environments and Human Behavior (3.0 cr)
• APST 5123 - Living in a Consumer Society (3.0 cr)
• APST 5124 - Consumers of Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8151 - Product Development (3.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)
• APST 8271 - Retailing: Strategic Perspectives (3.0 cr)

• Plan B Master's Project
Students take a minimum of 3 credits in this category.
• APST 8222 - Plan B Master's Project (3.0 cr)

Graphic Design
The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; data visualization; and interactive design.

Theory and Philosophy Coursework
Students take a minimum of 3 credits in this category.
DES 8112 - Design Theory (3.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)
or GDES 5399 - Theory of Electronic Design (3.0 cr)

Evaluation and Analysis Coursework
Students take a minimum of 6 credits in this category.
DES 8102 - Quantitative Research Methods (3.0 cr)
or DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
or GDES 5388 - Graphic Design Research (3.0 cr)

Concentration
Plan A Requirements
Students are required to take DES 8114, and GDES 8361 or GDES 8362.
Take 8 or more credit(s) from the following:
• GDES 4131W - History of Graphic Design [WI] (4.0 cr)
• GDES 4330 - Surface Fabric Design Workshop (4.0 cr)

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Information current as of January 20, 2017
• GDES 4345 - Advanced Typography (4.0 cr)
• GDES 5311 - Illustration (3.0 cr)
• GDES 5341 - Interactive Design (3.0 cr)
• GDES 5342 - Advanced Web Design (3.0 cr)
• GDES 5371 - Data Visualization Studio (3.0 cr)
• GDES 5372 - Data Visualization for Interactive Platforms (3.0 cr)
• GDES 5383 - Digital Illustration and Animation (3.0 cr)
• GDES 5386 - Fundamentals of Game Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
• GDES 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

**Thesis Credits**
Students take a minimum of 10 thesis credits.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

- OR -

**Plan B Requirements**
Students are required to take DES 8114, and GDES 8361 or GDES 8362. Plan B Master's students are required to take GDES 8222, Plan B Master's Project, the last semester of the program.
Take 15 or more credit(s) from the following:
• GDES 4131W - History of Graphic Design [WI] (4.0 cr)
• GDES 4330 - Surface Fabric Design Workshop (4.0 cr)
• GDES 4345 - Advanced Typography (4.0 cr)
• GDES 5311 - Illustration (3.0 cr)
• GDES 5341 - Interactive Design (3.0 cr)
• GDES 5342 - Advanced Web Design (3.0 cr)
• GDES 5371 - Data Visualization Studio (3.0 cr)
• GDES 5372 - Data Visualization for Interactive Platforms (3.0 cr)
• GDES 5383 - Digital Illustration and Animation (3.0 cr)
• GDES 5386 - Fundamentals of Game Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
• GDES 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

**Plan B Master's Project**
Students take a minimum of 3 credits in this category.
• GDES 8222 - Plan B Master's Project (3.0 cr)

**Housing Studies**
The housing studies track advances both theoretical and applied knowledge in the housing field. Through research experiences, students are prepared to assist people and communities in addressing housing-related issues. Courses emphasize human needs and behavior, analysis of designed environments, policy and community development, and housing of specific subpopulations such as the elderly or low-income families with children.

**Theory and Philosophy: Required Course**
HSG 8467 - Theoretical Perspectives in Housing Studies (3.0 cr)

**Evaluation and Analysis Coursework**
Students take a minimum of 6 credits in this category.
DES 8102 - Quantitative Research Methods (3.0 cr)
or DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
or EPSY 5261 - Introductory Statistical Methods (3.0 cr)

**Concentration**

**Plan A Requirements**
9 credits are required, including at least two courses from the following: HSG 5463, HSG 5467, and HSG 8463.
Take 8 or more credit(s) from the following:
• HSG 4461 - Housing Development and Management (4.0 cr)
• HSG 4465 - Housing in a Global Perspective (3.0 cr)
• HSG 5463 - Housing Policy (3.0 cr)
• HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
• HSG 5467 - Housing and the Social Environment (4.0 cr)
• HSG 5481 - Promoting Independence in Housing and Community (3.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• HSG 8192 - Readings in Housing Studies (1.0 - 3.0 cr)
• HSG 8193 - Directed Study (1.0 - 3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)

Thesis Credits
Students take a minimum of 10 credits in this category.
DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Requirements
Students select at least two of the following courses: HSG 5463, HSG 5467, and HSG 8463.
Take 15 or more credit(s) from the following:
• HSG 4461 - Housing Development and Management (4.0 cr)
• HSG 4465 - Housing in a Global Perspective (3.0 cr)
• HSG 5463 - Housing Policy (3.0 cr)
• HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
• HSG 5467 - Housing and the Social Environment (4.0 cr)
• HSG 5481 - Promoting Independence in Housing and Community (3.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• HSG 8192 - Readings in Housing Studies (1.0 - 3.0 cr)
• HSG 8193 - Directed Study (1.0 - 3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)

Plan B Master's Project
HSG 8222 - Plan B Master's Project (3.0 cr)

Interior Design
Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues, aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). Students are prepared for teaching and research positions as well as design specializations within the profession.

Theory and Philosophy Coursework
DES 8112 - Design Theory (3.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)
or DES 8166 - Material Culture and Design (3.0 cr)

Evaluation and Analysis Coursework
Statistics course is required. Select from DES 8102 or 8103 for the other 3 credits.
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
DES 8102 - Quantitative Research Methods (3.0 cr)
or DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Concentration
Take 5 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• DES 5166 - Evidence-Based Design (3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• IDES 8192 - Readings in Interior Design (1.0 - 3.0 cr)
• IDES 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)

• Thesis Credits
Students take a minimum of 10 credits in this category.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Design M.F.A.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219)
Email: dhaagr@umn.edu
Website: http://dha.design.umn.edu/programs/grad

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 60
• This program does not require summer semesters for timely completion.
• Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify the track and degree objective.

The MFA is available in the graphic design track only.

The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; data visualization; and interactive design.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:
Application requirements: http://dha.design.umn.edu/programs/grad/admissions.html

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS

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Information current as of January 20, 2017
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 52 major credits and 8 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: MFA coursework and research culminates in a creative thesis, which includes a paper and extensive creative project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

Design Program Core Requirement

DES 8181 - Research Ethics (1.0 cr)

Related Field

Students are required to take a minimum of 8 credits in a related field. Courses are selected with the approval of the advisor and committee.

Theory and Philosophy

Take 6 or more credit(s) from the following:

• DES 8112 - Design Theory (3.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• GDES 5399 - Theory of Electronic Design (3.0 cr)

Evaluation and Analysis

Take 6 or more credit(s) from the following:

• GDES 5388 - Graphic Design Research (3.0 cr)
• DES 8102 - Quantitative Research Methods (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Concentration

All students are required to take DES 8114, GDES 8361, and GDES 8362. Take 27 or more credit(s) from the following:

• GDES 4131W - History of Graphic Design [WI] (4.0 cr)
• GDES 4330 - Surface Fabric Design Workshop (4.0 cr)
• GDES 4345 - Advanced Typography (4.0 cr)
• GDES 5311 - Illustration (3.0 cr)
• GDES 5341 - Interactive Design (3.0 cr)
• GDES 5342 - Advanced Web Design (3.0 cr)
• GDES 5371 - Data Visualization Studio (3.0 cr)
• GDES 5372 - Data Visualization for Interactive Platforms (3.0 cr)
• GDES 5383 - Digital Illustration and Animation (3.0 cr)
• GDES 5386 - Fundamentals of Game Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
• GDES 8193 - Directed Study (1.0 - 3.0 cr)
GDES 8361 - Color, Design, and Human Perception (3.0 cr)
GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

MFA Creative Thesis Credits
Take 12 credits or more of the following:
GDES 8990 - MFA Creative Thesis (6.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Graphic Design
All Design MMFA students must complete the graphic design track. See program requirements above.
Twin Cities Campus
Design M.S.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219)
Email: dhaGrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify the track and degree objective.

Formal tracks are:
- Apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies)
- Graphic design
- Housing studies
- Interior design

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:
Application requirements: http://dha.design.umn.edu/programs/grad/admissions.html

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 144
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS

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The University of Minnesota is an equal opportunity educator and employer.
Information current as of January 20, 2017
- Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A**: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B**: Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

**Design Program Core Requirement**

DES 8181 - Research Ethics (1.0 cr)

**Related Field Coursework**

Students are required to take a minimum of 6 credits in a related field. Courses are selected with the approval of the advisor and committee.

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Apparel Studies**

The apparel studies track advances both theoretical knowledge and applications for apparel and worn products and their relationship to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis.

**Evaluation and Analysis Coursework**

Students are required to take a minimum of 6 credits in evaluation and analysis.

Students may take other courses with the approval of the advisor and committee.

DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

**Concentration**

**Dress, History, and Culture**

**Theory and Philosophy Coursework**

Students take a minimum of 3 credits in this category.

DES 8164 - Innovation Theory and Analysis (3.0 cr)
or DES 8112 - Design Theory (3.0 cr)

**Plan A Requirements**

Take 8 or more credit(s) from the following:
- DES 5165 - Design and Globalization (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8112 - Design Theory (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)

• Thesis Credits
Students take a minimum of 10 thesis credits.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B Requirements
All Plan B Master's students are required to register for DES 8222 Plan B Master's Project the last semester of the program. Take 15 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8112 - Design Theory (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)

• Plan B Master's Project
Students take a minimum of 3 credits in this category.
• APST 8222 - Plan B Master's Project (3.0 cr)

-OR-

Product Development

Theory and Philosophy Coursework
Students take a minimum of 3 credits in this category.
• DES 8112 - Design Theory (3.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)

or Plan A Requirements
Take 8 or more credit(s) from the following:
• DES 5185 - Human Factors in Design (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)

• Thesis Credits
Students take a minimum of 10 thesis credits.
• DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B Requirements
Plan B Master's students are required to take DES 8222 Master's Plan B Project the final semester of the program. Take 15 or more credit(s) from the following:
• DES 5185 - Human Factors in Design (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
Plan A Requirements
Take 8 or more credit(s) from the following:
- APST 5117 - Retail Environments and Human Behavior (3.0 cr)
- APST 5123 - Living in a Consumer Society (3.0 cr)
- APST 5124 - Consumers of Design (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- DES 8151 - Product Development (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)
- APST 8267 - Dress and Culture (3.0 cr)
- APST 8268 - Behavioral Aspects of Dress (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- APST 8271 - Retailing: Strategic Perspectives (3.0 cr)

Thesis Credits
Students take a minimum of 10 thesis credits.
- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or Plan B Requirements
Plan B Master's students are required to take APST 8222 Master's Plan B Project the final semester of the program.
Take 15 or more credit(s) from the following:
- APST 5117 - Retail Environments and Human Behavior (3.0 cr)
- APST 5123 - Living in a Consumer Society (3.0 cr)
- APST 5124 - Consumers of Design (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8151 - Product Development (3.0 cr)
- DES 8167 - Aesthetics of Design (3.0 cr)
- APST 8267 - Dress and Culture (3.0 cr)
- APST 8268 - Behavioral Aspects of Dress (3.0 cr)
- APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
- APST 8193 - Directed Study (1.0 - 3.0 cr)
- APST 8271 - Retailing: Strategic Perspectives (3.0 cr)

Plan B Master's Project
Students take a minimum of 3 credits in this category.
- APST 8222 - Plan B Master's Project (3.0 cr)

Graphic Design
The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; design authorship; data visualization; and interactive design.

Theory and Philosophy Coursework
Students take a minimum of 3 credits in this category.
- DES 8112 - Design Theory (3.0 cr)

or DES 8164 - Innovation Theory and Analysis (3.0 cr)

or GDES 5399 - Theory of Electronic Design (3.0 cr)

Evaluation and Analysis Coursework
Students take a minimum of 6 credits in this category.
- DES 8102 - Quantitative Research Methods (3.0 cr)

or DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

or GDES 5388 - Graphic Design Research (3.0 cr)

Concentration
Plan A Requirements
Students are required to take DES 8114, and GDES 8361 or GDES 8362.
Take 8 or more credit(s) from the following:
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4330 - Surface Fabric Design Workshop (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interactive Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data Visualization Studio (3.0 cr)
- GDES 5372 - Data Visualization for Interactive Platforms (3.0 cr)
- GDES 5383 - Digital Illustration and Animation (3.0 cr)
- GDES 5386 - Fundamentals of Game Design (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8114 - Design Studio (4.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
- GDES 8193 - Directed Study (1.0 - 3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

Thesis Credits
Students take a minimum of 10 thesis credits.
- DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Requirements
Students are required to take DES 8114 and GDES 8361 or GDES 8362.
Take 15 or more credit(s) from the following:
- GDES 4131W - History of Graphic Design [WI] (4.0 cr)
- GDES 4330 - Surface Fabric Design Workshop (4.0 cr)
- GDES 4345 - Advanced Typography (4.0 cr)
- GDES 5311 - Illustration (3.0 cr)
- GDES 5341 - Interactive Design (3.0 cr)
- GDES 5342 - Advanced Web Design (3.0 cr)
- GDES 5371 - Data Visualization Studio (3.0 cr)
- GDES 5372 - Data Visualization for Interactive Platforms (3.0 cr)
- GDES 5383 - Digital Illustration and Animation (3.0 cr)
- GDES 5386 - Fundamentals of Game Design (3.0 cr)
- DES 8113 - Teaching and Assessment (2.0 cr)
- DES 8114 - Design Studio (4.0 cr)
- DES 8115 - Grant Writing (2.0 cr)
- GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
- GDES 8193 - Directed Study (1.0 - 3.0 cr)
- GDES 8361 - Color, Design, and Human Perception (3.0 cr)
- GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

Plan B Master's Project
Students take a minimum of 3 credits in this category the last semester of the program.
- GDES 8222 - Plan B Master's Project (3.0 cr)

Housing Studies
The housing studies track advances both theoretical and applied knowledge in the housing field. Through research experiences, students are prepared to assist people and communities in addressing housing-related issues. Courses emphasize human needs and behavior, analysis of designed environments, policy and community development, and housing of specific subpopulations such as the elderly or low-income families with children.

Theory and Philosophy: Required Course
- HSG 8467 - Theoretical Perspectives in Housing Studies (3.0 cr)

Evaluation and Analysis Coursework
Students take a minimum of 6 credits in this category.
- DES 8102 - Quantitative Research Methods (3.0 cr)
or DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
or EPSY 5261 - Introductory Statistical Methods (3.0 cr)

Concentration
Plan A Requirements
Students take least two courses from the following: HSG 5463, HSG 5467, and HSG 8463.
Take 8 or more credit(s) from the following:
• HSG 4461 - Housing Development and Management (4.0 cr)
• HSG 4465 - Housing in a Global Perspective (3.0 cr)
• HSG 5463 - Housing Policy (3.0 cr)
• HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
• HSG 5467 - Housing and the Social Environment (4.0 cr)
• HSG 5481 - Promoting Independence in Housing and Community (3.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• HSG 8192 - Readings in Housing Studies (1.0 - 3.0 cr)
• HSG 8193 - Directed Study (1.0 - 3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)

Thesis Credits
Students take a minimum of 10 credits in this category.
DES 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B Requirements
Students select at least two of the following courses: HSG 5463, HSG 5467, and HSG 8463.
Take 15 or more credit(s) from the following:
• HSG 4461 - Housing Development and Management (4.0 cr)
• HSG 4465 - Housing in a Global Perspective (3.0 cr)
• HSG 5463 - Housing Policy (3.0 cr)
• HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
• HSG 5467 - Housing and the Social Environment (4.0 cr)
• HSG 5481 - Promoting Independence in Housing and Community (3.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• RES 8115 - Grant Writing (2.0 cr)
• HSG 8192 - Readings in Housing Studies (1.0 - 3.0 cr)
• HSG 8193 - Directed Study (1.0 - 3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)

• Plan B Master's Project
Students take a minimum of 3 credits the final semester of the program.
• HSG 8222 - Plan B Master's Project (3.0 cr)

Interior Design
This sub-plan is limited to students completing the program under Plan A.

Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people’s health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues, aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). Students are prepared for teaching and research positions as well as design specializations within the profession. The evidence-based design emphasis provides students with the opportunity to explore theoretical, process, and applied aspects of this design practice approach.

Theory and Philosophy Coursework
DES 8112 - Design Theory (3.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)
or DES 8166 - Material Culture and Design (3.0 cr)

Evaluation and Analysis Coursework
Take the following three courses for 9 credits:
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Concentration
Take 5 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• DES 5168 - Evidence-Based Design (3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• IDES 8192 - Readings in Interior Design (1.0 - 3.0 cr)
• IDES 8193 - Directed Study (1.0 - 3.0 cr)
• **GDES 8361** - Color, Design, and Human Perception (3.0 cr)

**Thesis Credits**

Students take a minimum of 10 credits in this category.

• **DES 8777** - Thesis Credits: Master’s (1.0 - 18.0 cr)
Twin Cities Campus
Design Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Students select a minimum of 9 credits in consultation with their advisor and the director of graduate studies for the design graduate program.

Doctoral
Students select a minimum of 12 credits in consultation with their advisor and the director of graduate studies for the design graduate program.
Twin Cities Campus
Design Ph.D.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify a track and degree objective.

Formal tracks are:
Apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies)
Graphic design (including interactive design)
Housing studies
Interior design (including evidence-based design)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:
Application requirements: http://dha.design.umn.edu/programs/grad/admissions.html

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 144
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may be required to complete additional credits upon recommendation of their committee.

Design Program Core Requirements
DES 8181 - Research Ethics (1.0 cr)

Related Field Coursework
Students are required to take a minimum of 12 credits in a related field. Courses are selected with the approval of the advisor and committee.

Doctoral Dissertation Credits
Students take a minimum of 24 credits of DES 8888. With the permission of the advisor, up to 10 credits may be taken prior to passing the preliminary oral examination.
DES 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Apparel Studies
The apparel studies track advances both theoretical knowledge and applications for apparel and worn products and their relationship to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis.

Evaluation and Analysis Coursework
Students are required to take a minimum of 9 credits in evaluation and analysis, including 3 credits in statistics.
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Statistics
Take 3 or more credit(s) from the following:
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Dress, History, and Culture

Theory and Philosophy Coursework
Students take a minimum of 6 credits in this category.
DES 8164 - Innovation Theory and Analysis (3.0 cr)
DES 8112 - Design Theory (3.0 cr)

Dress, History, and Culture Concentration Coursework
Take 12 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8112 - Design Theory (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)

-OR-

Product Development

Theory and Philosophy Coursework
Students take a minimum of 6 credits in this category.
DES 8112 - Design Theory (3.0 cr)
DES 8164 - Innovation Theory and Analysis (3.0 cr)

Product Development Concentration Coursework
Take 12 or more credit(s) from the following:
• DES 5185 - Human Factors in Design (3.0 cr)
• APST 5218 - Fashion, Design, and the Global Industry (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8192 - Readings in Apparel Studies (1.0 - 3.0 cr)
• APST 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)

-OR-

Retail Merchandising and Consumer Studies

Theory and Philosophy Coursework
Students take a minimum of 6 credits in this category.
APST 8272 - Digital Consumers: Theories in Retail and Consumer Studies (3.0 cr)

Take 3 or more credit(s) from the following:
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)
• SOC 8721 - Theories of Social Psychology (3.0 cr)

Retail Merchandising and Consumer Studies Concentration Coursework
Take 12 or more credit(s) from the following:
• APST 5117 - Retail Environments and Human Behavior (3.0 cr)
• APST 5123 - Living in a Consumer Society (3.0 cr)
• APST 5124 - Consumers of Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• DES 8151 - Product Development (3.0 cr)
• DES 8167 - Aesthetics of Design (3.0 cr)
• APST 8267 - Dress and Culture (3.0 cr)
• APST 8268 - Behavioral Aspects of Dress (3.0 cr)
• APST 8271 - Retailing: Strategic Perspectives (3.0 cr)
Graphic Design
The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; data visualization; and interactive design.

Theory and Philosophy Coursework
Students take a minimum of 6 credits in this category.
DES 8112 - Design Theory (3.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)
or GDES 5399 - Theory of Electronic Design (3.0 cr)

Evaluation and Analysis Coursework
Students take a minimum of 9 credits in this category, including 3 credits in statistics.
Take 6 or more credit(s) from the following:
• DES 8102 - Quantitative Research Methods (3.0 cr)
• DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)
• GDES 5388 - Graphic Design Research (3.0 cr)

Statistics
Take 3 or more credit(s) from the following:
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Graphic Design Concentration Coursework
Students are required to take GDES 8361 and GDES 8362.
Take 12 or more credit(s) from the following:
• GDES 4131W - History of Graphic Design [WI] (4.0 cr)
• GDES 4330 - Surface Fabric Design Workshop (4.0 cr)
• GDES 4345 - Advanced Typography (4.0 cr)
• GDES 5311 - Illustration (3.0 cr)
• GDES 5341 - Interactive Design (3.0 cr)
• GDES 5342 - Advanced Web Design (3.0 cr)
• GDES 5371 - Data Visualization Studio (3.0 cr)
• GDES 5372 - Data Visualization for Interactive Platforms (3.0 cr)
• GDES 5383 - Digital Illustration and Animation (3.0 cr)
• GDES 5386 - Fundamentals of Game Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8114 - Design Studio (4.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• GDES 8192 - Readings in Graphic Design (1.0 - 3.0 cr)
• GDES 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

Housing Studies
Housing studies is a multidisciplinary track that draws from a variety of theoretical perspectives. Students are trained in a variety of research methodologies. Coursework and research experiences combine to further understanding of the innovative approaches to the development of housing and related programs. Upon completion of the graduate degree, students seek housing careers in state and federal agencies, nonprofit community organizations, housing regulation, and higher education.

Theory and Philosophy Coursework
Students are required to take a total of 6 credits in this category, including HSG 8467. Students select one additional course in theory and philosophy with the approval of the advisor and committee.
HSG 8467 - Theoretical Perspectives in Housing Studies (3.0 cr)

Evaluation and Analysis Coursework
Students take a minimum of 9 credits in this category, including a minimum of 3 credits in statistics.
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Statistics
Take 3 or more credit(s) from the following:
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8252 - Statistical Methods in Education II (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Housing Studies Concentration Coursework
HSG 5463, HSG 5467, and HSG 8463 are required.
Take 12 or more credit(s) from the following:
• HSG 4461 - Housing Development and Management (4.0 cr)
• HSG 4465 - Housing in a Global Perspective (3.0 cr)
• HSG 5463 - Housing Policy (3.0 cr)
• HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
• HSG 5467 - Housing and the Social Environment (4.0 cr)
• HSG 5481 - Promoting Independence in Housing and Community (3.0 cr)
• HSG 5484 - Rural Housing Issues (3.0 cr)
• HSG 8192 - Readings in Housing Studies (1.0 - 3.0 cr)
• HSG 8193 - Directed Study (1.0 - 3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)

Interior Design
Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues, aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). Students are prepared for teaching and research positions as well as design specializations within the profession. The evidence-based design emphasis provides students with the opportunity to explore theoretical, process, and applied aspects of this design practice approach.

Theory and Philosophy Coursework
Students take DES 8112 and choose either DES 8164 or DES 8166 for a total of 6 credits in this category.
DES 8112 - Design Theory (3.0 cr)
Take 3 or more credit(s) from the following:
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• DES 8166 - Material Culture and Design (3.0 cr)

Evaluation and Analysis Coursework
Students take a minimum of 9 credits in this category, including a minimum of 3 credits in statistics.
DES 8102 - Quantitative Research Methods (3.0 cr)
DES 8103 - Qualitative and Mixed Methods Research (3.0 cr)

Statistics
Take 3 or more credit(s) from the following:
• EPSY 5261 - Introductory Statistical Methods (3.0 cr)
• EPSY 5262 - Intermediate Statistical Methods (3.0 cr)
• EPSY 8261 - Statistical Methods in Education I (3.0 cr)
• EPSY 8262 - Statistical Methods in Education II (3.0 cr)
• EPSY 8266 - Statistical Analysis Using Structural Equation Methods (3.0 cr)
• EPSY 8267 - Applied Multivariate Analysis (3.0 cr)

Interior Design Concentration Coursework
Take 12 or more credit(s) from the following:
• DES 5165 - Design and Globalization (3.0 cr)
• DES 5166 - Evidence-Based Design (3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 8113 - Teaching and Assessment (2.0 cr)
• DES 8115 - Grant Writing (2.0 cr)
• IDES 8192 - Readings in Interior Design (1.0 - 3.0 cr)
• IDES 8193 - Directed Study (1.0 - 3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
Twin Cities Campus
Ecological Restoration in Landscape Architecture
Landscape Architecture
College of Design

Link to a list of faculty for this program.

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 10
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Restoration, conservation, and ecological design projects have become an increasingly important component of the practice of landscape architecture and natural resource management. It is critical for students interested in the design and management of natural lands, water management landscapes, landscape reclamation, and other restoration project types to gain exposure to the issues associated with ecological restoration projects. This minor focuses on the applied practice of restoration with an emphasis on restoration management and design and the skills needed to lead successful projects.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
**Master's Minor Requirements**
- ESPM 5071 - Ecological Restoration (4.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- LA 5576 - Ecological Restoration Project Planning and Management (3.0 cr)
Twin Cities Campus
Housing Studies Postbaccalaureate Certificate
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN  55108 (612-626-1219)
Email: dhagrad@umn.edu
Website: http://dha.cdes.umn.edu/programs/grad/prospective/admissions/housingstudiescertificateprogram.htm

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2016
• Length of program in credits: 15
• This program does not require summer semesters for timely completion.
• Degree: Housing Studies PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The housing studies certificate is designed for individuals interested, or currently working, in housing related professions to expand their knowledge in areas including housing and community development, housing policy, residential environment and energy use, rural housing issues, housing management, and housing finance.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Some elective courses require prerequisites that may be waived with instructor permission according to University policy.

Required Course
HSG 5471 - Housing Studies Certificate Seminar (2.0 cr)
Elective Courses
Take 13 or more credit(s) from the following:

- HSG 4461 - Housing Development and Management (4.0 cr)
- HSG 4465 - Housing in a Global Perspective (3.0 cr)
- HSG 5463 - Housing Policy (3.0 cr)
- HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
- HSG 5467 - Housing and the Social Environment (4.0 cr)
- HSG 5481 - Promoting Independence in Housing and Community (3.0 cr)
- HSG 5484 - Rural Housing Issues (3.0 cr)
- HSG 8463 - Housing: Race and Class (3.0 cr)
- HSG 8467 - Theoretical Perspectives in Housing Studies (3.0 cr)
Twin Cities Campus
Human Factors and Ergonomics M.S.
DHA Human Factors and Ergonomics
College of Design

Link to a list of faculty for this program.

Contact Information:
Human Factors and Ergonomics Graduate Program, c/o DHA, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN  55108.  612-626-1219.
Email: cklarqui@umn.edu
Website: http://humanfactors.design.umn.edu/

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HFE) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The graduate program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HFE has applications ranging from clothing and living spaces to business processes, the design of health care processes and technology, computer interfaces, and spacecraft cockpits.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 96
  - Internet Based - Listening Score: 24
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 24
  - Internet Based - Speaking Score: 24
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 82

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.
Plan C: Plan C requires 30 major credits and 0 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Courses

Required Research Methods Core
- PSY 8814 - Analysis of Psychological Data (4.0 cr)
- PSY 8815 - Analysis of Psychological Data (4.0 cr)

Research Ethics
In addition to course listed below, students have online options. See program Research Ethics page for more information: http://humanfactors.design.umn.edu/research_ethics.html
Take 0 or more credit(s) from the following:
- DES 8181 - Research Ethics (1.0 cr)

Plans

Plan A
In addition to the required courses, students take a minimum of 3 credits in each component: Human Factors Fundamentals, Cognitive Human Factors, and Physical Human Factors. The remaining credits are selected from the approved course list.

Human Factors Fundamentals
Take 3 or more credit(s) from the following:
- DES 5185 - Human Factors in Design (3.0 cr)
- HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
- HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
- HUMF 5874 - Service Design: Designing complex systems to improve service delivery (4.0 cr)

Cognitive Human Factors
Take 3 or more credit(s) from the following:
- CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
- CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
- EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
- IDSC 8721 - Behavioral Decision Theory (3.0 cr)
- IDSC 8722 - Heuristic Decision Making (2.0 cr)
- MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
- PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
- PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
- PSY 5031W - Perception [WI] (3.0 cr)
- PSY 5037 - Psychology of Hearing (3.0 cr)
- PSY 5062 - Cognitive Neuropsychology (3.0 cr)
- PSY 5064 - Brain and Emotion (3.0 cr)
- PSY 8041 - Proseminar in Perception (3.0 cr)
- PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
- PSY 8201 - Social Cognition (3.0 cr)

Physical Human Factors
Take 3 or more credit(s) from the following:
- KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
- KIN 4136 - Embodied Cognition (3.0 cr)
- KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)
- KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
- KIN 8211 - Seminar: Perception and Action (3.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 8135 - Advanced Kinesiology (3.0 cr)

Other Approved Human Factors Courses
Take 0 or more credit(s) from the following:

User Interface Design
Take 0 or more credit(s) from the following:
- CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
- CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
- NUURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
• WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
• WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)

• Other Statistics
Psy 8960: Select Multivariate Statistics for Social Scientists section only.
Take 0 or more credit(s) from the following:
• PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
• PUBH 7406 - Advanced Regression and Design (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)

• Other Designing Experiments
Take 0 or more credit(s) from the following:
• STAT 5303 - Designing Experiments (4.0 cr)

• Other Research Methods
Take 0 or more credit(s) from the following:
• ANTH 4035 - Ethnographic Research Methods (3.0 cr)
• KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6343 - Epidemiologic Methods III (4.0 cr)
• PUBH 6806 - Principles of Public Health Research (2.0 cr)

• Other Human Factors Courses
Take 0 or more credit(s) from the following:
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 8117 - Understanding the Social Web (3.0 cr)
• DES 5165 - Design and Globalization (3.0 cr)
• DES 8151 - Product Development (3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• HUMF 8001 - Special Topics: Human Factors/Ergonomics (2.0 - 3.0 cr)
• HUMF 8002 - Proseminar in Human Factors/Ergonomics (1.0 cr)
• PSY 5501 - Vocational and Occupational Health Psychology (3.0 cr)
• PSY 5708 - Organizational Psychology (3.0 cr)
• PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 6470 - SAS Procedures and Data Analysis (3.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)

Thesis Credits
Students take a minimum of 10 thesis credits.
HUMF 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan C
in addition to the required courses, students take a minimum of 3 credits in each component: Human Factors Fundamentals, Cognitive Human Factors, and Physical Human Factors; and a minimum of 2, 3-credit courses 50% project-based. The remaining credits are selected from the approved course list.

Human Factors Fundamentals
Take 3 or more credit(s) from the following:
• DES 5185 - Human Factors in Design (3.0 cr)
• HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
• HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
• HUMF 5874 - Service Design: Designing complex systems to improve service delivery (4.0 cr)

Cognitive Human Factors
Take 3 or more credit(s) from the following:
• CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
• CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
• EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
• IDSC 8721 - Behavioral Decision Theory (3.0 cr)
• IDSC 8722 - Heuristic Decision Making (2.0 cr)
• MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
• PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
• PSY 5031W - Perception [WI] (3.0 cr)
• PSY 5037 - Psychology of Hearing (3.0 cr)
• PSY 5062 - Cognitive Neuropsychology (3.0 cr)
• PSY 5064 - Brain and Emotion (3.0 cr)
• PSY 8041 - Proseminar in Perception (3.0 cr)
• PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)

Physical Human Factors
Take 3 or more credit(s) from the following:
• KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
• KIN 4136 - Embodied Cognition (3.0 cr)
• KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
• KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)
• KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
• KIN 8211 - Seminar: Perception and Action (3.0 cr)
• RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
• RSC 8135 - Advanced Kinesiology (3.0 cr)

Other Approved Human Factors Courses
Take 0 or more credit(s) from the following:
User Interface Design
Take 0 or more credit(s) from the following:
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
• NURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
• WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
• WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)

Other Statistics
Psy 8960: Select Multivariate Statistics for Social Scientists section only.
Take 0 or more credit(s) from the following:
• PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
• PUBH 7406 - Advanced Regression and Design (4.0 cr)
• STAT 5021 - Statistical Analysis (4.0 cr)

Other Designing Experiments
Take 0 or more credit(s) from the following:
• STAT 5303 - Designing Experiments (4.0 cr)

Other Research Methods
Take 0 or more credit(s) from the following:
• ANTH 4035 - Ethnographic Research Methods (3.0 cr)
• KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6343 - Epidemiologic Methods III (4.0 cr)
• PUBH 6806 - Principles of Public Health Research (2.0 cr)

Other Human Factors Courses
Take 0 or more credit(s) from the following:
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 8117 - Understanding the Social Web (3.0 cr)
• DES 5165 - Design and Globalization (3.0 cr)
• DES 8151 - Product Development (3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• HUMF 8001 - Special Topics: Human Factors/Ergonomics (2.0 - 3.0 cr)
• HUMF 8002 - Proseminar in Human Factors/Ergonomics (1.0 cr)
• PSY 5501 - Vocational and Occupational Health Psychology (3.0 cr)
• PSY 5708 - Organizational Psychology (3.0 cr)
• PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 6470 - SAS Procedures and Data Analysis (3.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)

50% Project-Based Courses
Take 6 or more credit(s) from the following:
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 8151 - Product Development (3.0 cr)
• HUMF 5874 - Service Design: Designing complex systems to improve service delivery (4.0 cr)
• WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
**Twin Cities Campus**

**Human Factors and Ergonomics Minor**

*DHA Human Factors and Ergonomics*

**College of Design**

Link to a list of faculty for this program.

**Contact Information:**
Human Factors and Ergonomics Graduate Program, c/o DHA, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108. 612-626-1219
Email: cklarqui@umn.edu
Website: [http://humanfactors.design.umn.edu/](http://humanfactors.design.umn.edu/)

- **Program Type:** Graduate minor related to major
- **Requirements for this program are current for Fall 2016**
- **Length of program in credits (Masters):** 9
- **Length of program in credits (Doctorate):** 12
- **This program does not require summer semesters for timely completion.**

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HFE) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The graduate program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HFE has applications ranging from clothing and living spaces to business processes, the design of health care processes and technology, computer interfaces, and spacecraft cockpits. The minor is available to master's and doctoral students.

**Program Delivery**
This program is available:
- **via classroom** (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Any University of Minnesota graduate student in good standing is eligible to apply. Students discuss appropriate coursework with their advisers and the Director of Graduate Studies for Human Factors and Ergonomics.

Master's students are required to take 9 credits to fulfill the minor.
Doctoral students are required to take 12 credits to fulfill the minor.

**Program Sub-plans**
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Masters**
Students select a minimum of 9 credits in consultation with their adviser and the Director of Graduate Studies for the Human Factors and Ergonomics Graduate Program.

**Doctoral**
Students select a minimum of 12 credits in consultation with their adviser and the Director of Graduate Studies for the Human Factors
and Ergonomics Graduate Program.
**Twin Cities Campus**

**Human Factors and Ergonomics Ph.D.**

*DHA Human Factors and Ergonomics*

*College of Design*

Link to a [list of faculty](#) for this program.

**Contact Information:**

Human Factors and Ergonomics Graduate Program, c/o DHA, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108. 612-626-1219

Email: cklarqui@umn.edu

Website: [http://humanfactors.design.umn.edu/](http://humanfactors.design.umn.edu/)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HFE) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The graduate program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HFE has applications ranging from clothing and living spaces to business processes, the design of healthcare processes and technology, computer interfaces, and spacecraft cockpits.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 96
  - Internet Based - Listening Score: 24
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 24
  - Internet Based - Speaking Score: 24

- IELTS
  - Total Score: 7

- MELAB
  - Final score: 82

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](#) (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

42 credits are required in the major.

24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Courses

Required Research Methods Core
- PSY 8814 - Analysis of Psychological Data (4.0 cr)
- PSY 8815 - Analysis of Psychological Data (4.0 cr)

Additional Research Methods Course
Doctoral students take one additional course in research methods.

Statistics
- Students choosing PSY 8960 must take 3 credits of Multivariate Statistics for Social Scientists.
  - Take 0 or more credit(s) from the following:
    - PSY 8960 - Graduate Seminar in Psychology (1.0 - 4.0 cr)
    - PUBH 7406 - Advanced Regression and Design (4.0 cr)
    - STAT 5021 - Statistical Analysis (4.0 cr)

  or Designing Experiments
  - Take 0 or more credit(s) from the following:
    - STAT 5303 - Designing Experiments (4.0 cr)

  or Other Research Methods
  - Take 0 or more credit(s) from the following:
    - ANTH 4035 - Ethnographic Research Methods (3.0 cr)
    - KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
    - PUBH 6341 - Epidemiologic Methods I (3.0 cr)
    - PUBH 6342 - Epidemiologic Methods II (3.0 cr)
    - PUBH 6343 - Epidemiologic Methods III (4.0 cr)
    - PUBH 6806 - Principles of Public Health Research (2.0 cr)

Research Ethics
In addition to course listed below, students have online options. See program Research Ethics page for more information: http://humanfactors.design.umn.edu/research_ethics.html
- Take 0 or more credit(s) from the following:
  - DES 8181 - Research Ethics (1.0 cr)

Doctoral Dissertation Credits
- Students must take at least 24 doctoral thesis credits.
- HUMF 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Doctoral Course Requirements

Additional Coursework Requirements
In addition to the required courses, students must take a minimum of 3 credits in each of the following components: Human Factors Fundamentals, Cognitive Human Factors, and Physical Human Factors. Remaining credits are selected from the approved course list.

Human Factors Fundamentals
- Take 3 or more credit(s) from the following:
  - DES 5185 - Human Factors in Design (3.0 cr)
  - HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
  - HUMF 5211 - Human Factors and Work Analysis (4.0 cr)
  - HUMF 5874 - Service Design: Designing complex systems to improve service delivery (4.0 cr)

Cognitive Human Factors
- Take 3 or more credit(s) from the following:
  - CGSC 8000 - Seminar: Philosophy of the Cognitive Sciences (3.0 cr)
  - CGSC 8410 - Perspectives in Learning, Perception, and Cognition (2.0 cr)
  - EPSY 8114 - Seminar: Cognition and Learning (3.0 cr)
  - IDSC 8721 - Behavioral Decision Theory (3.0 cr)
  - IDSC 8722 - Heuristic Decision Making (2.0 cr)
  - MKTG 8813 - Consumer Judgment and Decision Making I (2.0 cr)
  - PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)
  - PSY 5015 - Cognition, Computation, and Brain (3.0 cr)
  - PSY 5031W - Perception [WI] (3.0 cr)
  - PSY 5037 - Psychology of Hearing (3.0 cr)
  - PSY 5062 - Cognitive Neuropsychology (3.0 cr)
• PSY 5064 - Brain and Emotion (3.0 cr)
• PSY 8041 - Proseminar in Perception (3.0 cr)
• PSY 8042 - Proseminar in Cognition, Brain, and Behavior (3.0 cr)
• PSY 8201 - Social Cognition (3.0 cr)

Physical Human Factors
Take 3 or more credit(s) from the following:
• KIN 4133 - Perceptual-Motor Control and Learning (3.0 cr)
• KIN 4136 - Embodied Cognition (3.0 cr)
• KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
• KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)
• KIN 5643 - Applied Motion Capture and Movement Analysis Technology (3.0 cr)
• KIN 8211 - Seminar: Perception and Action (3.0 cr)
• RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
• RSC 8135 - Advanced Kinesiology (3.0 cr)

Other Approved Human Factors Courses
Take 0 or more credit(s) from the following:

User Interface Design
Take 0 or more credit(s) from the following:
• CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
• CSCI 8115 - Human-Computer Interaction and User Interface Technology (3.0 cr)
• NURS 7118 - Human Factors and Human-Computer Interaction in Health Informatics (3.0 cr)
• WRIT 4501 - Usability and Human Factors in Technical Communication (3.0 cr)
• WRIT 8520 - Seminar in Scientific and Technical Communication (3.0 cr)

• Other Human Factors Courses
Take 0 or more credit(s) from the following:
• CSCI 5125 - Collaborative and Social Computing (3.0 cr)
• CSCI 5609 - Visualization (3.0 cr)
• CSCI 5619 - Virtual Reality and 3D Interaction (3.0 cr)
• CSCI 8117 - Understanding the Social Web (3.0 cr)
• DES 5165 - Design and Globalization (3.0 cr)
• DES 8151 - Product Development (3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• HUMF 8001 - Special Topics: Human Factors/Ergonomics (2.0 - 3.0 cr)
• HUMF 8002 - Proseminar in Human Factors/Ergonomics (1.0 cr)
• PSY 5501 - Vocational and Occupational Health Psychology (3.0 cr)
• PSY 5708 - Organizational Psychology (3.0 cr)
• PSY 5862 - Psychological Measurement: Theory and Methods (3.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 6470 - SAS Procedures and Data Analysis (3.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
Twin Cities Campus
Landscape Architecture M.L.A.
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, 144 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-625-6860)
Website: http://landarch.design.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 58 to 89
- This program does not require summer semesters for timely completion.
- Degree: Master of Landscape Architecture

The master of landscape architecture (MLA) is a first-professional degree required for students who wish to become licensed professional landscape architects. The program is accredited by the national Landscape Architecture Accreditation Board (LAAB). The curriculum introduces students to the practice and discipline of landscape architecture, providing them with the artistic, technical, cognitive, and communication skills, in addition to the scientific and aesthetic knowledge, necessary to practice in the profession and in related environmental fields. Students are encouraged to select from electives offered to develop a special focus or to explore more areas in depth.

The MLA program (MLA I) is a three-year, 89-credit degree. Coursework exposes students to the broad field of landscape architecture as both a discipline and a profession. Classes are collaborative in nature and challenge students to delve into landscape issues that cut across multiple systems and scales. Because the core of the curriculum is six design studios, organized in a sequential framework, a commitment to three successive years in the program is essential.

Applicants with accredited professional baccalaureate degrees in landscape architecture or architecture may be considered for the advanced-standing MLA degree (MLA II). The MLA II requires at least 58 credits of design studio, research methods, and elective courses.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
MLA program applicants must have completed a baccalaureate degree.

Special Application Requirements:
Students are admitted for fall semester only. M.L.A. program applicants must apply by January 15, for entry the following fall, to receive first consideration for admission, fellowships, and assistantships. In addition to the University's admission requirements, applicants must submit an electronic portfolio in 8.5 x 11 PDF format. GRE scores are not required; however, they can be helpful to applicants seeking national fellowships such as the Fulbright Scholarship. Please refer to the M.L.A. website for detailed information regarding department-specific application requirements and procedures, including a downloadable checklist, at http://landarch.design.umn.edu/prog/mla/adm.html.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 86
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

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Information current as of January 20, 2017
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 52 to 83 major credits and 6 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: See department for more details.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Core Coursework

All MLA students must take the following courses for a total of 36 credits:

- LA 5131 - Geospatial Data Analysis and Design (3.0 cr)
- LA 5202 - Landscape Analysis Workshop (1.0 cr)
- LA 8201 - Designing Landscapes for Dwelling and Settlement (6.0 cr)
- LA 8773 - Landscape Infrastructure and Systems III (3.0 cr)
- LA 8206 - Making Urban Landscape Space (6.0 cr)
- LA 8301 - Landscape Architecture: Research Issues and Methods (3.0 cr)
- LA 8554 - Project Programming (2.0 cr)
- LA 8774 - Landscape Infrastructure and Systems IV (3.0 cr)
- LA 8302 - Professional Practice (3.0 cr)
- LA 8555 - Advanced Landscape Planning and Design (6.0 cr)

Outside Coursework

All MLA students must take at least 6 credits outside landscape architecture, in consultation with their advisor.

MLA I and MLA II Program Options

MLA I Requirements

Additional Course Requirements

MLA I students must take the following courses for 32 credits:

- LA 5201 - Making Landscape Spaces and Types (6.0 cr)
- LA 5376 - Representation I (4.0 cr)
- LA 5413 - Introduction to Landscape Architectural History (3.0 cr)
- LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
- LA 5203 - Ecological Dimensions of Space Making (6.0 cr)
- LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
- LA 5377 - Representation II (4.0 cr)
- LA 5772 - Landscape Infrastructure Systems II (3.0 cr)

MLA I students may participate in the Cities on the Water study abroad option, with the approval of their advisor and the director of graduate studies. Students choosing the study abroad option take 8 credits of LA 8207 and 4 credits of LA 8411 for a total of 12 credits; those not choosing to study abroad take LA 8205 for 6 credits.

- LA 8207 - Cities on Water International Workshop (4.0 - 8.0 cr)
- LA 8411 - The foundational studio course on international applications of sustainable design in urban Europe. (2.0 - 8.0 cr)
- or LA 8205 - Urban Form Options: Landscape Architecture Studio (6.0 - 8.0 cr)

Landscape Architecture Electives

MLA I students choosing the Cities on the Water study abroad option take at least 3 elective credits; those not choosing to study abroad take at least 9 elective credits. Credits are selected in consultation with the advisor.

- LA 5xxx
- LA 8xxx

-OR-

MLA II Requirements

MLA II students may participate in the Cities on the Water study abroad option, with the approval of their advisor and the director of graduate studies. Students choosing the study abroad option take 8 credits of LA 8207 and 4 credits of LA 8411 for a total of 12 credits; those not choosing to study abroad take 6 credits of LA 8205 and 4 credits of LA 5377 for a total of 10 credits.

- LA 8207 - Cities on Water International Workshop (4.0 - 8.0 cr)
- LA 8411 - The foundational studio course on international applications of sustainable design in urban Europe. (2.0 - 8.0 cr)
- or LA 8205 - Urban Form Options: Landscape Architecture Studio (6.0 - 8.0 cr)
LA 5377 - Representation II (4.0 cr)

**Landscape Architecture Electives**

MLA II students choosing the study abroad option take at least 4 elective credits; those not choosing to study abroad take at least 6 elective credits. Credits are selected in consultation with the advisor.

LA 5xxx
LA 8xxx
Twin Cities Campus
Landscape Architecture M.S.
Landscape Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, 144 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Website: http://landarch.design.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS is for students with a clear focus in research related to landscape architecture. MS students build expertise related to the practice of landscape architecture as they learn how to conduct research. Students specialize within areas of faculty expertise, which may include art and landscape architecture, landscape ecology, landscape architectural history and theory, park and recreation design, rural and suburban landscape planning, transportation, planning of world heritage sites, and urban design.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.8
- MELAB
  - Final score: 80

Key to test abbreviations: (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 6 major credits, 14 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.
Coursework Requirements

Landscape Architecture Electives
Take 6 or more credit(s) from the following:
• LA 5xxx
• LA 8xxx

Interest Area Electives
Choose elective credits, in consultation with the advisor, from coursework outside landscape architecture.
Take 6 or more credit(s) from the following:
• xxxx 5xxx
• xxxx 6xxx
• xxxx 7xxx
• xxxx 8xxx

Remaining Electives
Choose remaining credits in consultation with the advisor.
Take 8 or more credit(s) from the following:
• xxxx 5xxx
• xxxx 6xxx
• xxxx 7xxx
• xxxx 8xxx

Thesis credits
Take 10 master's thesis credits.
LA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Landscape Architecture Minor
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, University of Minnesota, 144 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Email: gsland@umn.edu
Website: http://landarch.design.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in landscape architecture develop professional design skills through courses that address the increasingly complex relationships between art, ecology, and community that influence and inform design on the land. Courses emphasize three principal areas of study: 1) landscape architecture as a means to add to the aesthetic richness of our culture and environment—helping us to better understand ourselves and our place in the world; 2) integration of biological, geophysical, and ecological processes into lasting, meaningful, and systemically rigorous landscape architecture that sustains and protects the health of people and the ecosystems on which they depend; and 3) design for urban and suburban places and people, with emphasis on gaining knowledge and experience through direct engagement with clients and the public in order to address the problems and opportunities of the metropolitan core of cities.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor requirements are determined in consultation with the Landscape Architecture director of graduate studies.

Required Course
Take the following required course for 3 credits:
LA 5413 - Introduction to Landscape Architectural History (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
Electives
Take at least 6 credits from the following:
LA 5003 - Case Studies in Sustainable Landscape Planning and Design (3.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
LA 5755 - Infrastructure, Natural Systems and the Space of Inhabited Landscapes (3.0 cr)
LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
LA 8301 - Landscape Architecture: Research Issues and Methods (3.0 cr)

Doctoral Electives
Take at least 9 credits from the following:
LA 5003 - Case Studies in Sustainable Landscape Planning and Design (3.0 cr)
LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
LA 5514 - Making the Mississippi (3.0 cr)
LA 5755 - Infrastructure, Natural Systems and the Space of Inhabited Landscapes (3.0 cr)
LA 5771 - Landscape Infrastructure and Systems I (3.0 cr)
LA 8301 - Landscape Architecture: Research Issues and Methods (3.0 cr)
Twin Cities Campus
Metropolitan Design Postbaccalaureate Certificate
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
College of Design, Metropolitan Design Program, 1 Rapson Hall, 89 Church Street SE, Minneapolis, MN 55455 (625-9000; fax: 626-0600)
Email: mdc@umn.edu
Website: http://www.designcenter.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 21
- This program does not require summer semesters for timely completion.
- Degree: Metropolitan Design PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The metropolitan design certificate at the College of Design prepares students with the essential knowledge and understanding of the city within the complexities of the 21st-century metropolis. As suburban development is losing some of its past seductions, traditional cities are being transformed to accommodate the return to city living, an American counter-trend that requires the integrative approach of many fields of knowledge.

The certificate is open to graduate students in the College of Design and graduate students from other colleges with related urban planning programs are welcome to apply. The certificate is a two-semester, 21-credit course sequence within existing master's degrees at the College of Design. It is strongly recommended that the required urban design courses should be taken in sequence.

Interested students should enroll during the second semester (spring) of graduate studies. It is recommended that students make a decision to enroll in the certificate early so that the completion of courses can be made within the time required for completion of the professional degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
An application is required including a 2-page statement of interest in the program, university transcripts, and a portfolio of design work (no more 10 pages). Other students not from the College of Design should submit comparable graphic examples and two written papers.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

Coursework

Required Courses
ARCH 5711 - Theory and Principles of Urban Design (3.0 cr)
ARCH 5721 - Case Studies in Urban Design (3.0 cr)
ARCH 8255 - Graduate Architectural Design V (6.0 cr)

Electives
Take 9 or more credit(s) from the following:
• ARCH 5441 - Minnesota: Architecture and Landscapes (3.0 cr)
• ARCH 5731 - Territorial City (3.0 cr)
• ARCH 5671 - Historic Preservation (3.0 cr)
• PA 5501 - Theories and Policies of Development (3.0 cr)
• ARCH 5361 - 3-D Computer Architectural Modeling and Design (3.0 cr)
• PA 5511 - Community Economic Development (3.0 cr)
• PA 8203 - Neighborhood Revitalization Strategies and Theories (4.0 cr)
• HSG 5467 - Housing and the Social Environment (4.0 cr)
• HSG 5464 - Understanding Housing: Assessment and Analysis (3.0 cr)
• HSG 8463 - Housing: Race and Class (3.0 cr)
• HSG 5463 - Housing Policy (3.0 cr)
• LA 5405 - Interdisciplinary Studies in Landscape Architecture (1.0 - 6.0 cr)
• ARCH 8561 - Sustainable Design Theory and Practice (3.0 cr)
• LA 5204 - Metropolitan Landscape Ecology (3.0 cr)
• PA 5721 - Energy and Environmental Policy (3.0 cr)
• PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
• PA 5723 - Water Policy (3.0 cr)
• PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)
• PA 5211 - Land Use Planning (3.0 cr)
• PA 5212 - Managing Urban Growth and Change (3.0 cr)
• PA 5231 - Transit Planning and Management (3.0 cr)
• PA 5261 - Housing Policy (3.0 cr)
• PA 5802 - Global Economic Policy (3.0 cr)
• PA 8202 - Networks and Places: Transportation, Land Use, and Design (4.0 cr)
Twin Cities Campus

Museum Studies Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Museum Studies Graduate Minor, College of Design, 240 McNeal Hall, 1985 Buford Avenue, 612-626-1219
Email: lnelsonm@umn.edu
Website: http://www.design.umn.edu/prospective_students/programs/museumstudies.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The museum studies minor offers a structured graduate curriculum for master's and doctoral students interested in museums. It provides students from a variety of disciplines with an introduction to the issues involved in museum practices (e.g., educational, curatorial, administrative, and conservation). The curriculum includes seminars and internships.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
As a minor-only program, all graduate students who have already been accepted into a University of Minnesota Graduate program are eligible for acceptance into the program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Core Course Requirements
All students pursuing the museum studies minor must take the following core coursework, including 1 internship credit (MST 5020). Internships must be approved by the museum studies director of graduate studies.
- MST 5011 - Museum History and Philosophy (3.0 cr)
- MST 5012 - Museum Practices (3.0 cr)
- MST 5020 - Internship (1.0 - 6.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
Complete the 7-credit core curriculum described above.

Doctoral
Doctoral Electives
In addition to the core curriculum, take at least 5 credits from the following courses:

**Communication**
Take 0 or more credit(s) from the following:
• JOUR 5251 - Strategic Communication Theory (3.0 cr)

**Leadership**
Take 0 or more credit(s) from the following:
• ACL 5221 - Creative Entrepreneurship and Resource Development (3.0 cr)
• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 8020 - Leadership: From Theory to Reflective Practice (3.0 cr)
• PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
• PA 5104 - Strategic Human Resource Management (3.0 cr)
• PA 5123 - Philanthropy in America: History, Practice, and Trends (3.0 cr)
• PA 5253 - Designing Planning and Participation Processes (3.0 cr)
• PA 5251 - Strategic Planning and Management (3.0 cr)

**Education**
Take 0 or more credit(s) from the following:
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• PSY 5014 - Psychology of Human Learning and Memory (3.0 cr)

**Evaluation**
Take 0 or more credit(s) from the following:
• OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
• PA 5311 - Program Evaluation (3.0 cr)

**Exhibition Design**
Take 0 or more credit(s) from the following:
• DES 5185 - Human Factors in Design (3.0 cr)
• DES 8164 - Innovation Theory and Analysis (3.0 cr)
• GDES 8361 - Color, Design, and Human Perception (3.0 cr)
• KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)

**Other Museum Studies Electives**
Internships (MST 5020) must be approved by the museum studies director of graduate studies. Directed study (MST 8993) must be guided by a member of the museum studies graduate faculty.
Take 0 or more credit(s) from the following:
• MST 5020 - Internship (1.0 - 6.0 cr)
• MST 8993 - Directed Study in Museum Studies (1.0 - 4.0 cr)
Twin Cities Campus
Product Design Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Product Design Graduate Minor, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN  55108 (612-626-1219)
Email: cklarqui@umn.edu
Website: http://product.design.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 11
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Product design is the planning of an item intended to be manufactured and sold. These items exist both as discrete artifacts and as actors in larger social systems, such as branded environments, services, experiences, and social interactions. A graduate minor may be earned in product design when it logically relates to the graduate major field. The minor program is designed to suit the particular needs and interests of the student. The course of study is determined in consultation with the student's major adviser and the director of graduate studies for the minor.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A graduate minor may be earned in product design when it logically relates to the graduate major field.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of two courses with the PDes designator must be taken to fulfill the minor requirements.

The course of study must be approved by the director of graduate studies for the minor.

Product Design Core Courses
Courses listed under the core requirement may be used to fulfill the remaining credits if they were not taken to meet the core requirement.

Required Course
PDES 5701 - Creativity, Idea Generation, and Innovation (3.0 cr)

Product Design Process
Option 1
PDES 5711 - Toy Product Design (4.0 cr)

or Option 2
DES 8151 - Product Development (3.0 cr)

or Option 3
ME 8221 - New Product Design and Business Development I (4.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)

or Option 4
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Electives
Design Process
PDES 5711 - Toy Product Design (4.0 cr)
or
DES 8151 - Product Development (3.0 cr)
or
BMEN 8401 - New Product Design and Business Development (4.0 cr)
BMEN 8402 - New Product Design and Business Development (4.0 cr)
or
ME 8221 - New Product Design and Business Development I (4.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
or
DES 8164 - Innovation Theory and Analysis (3.0 cr)

or
Drawing and Visualization
PDES 5702 - Concept Sketching and Rendering (3.0 cr)
or
PDES 5704 - Computer-Aided Design Methods (3.0 cr)
or
GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

or
Prototyping, Manufacturing, and the Environment
PDES 5703 - Product Form and Model Making (4.0 cr)
or
CEGE 5571 - Acara Global Venture Design: Grand Challenges [GP] (3.0 - 4.0 cr)
or
ME 5221 - Computer-Assisted Product Realization (4.0 cr)
or
ME 5223 - Materials in Design (4.0 cr)
or
ME 5241 - Computer-Aided Engineering (4.0 cr)
or
ME 8243 - Topics in Design (4.0 cr)
or
ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
or
ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)

or
Human Factors
DES 5185 - Human Factors in Design (3.0 cr)
or
CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
or
GDES 5341 - Interactive Design (3.0 cr)
or
GDES 5386 - Fundamentals of Game Design (3.0 cr)
or
PDES 5505 - Human Centered Design - Principles and Applications (3.0 cr)
or
HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)

or
Understanding the Consumer and the Market
PDES 5705 - History and Future of Product Design (3.0 cr)
or
ANTH 5121 - Business Anthropology (2.0 cr)
or
DES 8164 - Innovation Theory and Analysis (3.0 cr)
or
MKTG 6055 - Buyer Behavior (4.0 cr)
or
MKTG 6050 - Business Research Methods (2.0 cr)

Doctoral
Electives
Design Process
PDES 5711 - Toy Product Design (4.0 cr)
or
DES 8151 - Product Development (3.0 cr)
or
BMEN 8401 - New Product Design and Business Development (4.0 cr)
BMEN 8402 - New Product Design and Business Development (4.0 cr)
or
ME 8221 - New Product Design and Business Development I (4.0 cr)
ME 8222 - New Product Design and Business Development II (4.0 cr)
or
DES 8164 - Innovation Theory and Analysis (3.0 cr)

or
Drawing and Visualization
PDES 5702 - Concept Sketching and Rendering (3.0 cr)
or
PDES 5704 - Computer-Aided Design Methods (3.0 cr)
or
GDES 8362 - The Nature of Representation in Visual Communication (3.0 cr)

or
Prototyping, Manufacturing, and the Environment
PDES 5703 - Product Form and Model Making (4.0 cr)
or CEGE 5571 - Acara Global Venture Design: Grand Challenges [GP] (3.0 - 4.0 cr)
or ME 5221 - Computer-Assisted Product Realization (4.0 cr)
or ME 5223 - Materials in Design (4.0 cr)
or ME 5241 - Computer-Aided Engineering (4.0 cr)
or ME 8243 - Topics in Design (4.0 cr)
or ESPM 5603 - Environmental Life Cycle Analysis (3.0 cr)
or ESPM 5605 - Recycling: Extending Raw Materials Supplies (3.0 cr)
or Human Factors
DES 5185 - Human Factors in Design (3.0 cr)
or CSCI 5115 - User Interface Design, Implementation and Evaluation (3.0 cr)
or GDES 5341 - Interactive Design (3.0 cr)
or GDES 5386 - Fundamentals of Game Design (3.0 cr)
or KIN 5505 - Human-Centered Design - Principles and Applications (3.0 cr)
or HUMF 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
or Understanding the Consumer and the Market
PDES 5705 - History and Future of Product Design (3.0 cr)
or ANTH 5121 - Business Anthropology (2.0 cr)
or DES 8164 - Innovation Theory and Analysis (3.0 cr)
or MKTG 6055 - Buyer Behavior (4.0 cr)
or MKTG 6050 - Business Research Methods (2.0 cr)
Biochemistry, Molecular Biology and Biophysics M.S.

Graduate School

Twin Cities Campus

Biochemistry, Molecular Biology, & Biophysics TCBS

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics
6-155 Jackson Hall
321 Church St. SE
Minneapolis, MN 55455
612-625-6100
Email: bmbbgp@umn.edu
Website: http://cbs.umn.edu/academics/departments/bmbb/graduate-program/about-graduate-program

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biochemistry, Molecular Biology and Biophysics (BMBB) graduate program is an interdisciplinary program that is supported by the College of Biological Sciences (CBS) and the Medical School of the University of Minnesota. The program provides a broad research-based education involving faculty from BMBB, as well as many faculty members from several other departments in CBS, the Medical School, the College of Science and Engineering (CSE), the College of Food, Agricultural and Natural Resources Sciences (CFANS), and the College of Veterinary Medicine.

BMBB focuses on determining the molecular mechanisms that underlie basic biological functions using an integrated approach that encompasses biochemistry, chemistry, biophysics, genomics, molecular biology, proteomics, and structural biology. Special emphasis is placed on revealing how biological processes go awry in diseases including cancer, diabetes, heart disease, and AIDS. The program has four areas of emphasis: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, and chemical and structural biology. All students are expected to demonstrate a minimum level of competence in these areas, but will emphasize the area most related to their thesis project.

While graduate training in a BMBB laboratory involves first-year coursework and associated preliminary examinations, the focal point for graduate education is thesis research. Laboratory-based exploration coupled with journal clubs, seminars, scientific meetings and retreats, career counseling, and scientific ethics constitutes the major components of the program. Support for graduate education comes from a variety of sources but is augmented by several NIH and NSF-based training grants. Most graduate students from the University of Minnesota obtain full-time employment immediately after graduation or pursue advanced training in academic or corporate positions.

Students pursuing a degree in BMBB are only admitted to the PhD program (see note below) under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first-year program administered by BMBB and the Molecular, Cellular, Developmental Biology and Genetics (MCDB&G) graduate programs. After the first year, students select either BMBB or MCDB&G to complete their degree.

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the Master of Biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the Master in Microbial Engineering (http://bti.umn.edu/MicE/).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program can accommodate for a variety of educational backgrounds. However, applications from students with an undergraduate degree in the biological, chemical, or physical sciences are encouraged.
The program can accommodate for a variety of educational backgrounds. However, applications from students with an advanced degree in the biological, chemical, or physical sciences are encouraged.

Other requirements to be completed before admission:
Recommended academic preparation includes one year each of calculus, organic chemistry, and basic biology, including biochemistry and genetics. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study.

Successful applicants must have previous research experience in an academic or industrial setting, in addition to any course-related laboratory experiences. It is important to demonstrate familiarity, with an aptitude for basic science research prior to embarking on a graduate career in this program.

***Note: Students are admitted only to the PhD program for BMBB (see additional note below).

Special Application Requirements:
Additionally, applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required.

The deadline to submit a completed application is December 1. Completed files are reviewed between January and February. Graduate studies begin fall semester only.

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the Master of Biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the Master in Microbial Engineering (http://bti.umn.edu/MicE/).

Applicants must submit their test score(s) from the following:
• GRE

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Requirements for the Master's degree include core coursework, thesis credits, and laboratory experiences taken by all students as well as coursework in one of the four BMBB emphases: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, or chemical and structural biology. Additionally, all students are expected to participate in the seminars involving student reports on current literature and research. A thesis based on original laboratory research is required.

Biochemistry Core
Students must complete the biochemistry core coursework.
BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
BIOC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Laboratory and Field Course
In August of the first year, BMBB students must register for this hands-on, intensive lab course which takes place at the Itasca Biological Station and Laboratories. This course will provide first-year students with exposure to a range of modern methods and model systems.
MCDG 8920 - Special Topics (1.0 - 4.0 cr)

Electives for Emphases
All students must complete 12 credits of coursework in one of the four BMBB emphases: synthetic biology and biotechnology,
molecular biology, metabolic and systems biology, or chemical and structural biology. Courses from disciplines other than BMBB may be used to build an emphasis in consultation with the student's advisor.

Take 12 or more credit(s) from the following:

- **BIOC 5352** - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- **BIOC 5361** - Microbial Genomics and Bioinformatics (3.0 cr)
- **MICA 8002** - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- **GCD 8151** - Cell Structure and Function (3.0 cr)
- **MICA 8003** - Immunity and Immunopathology (4.0 cr)
- **MICA 8004** - Cellular and Cancer Biology (4.0 cr)
- **GCD 8008** - Mammalian Gene Transfer and Expression (2.0 cr)
- **PUBH 6450** - Biostatistics I (4.0 cr)
- **SCB 8181** - Stem Cell Biology (3.0 cr)
- **STAT 5021** - Statistical Analysis (4.0 cr)
- **MICA 8010** - Microbial Pathogenesis (3.0 cr)
- **BIOC 5216** - Current Topics in Signal Transduction (3.0 cr)
- **BIOC 5527** - Introduction to Modern Structural Biology (4.0 cr)
- **BIOC 5528** - Spectroscopy and Kinetics (4.0 cr)
- **CHEN 8754** - Systems Analysis of Biological Processes (3.0 cr)
- **BIOC 5213** - Selected Topics in Molecular Biology (3.0 cr)
- **BIOC 5444** - Muscle (3.0 cr)
- **BIOC 5531** - Macromolecular Crystallography I: Fundamentals and Techniques (1.0 cr)
- **BIOC 5532** - Macromolecular Crystallography II: Techniques and Applications (1.0 cr)
- **CHEM 8011** - Mechanisms of Chemical Reactions (4.0 cr)
- **CHEM 8021** - Computational Chemistry (4.0 cr)
- **CHEM 8411** - Introduction to Chemical Biology (4.0 cr)
- **CHEM 8412** - Chemical Biology of Enzymes (4.0 cr)
- **CHEM 8735** - Bioinorganic Chemistry (4.0 cr)
- **PHCL 5111** - Pharmacogenomics (3.0 cr)
- **PUBH 7445** - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- **MICA 8013** - Translational Cancer Research (2.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)
- **GRAD 8200** - Teaching and Learning Topics in Higher Education (1.0 cr)
- **BIOC 5309** - Biocatalysis and Biodegradation (3.0 cr)
- **BIOC 5351** - Protein Engineering (3.0 cr)
- **CSCI 5461** - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- **GRAD 5102** - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
Twin Cities Campus
Biochemistry, Molecular Biology and Biophysics Minor

Biochemistry, Molecular Biology, & Biophysics TCBS
Graduate School

Link to a list of faculty for this program.

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics
6-155 Jackson Hall
321 Church St. SE
Minneapolis, MN 55455
612-625-6100
Email: bmbbgp@umn.edu
Website: http://cbs.umn.edu/academics/departments/bmbb/graduate-program/about-graduate-program

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biochemistry, Molecular Biology and Biophysics (BMBB) program is an interdisciplinary program that is supported by the College of Biological Sciences (CBS) and the Medical School of the University of Minnesota. The program provides a broad research-based education involving faculty from BMBB as well as many faculty members from several other departments in CBS, the Medical School, the College of Science and Engineering (CSE), the College of Food, Agricultural and Natural Resources Sciences (CFANS), and the College of Veterinary Medicine.

BMBB focuses on determining the molecular mechanisms that underlie basic biological functions using an integrated approach that encompasses biochemistry, chemistry, biophysics, genomics, molecular biology, proteomics, and structural biology. Special emphasis is placed on revealing how biological processes go awry in diseases including cancer, diabetes, heart disease, and AIDS. The program has four areas of emphasis: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, and chemical and structural biology. All students are expected to demonstrate a minimum level of competence in these areas, but will emphasize the area most related to their thesis project.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires 6 credits of general graduate level coursework, which may be selected (with approval by the director of graduate studies) from the 5xxx and 8xxx courses offered by the program.

A doctoral minor requires BIOC 8001 (3 cr) and BIOC 8002 (3 cr), plus additional BIOC 5xxx-level and above courses (6 cr) approved by the director of graduate studies, to meet the minimum requirement of 12 credits total.

In extenuating cases, students may petition the director of graduate studies for substitution of a required course.
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
Required Courses
- BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)

Biochemistry Elective Courses
In addition to the 6 required credits, a doctoral minor requires 6 credits of graduate-level BMBB coursework, chosen in consultation with the BMBB director of graduate studies.
- BIOC 5xxx
- BIOC 6xxx
- BIOC 7xxx
- BIOC 8xxx

Masters
Required Courses
A master's minor requires 6 credits of graduate-level BMBB coursework, chosen in consultation with the BMBB director of graduate studies.
- BIOC 5xxx
- BIOC 8xxx
Twin Cities Campus
Biochemistry, Molecular Biology and Biophysics Ph.D.

Graduate School

Link to a list of faculty for this program.

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics
6-155 Jackson Hall
321 Church St. SE
Minneapolis, MN 55455
612-625-6100
Email: bmbbgp@umn.edu
Website: http://cbs.umn.edu/academics/departments/bmbb/graduate-program/about-graduate-program

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biochemistry, Molecular Biology and Biophysics (BMBB) graduate program is an interdisciplinary program that is supported by the College of Biological Sciences (CBS) and the Medical School of the University of Minnesota. The program provides a broad research-based education involving faculty from BMBB as well as many faculty members from several other departments in CBS, the Medical School, the College of Science and Engineering (CSE), the College of Food, Agricultural and Natural Resources Sciences (CFANS), and the College of Veterinary Medicine.

BMBB focuses on determining the molecular mechanisms that underlie basic biological functions using an integrated approach that encompasses biochemistry, chemistry, biophysics, genomics, molecular biology, proteomics, and structural biology. Special emphasis is placed on revealing how biological processes go awry in diseases including cancer, diabetes, heart disease, and AIDS. The program has four areas of emphasis: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, and chemical and structural biology. All students are expected to demonstrate a minimum level of competence in these areas but will emphasize the area most related to their thesis project.

While graduate training in a BMBB laboratory involves first-year coursework and associated preliminary examinations, the focal point for graduate education is thesis research. Laboratory-based exploration coupled with journal clubs, seminars, scientific meetings and retreats, career counseling and scientific ethics constitutes the major components of the program. Support for graduate education comes from a variety of sources but is augmented by several NIH and NSF-based training grants. PhD graduates from the University of Minnesota obtain full-time employment immediately after graduation or pursue advanced training in academic or corporate postdoctoral positions.

Students pursuing the PhD are admitted to BMBB under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first year program administered by BMBB and the Molecular, Cellular, Developmental Biology and Genetics (MCDB&G) graduate programs. After the first year, students select either BMBB or MCDB&G to complete their degree.

Related Ph.D. and M.S. Programs in BMBB:

As a part of the BMBB program, graduate studies leading to a PhD degree may be pursued on the Duluth Campus. A PhD in BMBB may also be obtained through the Combined MD-PhD Program. Please visit the program website for more information (http://www.med.umn.edu/mdphd/index.htm).

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the Master of Biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the Master in Microbial Engineering (http://bti.umn.edu/MicE/).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
Prerequisites for Admission
The program can accommodate for a variety of educational backgrounds. However, applications from students with an undergraduate degree in the biological, chemical, or physical sciences are encouraged.

The program can accommodate for a variety of educational backgrounds. However, applications from students with an advanced degree in the biological, chemical, or physical sciences are encouraged.

Other requirements to be completed before admission:
Recommended academic preparation includes one year each of calculus, organic chemistry, and basic biology, including biochemistry and genetics. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study.

Successful applicants must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate an aptitude for basic science research prior to embarking on a graduate career in this program.

Special Application Requirements:
Additionally, applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required.

The deadline to submit a completed application is December 1. Completed files are reviewed between January and February. Graduate studies begin fall semester only.

Related Ph.D. and M.S. Programs in BMBB:
As a part of the BMBB program, graduate studies leading to a PhD degree may be pursued on the Duluth Campus. A PhD in BMBB may also be obtained through the Combined MD-PhD Program. Please visit the program website for more information (http://www.med.umn.edu/mdphd/index.htm).

Note: One cannot apply for admission to the master's degree in BMBB. Students are only admitted to the BMBB PhD program. Alternative, related master's degree programs that admit students are the Master of Biological Sciences (MBS) (http://cce.umn.edu/master-of-biological-sciences) and the Master in Microbial Engineering (http://bti.umn.edu/MicE/).

Applicants must submit their test score(s) from the following:
• GRE

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Requirements for the doctoral degree include core coursework, thesis credits, and laboratory experiences taken by all students, as well as coursework in one of the four BMBB emphases listed below. To obtain a PhD degree, students must register for a minimum of 24 thesis credits (BIOC 8888). Upon completion of the 24 thesis-credit requirement, students are required to register every fall and spring, up through the term they are awarded the PhD, for 1 credit of advanced doctoral credits (BIOC 8444) in order to maintain full-time, active student status.

Additional requirements for the PhD degree include seminar presentations, examinations, and teaching assignments. BIOC 8084 is a
weekly student seminar on current literature and research, and students must register for 1 credit of BIOC 8084 each term until they have reached advanced doctoral status. Students must attend at least 50% of weekly meetings for BIOC 8084 and BIOC 8184, which is a departmental seminar involving prominent national and international scientists. Three examinations for the PhD degree include a written preliminary proposal (4th semester), preliminary oral exam (4th semester), and a final oral exam with thesis defense (typically year 5). Examinations will be conducted by the student's preliminary and graduate committees. Students are also required to complete two semesters of teaching, typically between years 2 to 4.

Biochemistry Core
To obtain a PhD in BMBB, all students must complete the biochemistry core coursework.
- BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
- BIOC 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Laboratory and Field Course
In August of the first year, all PhD BMBB students must register for this hands-on, intensive lab course which takes place at the Itasca Biological Station and Laboratories. This course will provide first-year students with exposure to a range of modern methods and model systems.
- MCDG 8920 - Special Topics (1.0 - 4.0 cr)

Electives for Emphases
All students must complete 15 credits of coursework in one of the four BMBB emphases: synthetic biology and biotechnology, molecular biology, metabolic and systems biology, or chemical and structural biology. Courses from disciplines other than BMBB may be used to build an emphasis in consultation with the student's advisor.
Take 15 or more credit(s) from the following:
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- GCD 8151 - Cell Structure and Function (3.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- MICA 8010 - Microbial Pathogenesis (3.0 cr)
- BIOC 5216 - Current Topics in Signal Transduction (3.0 cr)
- BIOC 5527 - Introduction to Modern Structural Biology (4.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
- BIOC 5213 - Selected Topics in Molecular Biology (3.0 cr)
- BIOC 5444 - Muscle (3.0 cr)
- BIOC 5531 - Macromolecular Crystallography I: Fundamentals and Techniques (1.0 cr)
- BIOC 5532 - Macromolecular Crystallography II: Techniques and Applications (1.0 cr)
- CHEM 8011 - Mechanisms of Chemical Reactions (4.0 cr)
- CHEM 8021 - Computational Chemistry (4.0 cr)
- CHEM 8411 - Introduction to Chemical Biology (4.0 cr)
- CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
- CHEM 8735 - Bioinorganic Chemistry (4.0 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- MICA 8013 - Translational Cancer Research (2.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
- BIOC 5351 - Protein Engineering (3.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
**Twin Cities Campus**

**Bioethics M.A.**  
*Bioethics, Center for Graduate School*

Link to a [list of faculty](http://www.bioethics.umn.edu/education/master-arts-bioethics) for this program.

**Contact Information:**
Center for Bioethics, University of Minnesota, Suite N504 Boynton, 410 Church Street SE, Minneapolis, MN 55455 (612-624-9440; fax: 612-624-9108)  
Email: bthxed@umn.edu  
Website: [http://www.bioethics.umn.edu/education/master-arts-bioethics](http://www.bioethics.umn.edu/education/master-arts-bioethics)

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 30  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](http://www.bioethics.umn.edu/education/master-arts-bioethics) section of the catalog website for requirements that apply to all major fields.

The Center for Bioethics offers two kinds of MA degrees: Plan A and Plan B with a major in bioethics. The curriculum for both Plan A and Plan B degrees includes a set of required core courses, bioethics electives, and a requirement for coursework in fields related to bioethics. The Plan A culminates in a substantial, 10-credit master's thesis. In lieu of a thesis, the Plan B culminates in a 4-credit practicum, a 3-credit capstone project and final exam. Electives comprise the additional 3 credits in the Plan B degree.

Graduates of the MA in bioethics greatly enhance their professional opportunities in the field when they combine their bioethics degree with a terminal graduate or professional degree in another field. Examples of degree combinations can include an MA degree in bioethics with a JD, PhD, MD, nursing, or others. This model of pairing the MA in bioethics with another degree prompts students to acquire a firm disciplinary grounding as well as interdisciplinary bioethics expertise, a practice which best prepares students for the interdisciplinary career options related to bioethics. Some examples of careers include work in the fields of genetics, social work, public health, veterinary science, religious studies, psychology, biology and philosophy.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree is required for admission.

**Special Application Requirements:**

Transcripts of all postsecondary academic work, a personal statement, a writing sample (preferably on a topic in bioethics), a description of research or relevant work experience, a C.V. or résumé, and at least three letters of reference are required. Applicants may also submit a statement on "Extenuating Circumstances" and "Diversity." See program website for more details.

Students are admitted to the Bioethics M.A. program for fall semester only. Applications are accepted as early as the first day of fall semester prior to the proposed start of the student's M.A. program. Our primary deadline is March 1 with an extended deadline of May 1 if space in our program remains available.

Students are encouraged to link their degree in bioethics to a degree in a related field (either before entering the bioethics M.A. program or at the same time). Given the fundamentally interdisciplinary nature of bioethics, prospective students are advised against viewing the bioethics M.A. as a stand-alone degree that prepares them for career placement. This model prompts students to acquire a firm disciplinary grounding as well as interdisciplinary bioethics expertise—a practice that best prepares students for bioethics-related career placement. Thus, the admissions process will give preference to students who have already earned or are in the process of earning an advanced degree in a related field, although this will not strictly be required for admission.

Because our program recommends pairing the Bioethics degree with another graduate or professional degree, we recognize applicants may need to answer to another program prior to our deadline. If this is the case, please email bthxed@umn.edu with your concern.
Applicants must submit their test score(s) from the following:

- GRE
- MCAT
- LSAT

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (GRE, MCAT, LSAT, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 21 major credits and 9 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** Students will design and undertake a project and its corollary product relevant to their interests, experience, and intended use of the MA in bioethics. The experiential component is designed to be flexible, allowing the student to undertake an internship, shadow physicians or other health care personnel, or use their own work experience when relevant to cater a project to their intended goals. Rigor is maintained through committee oversight, nature of the experience, and number of hours undertaken.

Products are also designed to be flexible while retaining rigor, innovation, and written analysis. Original research is not required (as with a thesis), but a thorough literature review and accompanying overview or synthesis of the arena of which the project is a part is necessary, as is a thorough explanation of the final product. Full committee approval of the final product before the project is undertaken is required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Joint- or Dual-degree Coursework:** Joint Degree Program in Law, Health, and the Life Sciences Student may take a total of 11 credits in common among the academic programs.
Twin Cities Campus
Bioethics Minor
Bioethics, Center for
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Bioethics, University of Minnesota, Suite N504 Boyton, 410 Church Street S.E., Minneapolis, MN 55455 (612-624-9440; fax: 612-624-9108)
Email: bthxed@umn.edu
Website: http://www.bioethics.umn.edu/education/graduate-minor-bioethics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor is administered by the Center for Bioethics and is designed for University of Minnesota students interested in deepening their knowledge of the ethical issues surrounding health and the life sciences. Explore your interests in bioethics while also earning a degree in your home discipline.

The minor is open to students in many of the University's masters or doctoral degree programs. Some professional degree-seeking students also may elect a minor, including MEd, MPH, MHA, MN, DNP, MOT, MPSE, MDH, MDT, and MPS students. To be eligible, the degree program must offer the option to pursue a minor; please consult with your Director of Graduate Studies in your major field to determine if this option is open for you. At this time, students in first-professional programs (JD, MD, PharmD, DVM, DDS, and LLM) are not eligible for minors.

Enrollment is contingent upon approval by the Director of Graduate Studies in Bioethics. Students work with the Director of Graduate Studies to tailor their minor program to their individual needs and interests.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A doctoral student must complete a minimum of 14 graduate credits in bioethics offered outside the major field: 8 credits of required courses and 6 credits of electives. A master's student must complete a minimum of 8 graduate credits in bioethics offered outside the major field: 6 credits of required courses and 2 credits of electives. All students must take BTHX 5010 - Bioethics Proseminar and one moral theory course, preferably BTHX 5300 - Foundations of Bioethics. Courses should be chosen in consultation with the bioethics director of graduate studies. Courses that satisfy requirements and serve as electives can be found at http://www.ahc.umn.edu/bioethics/education/graduate/home.html.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.
Masters

Doctoral
**Twin Cities Campus**

**Biomedical Informatics and Computational Biology M.S.**
*R Bioscience/Biotechnology*

**Graduate School**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: [http://www.r.umn.edu/academics-research/bicb](http://www.r.umn.edu/academics-research/bicb)

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Those interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

The M.S. is offered under two plans: Plan A (with thesis), and Plan B (with project). Plan A is considered suitable for students planning to pursue careers that require a limited research experience or those planning to continue their education in a Ph.D. program. It is also suitable for students with full-time employment whose thesis can be related to their work assignments. Plan B is suitable for students planning to work in settings where technical knowledge is more germane than research experience.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

Other requirements to be completed before admission:

The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences. The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

In addition to completing the online application form, applicants must submit a personal statement, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in biomedical informatics and computational biology. Applicants should also indicate the names of the BICB graduate faculty whose interests overlap their own. Although there is no page limit for the personal statement, 2-3 pages are recommended.

**Special Application Requirements:**
Applications for the M.S. program are accepted throughout the year for either fall or spring.

GRE scores may be waived for students with significant work or academic experience.
Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and up to null credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under two plans: Plan A (with thesis), and Plan B (with project).

Plan A is considered suitable for students planning to pursue careers that require a limited research experience or those planning to continue their education in a Ph.D. program. Plan A students defend their thesis in public and must pass an oral examination. Plan A is suitable for students with full-time employment whose thesis can be related to their work assignments.

Plan B is suitable for students planning to work in settings where technical knowledge is more germane than research experience.

The requirements include 20 course credits for Plan A and 30 course credits for Plan B.

Up to 6 credits outside the major may be taken but are not required.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Biomedical Informatics and Computational Biology Minor
R Bioscience/Biotechnology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Minor programs are arranged on an individual basis.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Master's Minor: A minimum of 9 credits must be completed in Core Area 1 and one of Core Areas 2-5.

Doctoral Minor: A minimum of 12 credits must be completed in Core Area 1 and two of Core Areas 2-5.

Graduate students choose from a list of courses that satisfy requirements in core areas and electives.

There are five core areas:
1. Biochemistry, molecular and cell biology
2. Database, data mining, and computing

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Information current as of December 20, 2016
3. Informatics, analysis, and machine learning
4. Mathematics, biostatistics, and statistics
5. Computational and systems biology

Students choose elective courses from the following eight areas:
1. Biochemistry, molecular and cell biology
2. Informatics, database, data mining, and computing
3. Mathematics, biostatistics, and statistics
4. Chemistry, chemical engineering, and physics
5. Biophysics and structural biology
6. Imaging, information theory, and signal processing
7. Computational chemistry, medicinal chemistry, and drug design
8. Clinical and translational sciences

Core/elective courses are listed on the courses page of the BICB Student Handbook (http://r.umn.edu/academics-research/bicb/graduate-program/student-handbook/courses). The adviser(s), together with the DGS, will ensure that the student selects appropriate courses.
Twin Cities Campus

Biomedical Informatics and Computational Biology Ph.D.

Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 60
• This program requires summer semesters for timely completion.
• The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. The Ph.D. program includes an industrial or clinical internship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences. The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

In addition to completing the online application form, applicants must submit a personal statement, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in biomedical informatics and computational biology. Prospective students should also indicate the names of the BICB graduate faculty whose interests overlap with their own. The department strongly encourages applicants to contact these faculty members before applying. Although there is no page limit for the personal statement, 2-3 pages are recommended.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are admitted only for the fall semester.

GRE scores may be waived for students with significant work or academic experience.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

30 credits are required in the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Ph.D. students take preliminary written exams at the end of the second year of study, which focuses on the development of a research proposal. An oral preliminary exam focuses on the plan for thesis research and the student's coursework and is taken by the fall of the third year of full-time registration or its equivalent. At least 24 course credits are required to gain competency in both biology and quantitative areas related to biomedical informatics and computational biology. An internship is required, which may be waived for students with equivalent experience. Additionally, 24 thesis credits are required. Ph.D. students defend their thesis in public and must pass an oral examination.

An internship is required, which may be waived for students with equivalent experience.

Up to 9 credits outside the major may be taken but are not required.

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus

Biophysical Sciences and Medical Physics M.S.

Radiology

Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota School of Medicine, Department of Radiology, Box 292 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-0131; fax: 612-626-1951)
Email: riten001@tc.umn.edu
Website: http://www.med.umn.edu/radiology/research/physics/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program includes faculty members who have primary appointments in fields such as radiobiology, physics, engineering, computer science, physiology, dentistry, genetics, and biochemistry. Students concentrate in research areas such as molecular biophysics, medical imaging, magnetic resonance imaging and spectroscopy, radiobiology, radiation therapy physics, and mathematical biophysics and computation. A limited number of students prepare for employment as hospital-based medical physicists through a program that includes opportunities for coursework, laboratory work, and directed study to provide experience in areas such as purchase specification, acceptance testing, quality assurance, and radiation safety.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are considered for admission in both semesters.

Applicants must submit their test score(s) from the following:
- GRE

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

The M.S. is offered under two plans: Plan A, (with thesis), and Plan B, (with project). Plan A is considered suitable for students with full-time employment whose thesis can be related to their work assignments. Plan B is more suitable for students planning to work in government or hospital settings where technical knowledge is more germane than research experience. Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam. A total of 30 credits is required, including 14 in the major and 6 in a related field or minor.
Twin Cities Campus
Biophysical Sciences and Medical Physics Minor
Radiology
Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota School of Medicine, Department of Radiology, Box 292 UMHC, 420 Delaware Street S.E., Minneapolis, Minnesota 55455 (612-626-0131; fax: 612-626-1951)
Email: riten001@tc.umn.edu
Website: http://www.med.umn.edu/radiology/research/physics/home.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program includes faculty members who have primary appointments in fields such as radiobiology, physics, engineering, computer science, physiology, dentistry, genetics, and biochemistry. Students concentrate in research areas such as molecular biophysics, medical imaging, magnetic resonance imaging and spectroscopy, radiobiology, radiation therapy physics, and mathematical biophysics and computation. A limited number of students prepare for employment as hospital-based medical physicists through a program that includes opportunities for coursework, laboratory work, and directed study to provide experience in areas such as purchase specification, acceptance testing, quality assurance, and radiation safety.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Programs are arranged on an individual basis and must consist of courses that represent a subfield of the discipline, e.g., radiobiology or medical physics.
Twin Cities Campus

Biophysical Sciences and Medical Physics Ph.D.

Radiology

Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota School of Medicine, Department of Radiology, Box 292 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-0131; fax: 612-626-1951)
Email: riten001@tc.umn.edu
Website: http://www.med.umn.edu/radiology/research/physics/home.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program includes faculty members who have primary appointments in fields such as radiobiology, physics, engineering, computer science, physiology, dentistry, genetics, and biochemistry. Students concentrate in research areas such as molecular biophysics, medical imaging, magnetic resonance imaging and spectroscopy, radiobiology, radiation therapy physics, and mathematical biophysics and computation. A limited number of students prepare for employment as hospital-based medical physicists through a program that includes opportunities for coursework, laboratory work, and directed study to provide experience in areas such as purchase specification, acceptance testing, quality assurance, and radiation safety.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are considered for admission in both semesters.

Applicants must submit their test score(s) from the following:
- GRE

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Ph.D. students take preliminary written exams at the end of the first year of study or as soon as possible after completing the core course sequence in topics in physics for medicine and biology. An oral preliminary exam focuses on the plan for thesis research and the student's grasp of related information and is taken by the fall of the third year of full-time registration or its equivalent. At least 12 credits are required in a minor or supporting program. Additionally, 24 thesis credits are required.
Clinical Ethics Postbaccalaureate Certificate

Bioethics, Center for Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Bioethics
N504 Boynton
410 Church St SE
Minneapolis, MN 55455
Email: bthxed@umn.edu
Website: http://www.bioethics.umn.edu/education/clinical-ethics-certificate-program

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Clinical Ethics PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Clinical Ethics post-baccalaureate certificate will offer a graduate level educational opportunity for practicing professionals including physicians, nurses, social workers, chaplains, and others. Students will engage in classwork and practical experience geared toward mastery of the knowledge and skills needed for work in clinical ethics, including participation on ethics committees, clinical ethics consultation services, institutional and regional clinical ethics policy bodies such as organ allocation committees or brain death committees, support for institutional staff development programs in their professional fields, or simply being better prepared to meet the ethical challenges that arise in their work. The curriculum will fulfill the health care ethics core competencies promulgated by the American Society for Bioethics and Humanities.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A graduate or professional degree in a field related to clinical ethics is required for admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Courses
NB: BTHX 8500 will be taken twice, 2 cr each time, once fall once spring.

BTHX 5100 - Introduction to Clinical Ethics (3.0 cr)
BTHX 5110 Ethical Issues in Pediatrics (2.0 cr)
BTHX 5120 Dying in Contemporary Medical Culture (2.0 cr)
BTHX 8100 Advanced Theory and Practice of Clinical Ethics (2.0 cr)
BTHX 8500 - Practicum in Bioethics (1.0 - 4.0 cr)
Twin Cities Campus
Health Care Design and Innovation Postbaccalaureate Certificate
School of Nursing
Graduate School

Link to a list of faculty for this program.

Contact Information:
Densford International Center for Nursing Leadership, University of Minnesota School of Nursing, 4-185 Weaver-Densford Hall, 308 Harvard St SE, Minneapolis, MN 55455 (612-625-1187; fax: 612-624-0908)
Email: nursecerts@umn.edu
Website: http://www.hcdi.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Health Care Design & Innovation PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in health care design and innovation prepares health care and design practitioners to create optimal healing environments. Students learn how to apply design thinking in creating new processes, systems, and care environments. The certificate emphasizes principles that promote healing and safe patient care while maximizing clinical and financial outcomes.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the certificate program requires a baccalaureate degree from an accredited institution in a health-related field, interior design, architecture, or other design-related area.

Other requirements to be completed before admission:
Applicants are required to submit transcripts from all institutions where postsecondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, one essay, a current curriculum vitae/resume, and English language proficiency scores (if applicable). This certificate has two application deadlines: November 1 for spring admission and July 1 for fall admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.
Required Courses
CSPH 5711 - Optimal Healing Environments (3.0 cr)
NURS 7610 - System Leadership and Innovation (3.0 cr)
HUMF 5874 - Service Design: Designing complex systems to improve service delivery (4.0 cr)
NURS 6707 - Health Care Design and Innovation Practicum (2.0 cr)
Twin Cities Campus
Health Informatics M.H.I.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 505 Essex St. SE, 330 Diehl Hall, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ihi@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Health Informatics

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants are expected to have at least a bachelor of science or equivalent degree from a regionally accredited institution of higher education or an international equivalent.

Required prerequisites
Health or Biological Sciences
6-semester credits or 9 quarter-credits of health or biological coursework at the undergraduate or graduate level.
or Department Consent

Programming Language
Documented work or educational experience working with a programming language such as C, C++, Java, Visual Basic, PASCAL, etc.
or HINF 5502 - Programming Essentials Python 3 (1.0 cr)
or Department Consent

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 152
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79

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Information current as of December 20, 2016
The preferred English language test is Test of English as Foreign Language (TOEFL). Key to test abbreviations: (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 18 to 24 major credits and 7 to 13 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone project is a 3-credit course in which students will have a final opportunity to apply their newly acquired knowledge and skills to a project involving a practical problem in health informatics. Students will learn how to design these projects properly, reviewing past exemplary projects as guides. Then, with the help of their advisors and the capstone course director, students will design and carry out their own projects which can take a variety of forms, including: developing design and evaluation specifications for software to address a specific healthcare need; working on, observing, analyzing, and reporting the actions of a team involved in implementing a new information system; or observing and measuring the impact of such a system in a healthcare setting. Students will submit a written project report in lieu of a final examination. The capstone project instructor and the student's advisor will grade the report.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

HINF Courses

Students must take HINF 5436 AHC Informatics Grand Rounds twice for a total of 2 credits.

- HINF 5430 - Health Informatics I (3.0 cr)
- HINF 5431 - Health Informatics II (3.0 cr)
- HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5520 - Clinical Informatics and Patient Safety (2.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (2.0 cr)

Other Required Courses

- NURS 5116 - Consumer Health Informatics (1.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)

Electives

Graduate-level electives of your choice to complete the total 31 credits; see student handbook for a list of recommended electives.

Final Project

- MHI students should take HINF 5499.
- MD/MHI students should take LAMP 7195 for 3 credits.

- HINF 5499 - Capstone Project for the Masters of Health Informatics (3.0 cr)
- or LAMP 7195 - Medical Informatics (3.0 - 6.0 cr)

Joint- or Dual-degree Coursework: MD/MHI program students may take a total of 3 credits in common among the academic programs.
Twin Cities Campus
Health Informatics M.S.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 505 Essex St. SE, 330 Diehl Hall, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ihi@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

The MS is a 36 credit degree that may be completed in as little as two years or up to five years. It is intended for students who are interested in research, but who do not have the background or are not ready to commit to the PhD program.

There are two kinds of MS degrees: MS Plan A and MS Plan B. The Plan A culminates in a substantial, 10-credit master's thesis. The Plan B culminates in a smaller, 4-credit, Plan B project. Electives comprise the additional six credits in the Plan B degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.30.

Applicants are expected to have at least a bachelor of science or equivalent degree from a regionally accredited institution of higher education.

Required prerequisites
Health or Biological Sciences
6-semester credits or 9 quarter-credits of health or biological coursework at the undergraduate or graduate level.

or Department Consent

Programming Language
Documented work or educational experience working with a programming language such as C, C++, Java, Visual Basic, PASCAL, etc.

or HINF 5502 - Programming Essentials Python 3 (1.0 cr)

or Department Consent

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 152
  - General Test - Quantitative Reasoning: 159
  - General Test - Analytical Writing: 4
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 15 to 19 major credits, 7 to 11 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 19 to 31 major credits and 7 to 17 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required HINF Courses**

N.B. All students must take AHC Informatics Grand Rounds (HINF 5436) twice for a total of two credits.

- HINF 5430 - Health Informatics I (3.0 cr)
- HINF 5431 - Health Informatics II (3.0 cr)
- HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
- HINF 5520 - Clinical Informatics and Patient Safety (2.0 cr)
- HINF 5531 - Health Data Analytics and Data Science (2.0 cr)

**Other Required Courses**

- NURS 5116 - Consumer Health Informatics (1.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)

**Final Project/Thesis**

- Plan A students will take 10 credits of 8777 and Plan B students will take 4 credits of 8770.
- HINF 8770 - Plan B Project (4.0 cr)
  - or HINF 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Electives**

Graduate-level electives of your choice; see student handbook for a list of recommended electives. Plan A students will need 4 credits of electives, and Plan B students will need 10 credits of electives.
Twin Cities Campus
Health Informatics Minor
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 505 Essex St. SE, 330 Diehl Hall, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ih@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. The minor provides an opportunity for the student to supplement their primary training with additional knowledge and skills in health informatics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Applicants are required to have taken 6 semester credits or 9 quarter credits in medical, life, or biological sciences from a recognized institution of higher learning. This a broadly defined requirement and most courses with a health or biology emphasis will be accepted including biostatistics, health services research, and public health, as well as the more traditional biology or life science courses.

Special Application Requirements:
Applicants must be earning a graduate-level degree from the University of Minnesota.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Master’s minor
HINF 5430 - Health Informatics I (3.0 cr)
HINF 5431 - Health Informatics II (3.0 cr)

Doctoral

Doctoral minor

HINF 5430 - Health Informatics I (3.0 cr)
HINF 5431 - Health Informatics II (3.0 cr)
6 HINF elective credits
Twin Cities Campus
Health Informatics Ph.D.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Physical Address: 505 Essex St. SE, 330 Diehl Hall, Minneapolis, MN 55455
Mailing Address: MMC 912, 420 Delaware St. SE, Minneapolis, MN 55455
Email: ihit@umn.edu
Website: http://healthinformatics.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have at least a master's degree or equivalent in a science, technology, engineering, or math field (or another field related to informatics) from a regionally accredited university.

Required prerequisites
Health or Biological Sciences
6-semester credits or 9 quarter-credits of health or biological coursework at the undergraduate or graduate level.

or Department Consent

Programming Language
Documented work or educational experience working with a programming language such as C, C++, Java, Visual Basic, PASCAL, etc.

or HINF 5502 - Programming Essentials Python 3 (1.0 cr)

or Department Consent

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 152
  - General Test - Quantitative Reasoning: 159
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
20 to 35 credits are required in the major.
11 to 26 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required HINF Courses
Students must take HINF 5436 AHC Informatics Grand Rounds twice for a total of 2 credits.
HINF 5430 - Health Informatics I (3.0 cr)
HINF 5431 - Health Informatics II (3.0 cr)
HINF 5436 - AHC Informatics Grand Rounds (1.0 cr)
HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
HINF 5520 - Clinical Informatics and Patient Safety (2.0 cr)
HINF 5531 - Health Data Analytics and Data Science (2.0 cr)
HINF 8525 - Health Informatics Teaching (2.0 cr)
HINF 8535 - Advanced Health Informatics Research Methods (3.0 cr)
HINF 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Other Required Courses
NURS 5116 - Consumer Health Informatics (1.0 cr)
NURS 7108 - Population Health Informatics (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

Electives
Graduate-level electives of your choice to equal 70 credits; see student handbook for a list of recommended electives.
Twin Cities Campus
Health Journalism and Communication M.A.
School of Journalism & Mass Communication
Graduate School

Link to a list of faculty for this program.

Contact Information:
Health Journalism and Communication M.A. Program, School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis MN 55455 (612-626-1851; fax 612-625-9525)
Email: dans@umn.edu
Website: http://sjmc.umn.edu/grad/hjComm.html#degree

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program has been temporarily suspended. Applications are not being accepted at this time. Please contact Graduate Student Services at sjmcgrad@umn.edu with questions.

A joint program of the School of Journalism and Mass Communication and the School of Public Health, the professional master's in health journalism and communication promotes improved public communication about health matters by combining knowledge, skills, and experience from both disciplines. The program is designed for journalists and health professionals, who earn a master's degree in health journalism. Journalists and communications professionals learn the fundamentals of medical research and public health. Health professionals learn basic journalistic principles and ethics, and how to develop meaningful health stories. Those pursuing other master's degrees, (e.g., master's in public health), earn the M.A. in health journalism and communication in addition to the other degree.

The Health Journalism and Communication program has two distinct, but overlapping, programs of study. Students in the health journalism emphasis will gain advanced knowledge about public health and the evaluation of claims from health, medical, and scientific sources, as well as advanced training on reporting health stories for different media. Students in the health communication emphasis will learn the fundamentals of writing about health topics for different audiences in different formats, as well as health campaign development and evaluation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applications to this master's program are not currently being accepted. Please contact sjmcgrad@umn.edu with questions.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

**Plan B:** Plan B requires 25 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Contact the program for capstone project information.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The M.A. in health journalism and communication requires a minimum of 33 semester credits, to be completed over a two-year schedule. The program has two distinct areas of emphasis: health journalism and health communication. Students in the health journalism emphasis area learn to evaluate claims from health, medical, and scientific sources and to tell health-oriented stories in broadcast or magazine journalism. Students in the health communication emphasis learn the fundamentals of writing about health topics for different audiences, as well as health campaign development and evaluation.
Twin Cities Campus
Health Journalism and Communication Minor
School of Journalism & Mass Communication
Graduate School

Link to a list of faculty for this program.

Contact Information:
Health Journalism and Communication M.A. Program, School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis MN 55455 (612-626-1851; fax 612-625-9525)
Email: dans@umn.edu
Website: http://sjmc.umn.edu/grad/hjComm.html#degree

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program has been temporarily suspended. Applications are not being accepted at this time. Please contact the School of Journalism's Graduate Student Services office at sjmcgrad@umn.edu with questions.

A joint program of the School of Journalism and Mass Communication and the School of Public Health, the professional master's in health journalism and communication promotes improved public communication about health matters by combining knowledge, skills, and experience from both disciplines. The program is designed for journalists and health professionals, who earn a master's degree in health journalism. Journalists and communications professionals learn the fundamentals of medical research and public health. Health professionals learn basic journalistic principles and ethics, and how to develop meaningful health stories. Those pursuing other master's degrees, (e.g., master's in public health), earn the M.A. in health journalism and communication in addition to the other degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires 6 credits. The doctoral minor requires 12 credits.
Twin Cities Campus

History of Science, Technology, and Medicine M.A.

Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 154 Shepherd Labs, 100 Union Street S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-301-1442)
Email: hstm@umn.edu
Website: http://www.hstm.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30 to 31
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must have a bachelor's degree with a preferred grade average of B or better and must be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

Although it is not strictly required for admission, it's strongly recommended that applicants submit a GRE score.

Special Application Requirements:
All application materials are submitted online to the University. Check the HSTM website (www.hstm.umn.edu) for more information. Applications are accepted for fall admission only. The application deadline is December 1.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in one foreign language.

A minimum GPA of 3.30 is required for students to remain in good standing.

The M.A. is offered under Plan A and Plan B. Following the guidelines in the Graduate Student Handbook for the program (www.hstm.umn.edu), M.A. students select one of two tracks, the history of science and technology or the history of medicine, and, within the chosen track, select courses subject to distribution requirements in terms of area and period. All of the courses selected for the requirements must be passed with a grade of B or better.

Plan A requires 31 credits consisting of 6 credits in the required courses HSCI/HMED 8112 and 8113, 9 additional credits in HSCI or HMED, 6 credits in an outside field or in a minor, and 10 thesis credits.

Plan B requires 30 credits consisting of 6 credits in the required courses HSCI/HMED 8112 and 8113, 15 additional credits in HSCI or HMED, 3 credits in a directed study course, and 6 credits in an outside field or in a minor.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**History of Medicine**

**Plan A**

**Required Courses**
Take the two-semester sequence of historiography and research preparation, plus an additional 9 credits in HMED chosen in consultation with adviser.
- HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
- HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

**Outside Field Coursework**
In consultation with adviser and the DGS, take 6 credits in courses from either the track alternative to the one in which you are enrolled, in outside fields, or in a minor.

**Thesis Credits**
- Take 10 thesis credits
- HMED 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B**

**Required Courses**
Take the two-semester sequence of historiography and research preparation, plus an additional 15 credits in HMED chosen in consultation with adviser.
- HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
- HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

**Outside Field Coursework**
In consultation with adviser and the DGS, take 6 credits in courses from either the track alternative to the one in which you are enrolled, in outside fields, or in a minor.

**Directed Study**
- Take 3 credits in a directed study course.
- HMED 8631 - Directed Study (1.0 - 6.0 cr)
- HMED 8632 - Directed Study (1.0 - 6.0 cr)

**History of Science and Technology**

**Plan A**

**Required Courses**
Take the two-semester sequence of historiography and research preparation, plus an additional 9 credits in HSCI chosen in
consultation with adviser.
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HSCI 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

Outside Field Coursework
In consultation with adviser and the DGS, take 6 credits in courses from either the track alternative to the one in which you are enrolled, in outside fields, or in a minor.

Thesis Credits
Take 10 thesis credits
HSCI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B

Required Courses
Take the two-semester sequence of historiography and research preparation, plus an additional 15 credits in HSCI chosen in consultation with adviser.
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HSCI 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

Outside Field Coursework
In consultation with adviser and the DGS, take 6 credits in courses from either the track alternative to the one in which you are enrolled, in outside fields, or in a minor.

Directed Study
Take 3 credits in a directed study course.
HSCI 8993 - Directed Studies (1.0 - 5.0 cr)
HSCI 8994 - Directed Research (1.0 - 5.0 cr)
Twin Cities Campus
History of Science, Technology, and Medicine Minor
History of Science & Technology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 154 Shepherd Labs, 100 Union Street SE, Minneapolis, MN 55455 (612-624-7069; fax: 612-301-1442)
Email: hstm@umn.edu
Website: http://www.hstm.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Students must have a bachelor's degree with a preferred grade average of B or better and must be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students who wish to take the graduate minor in the history of science, technology, and medicine are required to take 6 credits for the master's minor and 12 credits for a doctoral minor. The historiography course (HSCI or HMED 8112) is strongly recommended, along with other courses that are selected to define a course of study that should have some identifiable focus but also a certain breadth. Students should not plan to take all courses in the minor from the same faculty member.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
The master's minor requires two 3-credit courses in HSTM or HMED at the 5xxx level or above.

Recommended Courses
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
or HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
Doctoral
The doctoral minor requires four 3-credit courses in HSTM or HMED at the 5xxx level or above.

Recommended Courses
HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
or HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
Twin Cities Campus

History of Science, Technology, and Medicine Ph.D.
History of Science & Technology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 154 Shepherd Labs, 100 Union Street S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-301-1442)
Email: hstm@umn.edu
Website: http://www.hstm.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Students must have a bachelor's degree with a preferred grade average of B or better and must be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

Although it is not strictly required for admission, it's strongly recommended that applicants submit a GRE score.

Special Application Requirements:
All application materials are submitted online to the University. Check the HSTM website (www.hstm.umn.edu) for more information. Applications are accepted for fall semester only. The application deadline is December 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
24 credits are required in the major.
6 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in two foreign languages.

A minimum GPA of 3.30 is required for students to remain in good standing.

Following the guidelines in the Graduate Student Handbook for the program (www.hstm.umn.edu), Ph.D. students select one of two tracks: the history of science and technology or the history of medicine; and within the chosen track, select courses subject to distribution requirements in terms of area and period. All of the courses selected for the requirements must be passed with a grade of B or better.

The PhD requires 54 credits consisting of the following: 6 credits in the required courses HSCI/HMED 8112 and 8113, 15 additional credits in HSCI or HMED courses, 3 credits in a directed study course, 6 credits in outside fields, and 24 thesis credits.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

History of Medicine
Required Courses
Take the two-semester sequence of historiography and research preparation, plus an additional 15 credits in HMED chosen in consultation with adviser.

HMED 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HMED 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

Directed Study
Take 3 credits in a directed study course.

HMED 8631 - Directed Study (1.0 - 6.0 cr)
HMED 8632 - Directed Study (1.0 - 6.0 cr)

Outside Field Coursework
In consultation with adviser and the DGS, take 6 credits in courses from either the track alternative to the one in which you are enrolled, in outside fields, or towards a doctoral minor.

Thesis Credits
Take 24 credits after passing preliminary oral exam.

HMED 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

History of Science and Technology
Required Courses
Take the two-semester sequence of historiography and research preparation, plus an additional 15 credits in HSCI chosen in consultation with adviser.

HSCI 8112 - Historiography of Science, Technology, and Medicine (3.0 cr)
HSCI 8113 - Research Methods in the History of Science, Technology, and Medicine (3.0 cr)

Directed Study
Take 3 credits in a directed study course.

HSCI 8993 - Directed Studies (1.0 - 5.0 cr)
HSCI 8994 - Directed Research (1.0 - 5.0 cr)

Outside Field Coursework
In consultation with adviser and the DGS, take 6 credits in courses from either the track alternative to the one in which you are enrolled, in outside fields, or towards a doctoral minor.

Thesis Credits
Take 24 credits after passing preliminary oral exam.

HSCI 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Human Rights M.H.R.
Global Studies Department
Graduate School

Link to a list of faculty for this program.

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Human Rights

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Human Rights will be a two-year interdisciplinary professional master's degree to prepare students to work in the field of human rights or to advance their knowledge and skills in the field. This degree will equip graduate students with core professional and conceptual knowledge and analytical tools necessary to operate on the professional level in the field of human rights, along with the in-depth academic and professional training needed for the specific human rights area in which they practice or intend to practice. Students will follow a core curriculum that includes the study of human rights norms and law, methodology, critical views of human rights, and human rights policy that will equip them with the skills needed to address the problems.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 45 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: Students will participate in a three-credit capstone seminar rather than a thesis. The capstone seminar is one of the required core courses.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

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Information current as of December 20, 2016
Students will be required to complete 45 credits, including 21 credits of core human rights courses, 12 credits in an approved concentration, 2 credits in a first-year cohort seminar, and 3 credits in either a professional paper or capstone project in their second year, and a professional internship of 400 hours, completed before graduation and preferably during the summer after the first year. The internship would be supervised by the Human Rights Program, and would be a non-credit program.

The Masters in Human Rights will require all students to take courses in the following framework, as outlined below:

Human rights core (9 credits), professional/social science/humanities core (minimum 12 credits), concentration (minimum 12 credits), a capstone or professional paper (3 credits), cohort seminar (1 credit per semester x 2 semesters=2 credits) and electives (remaining credits) and the aforementioned 400 hours in a non-credit professional internship.
Twin Cities Campus
Integrated Biosciences M.S.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the master of science (M.S.) degree under Plan A (coursework and original thesis). The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology; and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college/university in the biological or physical sciences or a related field. Background in a variety of subdisciplines is appropriate preparation.

Other requirements to be completed before admission:
Recommended undergraduate courses for applicants pursuing the M.S. degree include one year each of chemistry, biology, and physics. One semester of calculus is also recommended. Applicants are strongly encouraged to have taken other advanced courses in chemistry, biology, additional calculus, and introductory statistics.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Coursework
Twin Cities Campus
Integrated Biosciences Ph.D.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Integrated Biosciences Graduate Program, University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 56
- This program does not require summer semesters for timely completion.
- The Integrated Biosciences Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Integrated Biosciences Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the doctor of philosophy (Ph.D.) degree. The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology; and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college or university in the biological or physical sciences or a related field.

Other requirements to be completed before admission:
Recommended undergraduate courses for applicants pursuing the Ph.D. degree include one year each of chemistry, biology, physics, calculus, and advanced chemistry. One semester (minimum) of statistics is also recommended.

Additional recommended courses for students in the ecology, organismal, and population (EOP) emphasis include one year of calculus, one semester each of ecology and evolutionary biology along with one course in two of the following subjects: genetics, cell biology, biochemistry.

Additional recommended courses for students in the cell, molecular, and physiological (CMP) emphasis include one year of organic chemistry plus one course in each of the following: genetics, cell biology, and biochemistry.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

20 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Ph.D. Written Preliminary Examination: In addition to completing the curriculum for the major and internal related fields, students will be required to pass both a written and oral preliminary examination prior to completing the Ph.D. program. The preliminary written examination will be administered once the student has completed the majority of the required coursework. This will typically occur in the summer of the second year. The written examination will consist of a completed NIH or NSF grant application for the student's proposed research project. The project will be evaluated by the Thesis Examining Committee, which will also serve as the student's Final Oral Examining Committee to provide continuity of advice during the length of the student's research program.

Ph.D. Oral Preliminary Examination: The oral preliminary examination will be administered within two months of the successful completion of the preliminary written examination. The examination will be administered by the graduate faculty according to University regulations and all students will be required to pass the oral examination to continue in the Ph.D. program.

Most students will complete the requirements for the Ph.D. degree within five years. The final oral defense will be conducted by the graduate faculty according to University regulations. It will consist of a public seminar presented by the student.
Twin Cities Campus
Integrative Health & Wellbeing Coaching M.A.
Health Sciences-Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Spirituality & Healing
C592 Mayo Memorial Building
420 Delaware St SE
Minneapolis, MN 55455
Email: fider002@umn.edu
Website: http://www.csh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 38
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health Coaching is an emerging method of partnering with clients to achieve their overall goals. It is practiced from a holistic perspective that views each person as intrinsically whole and the ultimate expert in his or her healing journey. Health coaching is being offered in a wide range of venues including hospitals, clinics, community health and fitness facilities, corporations, educational institutions, and private practices. The Center for Spirituality & Healing is a pioneer in the field of health coaching, working to advance education, research and care model innovation.

The Master of Arts degree is designed for individuals with a bachelor's degree in either a healthcare or non-healthcare field. Students without healthcare backgrounds are eligible for admission with the prior completion of required prerequisites. The degree is designed for students who wish to further their education so that they may hold positions of responsibility coaching individuals and groups, initiating and leading new coaching service lines, and developing outcomes assessments for coaching initiatives. Although the instruction is based on research in the field, this Plan B degree is not intended to provide intensive research training and is understood to be a terminal degree. The degree consists of 38 credits of coursework, including 6 credits of electives, and a minimum 2-credit project that is presented in both verbal and written format prior to graduation. Elective credits may be chosen from CSPH courses or students may complete a minor from other departments, if approved by their academic adviser. In all cases, the student's faculty advisor will work with the student in designing a program plan that accommodates the student's unique learning objectives.

The program is structured to prepare a wide variety of students to be skilled and knowledgeable advocates and support agents for individuals on their path to greater health and healing. Students must be able to demonstrate the following competencies prior to being admitted into the Advanced Health Coaching Seminar:
- Demonstrate appropriate knowledge of major health problems.
- Demonstrate familiarity with the routine mechanics of the conventional healthcare system and its processes.
- Demonstrate basic knowledge of physical and psychological symptoms related to disease and treatment.
- Demonstrate basic knowledge of pharmacology, pathophysiology of disease, and assessment of symptoms across the life span.

Students whose previous coursework does not enable them to meet these competencies may arrange with the program director to do additional outside coursework during the first year of the program.

University of Minnesota Health Coaching programs have transitional program approval from the National Consortium for Credentialing Health and Wellness Coaches (www.ncchwc.org), and will be permanently accredited when that status is available in 2017. Graduates from the MA program will be eligible to sit for National Board Certification when that exam becomes available in 2017.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.
Bachelor's degree in a health-related field or a bachelor's in a non-health-related field with specific coursework in psychology, physiology, and statistics from an accredited institution.

**Required prerequisites**

**Required Prerequisite Coursework**

Previous coursework in basic psychology, human physiology, and statistics must have been completed. Statistics must be completed within 7 years prior to application. All prerequisites must be completed at an accredited institution for a grade equal to B (3.0) or better.

Other requirements to be completed before admission:

In addition to the University's online application, applicants submit a personal statement describing their goals for the program and their professional qualifications. This three to five page statement should focus on what led to the applicant's interest in health coaching as a professional activity, including a description of interest in, and experience with, holistic integrative health and healing. Three letters of recommendation, transcripts and a current C.V. or resume are also required. All items are uploaded into the University's online application. Selected applicants will be invited for admissions interviews.

**Special Application Requirements:**

The M.A. is designed for individuals with a bachelor's degree in a health-related field, or for professionals without healthcare backgrounds who have extensive interest in working with individuals and groups to optimize wellbeing, assuming completion of required prerequisites. All applicants must have completed the prerequisite courses in Physiology, Statistics (within past 7 years) and Psychology before beginning core health coaching coursework the Fall semester of entrance. All prerequisite courses must be completed at an accredited institution with a grade equal to B (3.0) or better.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 32 to 38 major credits and 0 to 6 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** Culminating course for the Master of Arts in Integrative Health and Wellbeing Coaching Program. Students use coaching data collected during the Advanced Health Coaching Practicum, Health Coaching Professional Internship, or Group Health Coaching Course to write and orally present a research-informed concept analysis and retrospective narrative case report.

Prerequisites: Integrative Health and Wellbeing Coaching MA student, CSPH 5701, 5702, 5703, 5704, 5706, 5707, 5709* (*may be taken concurrently).

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Up to 3 credits of CSPH courses at the 4xxx-level may be used for elective credits.
Required Coursework

CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
KIN 5123 - Motivational Interventions in Physical Activity (3.0 cr)
CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
CSPH 5704 - Business of Health Coaching (2.0 cr)
CSPH 5705 - Health Coaching Professional Internship (2.0 cr)
CSPH 5706 - Lifestyle Medicine (2.0 cr)
CSPH 5707 - Conditions People with Clinical Conditions (2.0 cr)
CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
CSPH 5709 - Health and Wellbeing Group Coaching (2.0 cr)
CSPH 8701 - Integrative Health and Wellbeing Coaching MA Capstone Project (2.0 cr)

Electives

Students complete 6 credits selected from CSPH courses. Up to 3 credits may be selected from CSPH courses at the 4xxx-level. Students may elect to use their elective credits to pursue a Minor in another department (more than 6 credits may be required depending on individual program requirements).

Take 6 or more credit(s) from the following:

- CSPH 4311 - Foundations of Hatha Yoga: Alignment & Movement Principles (3.0 cr)
- CSPH 4312 - Hatha Yoga Philosophy, Lifestyle, & Ethics (3.0 cr)
- CSPH 4313 - Hatha Yoga Teaching Principles & Methodology (2.0 cr)
- CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5121 - Whole Systems Healing: Health and the Environment (2.0 cr)
- CSPH 5201 - Spirituality and Resilience (2.0 cr)
- CSPH 5211 - Peacemaking and Spirituality: A Journey Toward Healing and Strength (2.0 - 3.0 cr)
- CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- CSPH 5225 - Meditation: Integrating Body and Mind (2.0 cr)
- CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
- CSPH 5311 - Introduction to Traditional Chinese Medicine (2.0 cr)
- CSPH 5313 - Acupressure (1.0 cr)
- CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)
- CSPH 5319 - Yoga and Ayurveda in India (4.0 cr)
- CSPH 5331 - Foundations of Shamanism and Shamans Healing (2.0 cr)
- CSPH 5332 - Global Healing Traditions: Amazonia Plant Spirit Medicine (2.0 cr)
- CSPH 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)
- CSPH 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)
- CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
- CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
- CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
- CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
- CSPH 5511 - Interdisciplinary Palliative Care: An Experiential Course in a Community Setting (2.0 cr)
- CSPH 5512 - Spiritual Aspects of Palliative Care (2.0 cr)
- CSPH 5521 - Therapeutic Landscapes (3.0 cr)
- CSPH 5522 - Therapeutic Horticulture (3.0 cr)
- CSPH 5533 - Introduction to Energy Healing (2.0 cr)
- CSPH 5535 - Reiki Healing (1.0 cr)
- CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
- CSPH 5541 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)
- CSPH 5545 - Mind-Body Healing Therapies (2.0 cr)
- CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
- CSPH 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)
- CSPH 5601 - Music, Health and Healing (2.0 cr)
- CSPH 5605 - Movement and Music for Well-being and Healing (2.0 cr)
- CSPH 5631 - Healing Imagery I (2.0 cr)
- CSPH 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)
- CSPH 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)
- CSPH 5643 - Horse as Teacher: Intro to Nature-Based Therapeutics Equine-Assisted Activities & Therapies (EAAT) (3.0 cr)
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 6000 - Integrative Therapies and Healing Practices Topics (1.0 - 4.0 cr)
- CSPH 8101 - Critiquing and Synthesizing Complementary and Alternative Healing Practices (CAHP) Research (2.0 cr)
- CSPH 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)
Twin Cities Campus

Integrative Therapies and Healing Practices Minor
Health Sciences-Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Spirituality & Healing, Mayo Memorial Building, 5th floor, MMC 505, 420 Delaware Street SE, Minneapolis, MN 55455 (612-624-9459; fax: 612-626-5280)
Website: http://www.csh.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The integrative therapies and healing practices minor is an interdisciplinary program designed to expose students to a global range of integrative, complementary, cross-cultural and spiritual healing practices. Courses enhance the preparation of graduate students in health sciences and other disciplines by developing knowledge and skills in the emerging field of integrative health care. Specifically, the minor provides students with a theoretical basis for applying integrative therapies and healing practices; prepares students to research integrative therapies and healing practices; and prepares students to work collaboratively with other health professionals and patients in a multicultural, pluralistic healthcare system. The curriculum includes a core introductory course that provides the theoretical foundation for the program. Students choose additional courses offered by the Center for Spirituality & Healing in clinical applications, spirituality, or cross-cultural health and healing. The program draws upon the rich expertise of University and community-based faculty who encourage and challenge students to discover new ways of caregiving, and to cultivate diverse skills that will transform their life's work, experiences and relationships with others.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The minor is designed for graduate students pursuing health or other careers, and who are seeking to deepen their understanding of integrative therapeutic topics.

Graduate students come from wide-ranging backgrounds and careers, including nursing, pharmacy, medicine, nutrition, psychology, physical therapy, liberal studies and public health.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Note that students may not use course credits to satisfy requirements for both a major and the minor.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.
Masters

Required Course
All students complete the Introduction to Integrative Therapies and Healing Practices course.
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)

Elective Options
Take 2 or more course(s) totaling 5 or more credit(s) from the following:
- CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5121 - Whole Systems Healing: Health and the Environment (2.0 cr)
- CSPH 5201 - Spirituality and Resilience (2.0 cr)
- CSPH 5211 - Peacemaking and Spirituality: A Journey Toward Healing and Strength (2.0 - 3.0 cr)
- CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- CSPH 5225 - Meditation: Integrating Body and Mind (2.0 cr)
- CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
- CSPH 5313 - Acupressure (1.0 cr)
- CSPH 5311 - Introduction to Traditional Chinese Medicine (2.0 cr)
- CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)
- CSPH 5319 - Yoga and Ayurveda in India (4.0 cr)
- CSPH 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)
- CSPH 5332 - Global Healing Traditions: Amazonia Plant Spirit Medicine (2.0 cr)
- CSPH 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)
- CSPH 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)
- CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
- CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
- CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
- CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
- CSPH 5511 - Interdisciplinary Palliative Care: An Experiential Course in a Community Setting (2.0 cr)
- CSPH 5512 - Spiritual Aspects of Palliative Care (2.0 cr)
- CSPH 5521 - Therapeutic Landscapes (3.0 cr)
- CSPH 5522 - Therapeutic Horticulture (3.0 cr)
- CSPH 5523 - Applications in Therapeutic Horticulture (2.0 cr)
- CSPH 5533 - Introduction to Energy Healing (2.0 cr)
- CSPH 5535 - Reiki Healing (1.0 cr)
- CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
- CSPH 5541 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)
- CSPH 5545 - Mind-Body Healing Therapies (2.0 cr)
- CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
- CSPH 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)
- CSPH 5601 - Music, Health and Healing (2.0 cr)
- CSPH 5605 - Movement and Music for Well-being and Healing (2.0 cr)
- CSPH 5631 - Healing Imagery I (2.0 cr)
- CSPH 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)
- CSPH 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)
- CSPH 5645 - Horse as Teacher: Intro to Nature-Based Therapeutics Equine-Assisted Activities & Therapies (EAAT) (3.0 cr)
- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5706 - Lifestyle Medicine (2.0 cr)
- CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 8000 - Integrative Therapies and Healing Practices Topics (1.0 - 4.0 cr)
- CSPH 8101 - Critiquing and Synthesizing Complementary and Alternative Healing Practices (CAHP) Research (2.0 cr)
- CSPH 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)

Doctoral

Required Course
All students take the Introduction to Integrative Therapies and Healing Practices course.
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
Elective Options
Take 2 or more course(s) totaling 9 or more credit(s) from the following:

- CSPH 5000 - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
- CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
- CSPH 5111 - Ways of Thinking about Health (2.0 cr)
- CSPH 5115 - Cultural Awareness, Knowledge and Health (3.0 cr)
- CSPH 5121 - Whole Systems Healing: Health and the Environment (2.0 cr)
- CSPH 5201 - Spirituality and Resilience (2.0 cr)
- CSPH 5211 - Peacemaking and Spirituality: A Journey Toward Healing and Strength (2.0 - 3.0 cr)
- CSPH 5212 - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- CSPH 5215 - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- CSPH 5225 - Meditation: Integrating Body and Mind (2.0 cr)
- CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
- CSPH 5313 - Acupressure (1.0 cr)
- CSPH 5311 - Introduction to Traditional Chinese Medicine (2.0 cr)
- CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
- CSPH 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)
- CSPH 5319 - Yoga and Ayurveda in India (4.0 cr)
- CSPH 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)
- CSPH 5332 - Global Healing Traditions: Amazonia Plant Spirit Medicine (2.0 cr)
- CSPH 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)
- CSPH 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)
- CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
- CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
- CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
- CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
- CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
- CSPH 5511 - Interdisciplinary Palliative Care: An Experiential Course in a Community Setting (2.0 cr)
- CSPH 5512 - Spiritual Aspects of Palliative Care (2.0 cr)
- CSPH 5521 - Therapeutic Landscapes (3.0 cr)
- CSPH 5522 - Therapeutic Horticulture (3.0 cr)
- CSPH 5533 - Introduction to Energy Healing (2.0 cr)
- CSPH 5535 - Reiki Healing (1.0 cr)
- CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
- CSPH 5544 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)
- CSPH 5545 - Mind-Body Healing Therapies (2.0 cr)
- CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
- CSPH 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)
- CSPH 5601 - Music, Health and Healing (2.0 cr)
- CSPH 5605 - Movement and Music for Well-being and Healing (2.0 cr)
- CSPH 5631 - Healing Imagery I (2.0 cr)
- CSPH 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)
- CSPH 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)
- CSPH 5643 - Horse as Teacher: Intro to Nature-Based Therapeutics Equine-Assisted Activities & Therapies (EAAT) (3.0 cr)
- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5706 - Lifestyle Medicine (2.0 cr)
- CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
- CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
- CSPH 6000 - Integrative Therapies and Healing Practices Topics (1.0 - 4.0 cr)
- CSPH 8101 - Critiquing and Synthesizing Complementary and Alternative Healing Practices (CAHP) Research (2.0 cr)
- CSPH 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)
Twin Cities Campus
Integrative Therapies and Healing Practices Postbaccalaureate Certificate
Health Sciences-Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Spirituality & Healing, Mayo Memorial Building, 5th floor, MMC 505, 420 Delaware Street SE, Minneapolis, MN 55455 (612-624-9459; fax: 612-626-5280).
Website: http://www.csh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12 to 20
- This program does not require summer semesters for timely completion.
- Degree: Integrative Thpys & Healing Practices PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The integrative therapies and healing practices certificate is an interdisciplinary program designed to expose students to a global range of integrative, complementary, cross-cultural and spiritual healing practices. Courses enhance the preparation of students in health sciences and other disciplines by developing knowledge and skills in the emerging field of integrative health care. Specifically, the certificate provides students with a theoretical basis for applying integrative therapies and healing practices; prepares students to research integrative therapies and healing practices; and prepares students to work collaboratively with other health professionals and patients in a multicultural, pluralistic healthcare system. The curriculum for the 12-credit certificate includes a core introductory course that provides the theoretical foundation for the program, as well as a course in self care. Students choose additional courses offered by the Center for Spirituality & Healing in clinical applications, spirituality, or cross-cultural health and healing. The program draws upon the rich expertise of University and community-based faculty who encourage and challenge students to discover new ways of caregiving, and to cultivate diverse skills that will transform their life’s work, experiences and relationships with others.

The certificate is also available with a health coaching track. Students who pursue the certificate with the health coaching track complete a total of 20 credits, including the core introductory course.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The certificate requires applicants to have a bachelors or higher degree in a healthcare or healthcare-related field.

Other requirements to be completed before admission:
This field of study is designed for the healthcare professional, those currently enrolled in a graduate health professions program, board-certified chaplains with at least three years in a healthcare setting, and those with a non-healthcare bachelor's degree with direct work experience in health related areas. Such fields include nursing, social work, psychology, medicine, nutrition, pharmacy, chiropractic, naturopathy, and licensed acupuncture.

The certificate’s Health Coaching track requires an applicant interview prior to admission.

Special Application Requirements:
In addition to the University's online application, applicants submit a personal statement describing their goals for obtaining the certificate and their professional qualifications. The statement should address your interest in integrative therapies and short- and long-term professional goals after completing the program. Two letters of recommendation are required, preferably one from an academic source and one from an employer/supervisor. A current C.V. or resume is also required. All items are uploaded directly into the University's online application.
Applicants to the Health Coaching track are required to provide three letters of recommendation and a three-to-five page personal statement focusing on what led to the applicant's interest in Health Coaching as a professional activity, including a description of interest in and experience with holistic integrative health and healing. A current C.V. or resume is also required. All items are uploaded directly into the University's online application. Selected Health Coaching track applicants will be chosen for admissions interviews.

The application deadline is March 15 for entrance into program the following fall semester.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Course**

Students pursuing either the general certificate or the certificate with health coaching track must complete this course.

CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)

**Certificate Options**

**General Certificate**

**Self Care Course Requirement**

General certificate students complete one of the two following courses for at least one credit:

- **CSPH 5102** - Art of Healing: Self as Healer (1.0 cr)
- **CSPH 5806** - Wellbeing and Resiliency for Health Professionals (1.0 cr)

**Electives**

Students are encouraged to choose electives, in consultation with their faculty advisor, from CSPH courses consistent with their academic training and professional goals. Up to 3 credits of CSPH courses at the 4xxx-level may be applied to the certificate.

Take 3 or more course(s) totaling 8 or more credit(s) from the following:

- **CSPH 4311** - Foundations of Hatha Yoga: Alignment & Movement Principles (3.0 cr)
- **CSPH 4312** - Hatha Yoga Philosophy, Lifestyle, & Ethics (3.0 cr)
- **CSPH 4313** - Hatha Yoga Teaching Principles & Methodology (2.0 cr)
- **CSPH 5000** - Explorations in Integrative Therapies and Healing Practices (1.0 - 4.0 cr)
- **CSPH 5102** - Art of Healing: Self as Healer (1.0 cr)
- **CSPH 5111** - Ways of Thinking about Health (2.0 cr)
- **CSPH 5115** - Cultural Awareness, Knowledge and Health (3.0 cr)
- **CSPH 5121** - Whole Systems Healing: Health and the Environment (2.0 cr)
- **CSPH 5201** - Spirituality and Resilience (2.0 cr)
- **CSPH 5211** - Peacemaking and Spirituality: A Journey Toward Healing and Strength (2.0 - 3.0 cr)
- **CSPH 5212** - Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community (3.0 cr)
- **CSPH 5215** - Forgiveness and Healing: A Journey Toward Wholeness (3.0 cr)
- **CSPH 5225** - Meditation: Integrating Body and Mind (2.0 cr)
- **CSPH 5226** - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
- **CSPH 5311** - Introduction to Traditional Chinese Medicine (2.0 cr)

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Information current as of December 20, 2016
• CSPH 5313 - Acupressure (1.0 cr)
• CSPH 5315 - Traditional Tibetan Medicine: Ethics, Spirituality, and Healing (2.0 cr)
• CSPH 5317 - Yoga: Ethics, Spirituality, and Healing (2.0 cr)
• CSPH 5318 - Tibetan Medicine, Ayurveda, and Yoga in India (4.0 cr)
• CSPH 5319 - Yoga and Ayurveda in India (4.0 cr)
• CSPH 5331 - Foundations of Shamanism and Shamanic Healing (2.0 cr)
• CSPH 5332 - Global Healing Traditions: Amazonia Plant Spirit Medicine (2.0 cr)
• CSPH 5341 - Overview of Indigenous Hawaiian Healing (2.0 cr)
• CSPH 5343 - Ayurveda Medicine: The Science of Self-healing (2.0 cr)
• CSPH 5401 - People, Plants, and Drugs: Introduction to Ethnopharmacology (3.0 cr)
• CSPH 5421 - Botanical Medicines in Integrative Healthcare (3.0 cr)
• CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
• CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
• CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
• CSPH 5511 - Interdisciplinary Palliative Care: An Experiential Course in a Community Setting (2.0 cr)
• CSPH 5512 - Spiritual Aspects of Palliative Care (2.0 cr)
• CSPH 5521 - Therapeutic Landscapes (3.0 cr)
• CSPH 5522 - Therapeutic Horticulture (3.0 cr)
• CSPH 5523 - Applications in Therapeutic Horticulture (2.0 cr)
• CSPH 5533 - Introduction to Energy Healing (2.0 cr)
• CSPH 5535 - Reiki Healing (1.0 cr)
• CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)
• CSPH 5541 - Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind (2.0 cr)
• CSPH 5545 - Mind-Body Healing Therapies (2.0 cr)
• CSPH 5555 - Introduction to Body and Movement-based Therapies (2.0 cr)
• CSPH 5561 - Overview of the Creative Arts in Health and Healing (2.0 cr)
• CSPH 5601 - Music, Health and Healing (2.0 cr)
• CSPH 5605 - Movement and Music for Well-being and Healing (2.0 cr)
• CSPH 5631 - Healing Imagery I (2.0 cr)
• CSPH 5641 - Animals in Health Care: The Healing Dimensions of Human/Animal Relationships (3.0 cr)
• CSPH 5642 - Nature Heals: An Introduction to Nature-Based Therapeutics (3.0 cr)
• CSPH 5643 - Horse as Teacher: Intro to Nature-Based Therapeutics Equine-Assisted Activities & Therapies (EAAT) (3.0 cr)
• CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
• CSPH 5706 - Lifestyle Medicine (2.0 cr)
• CSPH 5708 - Mind-Body Science and the Art of Transformation (1.0 cr)
• CSPH 5711 - Optimal Healing Environments (3.0 cr)
• CSPH 5805 - Wellbeing in the Workplace (3.0 cr)
• CSPH 5806 - Wellbeing and Resiliency for Health Professionals (1.0 cr)
• CSPH 6000 - Integrative Therapies and Healing Practices Topics (1.0 - 4.0 cr)
• CSPH 8101 - Critiquing and Synthesizing Complementary and Alternative Healing Practices (CAHP) Research (2.0 cr)
• CSPH 8191 - Independent Study in Integrative Therapies and Healing Practices (1.0 - 6.0 cr)

-OR-

Health Coaching track
Coursework for the certificate with the health coaching track is detailed in sub-plan requirements.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Health Coaching
Health coaching is an emerging method of partnering with clients to achieve their overall goals. It is practiced from a holistic perspective that views each person as intrinsically whole and the ultimate expert in his or her healing journey. Health coaching is being offered in a wide range of venues including hospitals, clinics, community health and fitness facilities, corporations, educational institutions, and private practices. The Center for Spirituality & Healing is a pioneer in the field of health coaching, working to advance education, research and care model innovation.

University of Minnesota health coaching programs have transitional program approval from the National Consortium for Credentialing Health and Wellness Coaches (www.ncchwc.org), and will be permanently accredited when that status is available in 2017.

In addition to the required CSPH 5101 introduction course, students complete the health coaching track course requirements for a minimum of 20 credits. Students are strongly encouraged to confer with their faculty advisor concerning the specific sequence in which the track coursework must be taken. A minimum GPA of 3.0 must be maintained for all required track coursework.
Coursework may be completed in a minimum of four semesters or may be spread over a variable amount of time up to a maximum of four years.

**Health Coaching track requirements**

- CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
- CSPH 5702 - Fundamentals of Health Coaching II (4.0 cr)
- CSPH 5703 - Advanced Health Coaching Practicum (3.0 cr)
- CSPH 5704 - Business of Health Coaching (2.0 cr)
- CSPH 5705 - Health Coaching Professional Internship (2.0 cr)
- CSPH 5706 - Lifestyle Medicine (2.0 cr)
Twin Cities Campus

Molecular, Cellular, Developmental Biology and Genetics M.S.
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED

Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street S.E., University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 50
- This program requires summer semesters for timely completion.
- The clinical component of the program program in genetic counseling involves work multiple clinical settings throughout the Twin Cities, the Mayo clinic in Rochester and clinics in St. Cloud and Duluth.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Genetic Counseling Focus: The master of science in MCDB&G is offered with a focus of study in genetic counseling. It is offered for full-time study, and designed to provide students with the academic foundation and clinical expertise necessary to enter the profession of genetic counseling. The curriculum integrates selected coursework with firsthand experience in the diagnostic medical genetics laboratories and supervised work in multiple clinical genetics settings with patients and families. The program is accredited by the Accreditation Council for Genetic Counseling and all graduates are eligible to apply to the American Board of Genetic Counseling for active candidate status and sit for board certification.

Joint Degree Program: MCDB&G also offers a master of science that is part of the Joint Degree Program in Law, Science, and Technology. This program is unique in the nation and enables students to combine a JD degree with a PhD or MS degree. Students entering this program must be admitted to both the MCDB&G program and the Law School. Admission qualifications for MS and PhD students are identical; only the student's career objectives distinguish the degree that they pursue.

MS Research Degree: Eligible students who were admitted to the MCDB&G doctoral program, but who leave before they have completed their PhD, may be offered the option to complete the MS degree. Eligibility is determined by the student's adviser and the MCDB&G DGS.

Accreditation
This program is accredited by The Accreditation Council for Genetic Counseling

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An undergraduate or master's degree in the biological, chemical, or physical sciences is preferred.

Other requirements to be completed before admission:
Applicants to the MCDB&G with the genetic counseling focus are required to have completed courses in organic chemistry, biochemistry, general genetics, statistics and probability, and psychology. In addition, all applicants to the genetic counseling focus must have some type of client advocacy experience such as volunteer or paid work with troubled teens, working in a shelter for battered women, or a suicide prevention hotline, etc. The best experiences afford the applicant the opportunity to work in a helping profession.

Successful applicants to the JD/MS must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate familiarity with and aptitude for basic science research prior to
embarking on a graduate career in this program. Recommended academic preparation includes coursework in molecular biology, genetics, biology, and biochemistry.

Special Application Requirements:
Applications to the genetic counseling focus of study are stronger if the applicant has spent some time with a practicing genetic counselor either in the clinical setting or in some capacity such as personal interviews that affords the applicant a real life understanding of the profession.

Applicants to the JD/MS program must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The recommended date for receipt of completed applications is December 1. Graduate studies begin fall semester. Entry into the JD/MS program requires separate admittance to both the Law School and the MCDB&G Graduate Program.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 550
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 625
• IELTS

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 14 to 40 major credits and 6 to 10 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: All Plan B students must complete a research or capstone project that is scholarly in quality, and present their results at their final oral examination. Projects that qualify for the genetic counseling focus include those that study a genetic counseling problem and add to the existing genetic counseling literature; produce materials that add to the profession such as teaching materials or ways of evaluating the service; or produce educational materials needed by patient populations or the general public. Other Plan B students are expected to produce a report approximately 15 pages in length that thoughtfully discusses an important scientific topic that the student and adviser agree upon. The report should include an introduction that explains the significance of the topic, a review of the literature or an analysis of a specific aspect of the area and a discussion regarding current or future endeavors.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The genetic counseling focus of study is offered under Plan B and is designed to be completed in 4 semesters and the interim summer. Most of the coursework takes place in the first year, leaving more open time during the second year for clinical experience. Students must complete a minimum of 40 graduate credits with at least 30 credits in the major area of study, a plan B project paper, and a final oral exam. Students will be placed in laboratory and clinical observation experiences during the first year and five clinical genetic counseling internships during the second year. Students will complete a minimum of 800 hours of direct patient contact. Students must
earn a passing grade in their five clinical internship rotations and present a completed log of at least 50 clinical cases before final oral exam. Only under exceptional circumstances will the course of study be varied to meet the needs of a student with many of the courses already completed or with extensive clinical laboratory experience.

Students in the JD/MS program or PhD to MS students may complete the MS under Plan A or Plan B. Plan A requires a minimum of 24 course credits and 10 thesis credits; Plan B requires a minimum of 24 course credits and the completion of a Plan B paper. Students take a core curriculum, which is multidisciplinary and contributes to both the major and minor or related field requirements. Students may choose a concentration or specialization within the program such as cell biology, developmental biology, genetics, or human genetics.

Degree Focuses

Genetic Counseling
Year 1
Students will take courses that focus on medical, human, and behavioral genetics and genetic counseling practice. Students will have the option to choose between several electives from law and ethics, public health, and counseling psychology. In addition, students will observe in a clinical setting one day per week and gain experience in the clinical laboratories one day per week.
Summer
During the summer between the first and second year of the program, students will begin their first clinical internship rotation where the student will have patient responsibilities. This rotation will be a full 10 weeks long with the expectation that students will spend between 2-3 days per week in the clinic. The minimum time in the clinic will be 20 hours per week but will ultimately be set by the clinical supervisor and may exceed the minimum.
Year 2
Students will complete course work in counseling skills, psychosocial issues in genetic counseling, and ethical issues in genetic counseling. In addition students will spend 2-3 days per week in the clinic seeing patients and families under the supervision of a board certified genetic counselor.

-OR-

Academic Focus
Joint- or Dual-degree Coursework: Joint Degree Program in Law, Science and Technology. Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Molecular, Cellular, Developmental Biology and Genetics Minor
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED
Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street SE, University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140).
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, Genome Engineering, Stem Cell research and a center for developmental biology provide opportunities for graduate study.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Masters
A master's minor requires 12 credits from the MCDB&G curriculum, graded A-F and with a minimum 3.0 GPA. Courses should be approved by the MCDB&G director of graduate studies.

Required courses
- GCD 8151 - Cell Structure and Function (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8161 - Advanced Developmental Biology (3.0 cr)

Electives
Choose at least one of the following courses for at least 3 credits:
GCD 8920 Special Topics: Computational Genomics
or GCD 5005 - Computer Programming for Cell Biology (3.0 cr)

Doctoral
A doctoral minor requires 12 credits from the MCDB&G curriculum, graded A-F and with a minimum 3.0 GPA. Substitutions for the required courses must be approved by the MCDB&G director of graduate studies.

Required courses
GCD 8151 - Cell Structure and Function (3.0 cr)
GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
GCD 8161 - Advanced Developmental Biology (3.0 cr)

Electives
Choose at least one of the following courses for at least 3 credits:
GCD 8920 Special Topics: Computational Genomics
or GCD 5005 - Computer Programming for Cell Biology (3.0 cr)
Twin Cities Campus
Molecular, Cellular, Developmental Biology and Genetics Ph.D.
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED
Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street SE, University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 50
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, genome engineering, stem cell research and a center for developmental biology provide opportunities for graduate study.

PhD students are admitted to MCDB&G under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first year program administered by the MCDB&G and the Biochemistry, Molecular Biology and Biophysics (BMBB) graduate programs. After the first year, students select either MCDB&G or BMBB to complete their degree. MCDB&G does NOT have a freestanding master's program.

The MCDB&G PhD is also part of two joint degree programs: The Joint Degree Program in Law, Health, and Life Sciences; and the MD/PhD program.

The Joint Degree Program in Law, Health, and Life Sciences is unique in the nation and enables students to combine a JD degree with a PhD or MS degree. Students entering this program must be admitted to both the MCDB&G program and the Law School. Admission qualifications for MS and PhD students are identical; only the student's career objectives distinguish the degree that they pursue.

The MD/PhD program emphasizes integration of the two major components of training--medicine and research--to ensure excellence in both. The program features a special curriculum that facilitates the transition from Medical School to the first year of formal graduate training, and the transition from graduate training back to Medical School.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applications from students with an undergraduate or master's degree in the biological, chemical, or physical sciences are preferred.

Other requirements to be completed before admission:
Recommended academic preparation includes coursework in molecular biology, genetics, biology, and biochemistry.

Successful applicants must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate familiarity with and aptitude for basic science research prior to embarking on a...
graduate career in this program.

**Special Application Requirements:**
Applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and scores from the General Test of the GRE are required. We will accept copies of the transcripts and GRE scores. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The deadline for receipt of completed applications is December 1. Graduate studies begin fall semester only.

Entry into the J.D./Ph.D. program requires separate admittance to both the Law School and the MCDB&G Graduate Program. Entry into the M.D./Ph.D. program requires separate admittance to both the Medical School and the MCDB&G Graduate Program.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 550
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 107
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 625

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

**Plan A:** Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 30 major credits and up to null credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** Plan B students are expected to produce a report approximately 15 pages in length that thoughtfully discusses an important scientific topic that the student and advisor agree upon. The report should include an introduction that explains the significance of the topic, a review of the literature or an analysis of a specific aspect of the area and a discussion regarding current or future endeavors.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Required courses**
Take all of the following courses:
- GCD 8151 - Cell Structure and Function (3.0 cr)
- GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
- GCD 8161 - Advanced Developmental Biology (3.0 cr)
- GCD 8171 - Literature Analysis (2.0 cr)
- BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
- MCDG 8920 - Special Topics (1.0 - 4.0 cr)
- MCDG 8900 - Student Research Seminar (1.0 cr)
GCD 8900 - Seminar (1.0 - 2.0 cr)
MCDG 8950 - Teaching Practicum (1.0 cr)
MCDG 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Course options**
- Choose at least one of these courses
- GCD 8920 Special Topics: Computational Genomics
  or
- GCD 5005 - Computer Programming for Cell Biology (3.0 cr)

**Elective Courses**
Take 0 or more credit(s) from the following:
- BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
- BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- BIOC 5309 - Biocatalysis and Biodegradation (3.0 cr)
- BIOC 5352 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
- BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- BIOC 5444 - Muscle (3.0 cr)
- BIOC 5527 - Introduction to Modern Structural Biology (4.0 cr)
- BIOC 5528 - Spectroscopy and Kinetics (4.0 cr)
- CSCI 5461 - Functional Genomics, Systems Biology, and Bioinformatics (3.0 cr)
- CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
- CSCI 8980 - Special Advanced Topics in Computer Science (1.0 - 3.0 cr)
- GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
- GCD 8073 - Advanced Human Genetics (3.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- MATH 8540 - Topics in Mathematical Biology (1.0 - 3.0 cr)
- NSC 8211 - Developmental Neurobiology (3.0 cr)
- OBIO 8012 - Basic Concepts in Skeletal Biology (2.0 cr)
- PHCL 5111 - Pharmacogenomics (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)

**Joint- or Dual-degree Coursework:**
Joint Degree Program in Law, Science and Technology. Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus  
Water Resources Science M.S.  
Water Resources Center  
Graduate School

Link to a list of faculty for this program.

Contact Information:  
Water Resources Science, University of Minnesota, 193 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)  
Email: wrs@umn.edu  
Website: http://wrs.umn.edu

- Program Type: Master's  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 30 to 38  
- This program does not require summer semesters for timely completion.  
- University of Minnesota, Duluth  
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the M.S. level: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. A Limnology and Oceanography track is also offered. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Plant Biology; and Soil, Water, and Climate. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; and Physics; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission  
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a bachelor's degree in physical, biological, or environmental science or engineering.

Other requirements to be completed before admission:  
Recommended academic preparation includes one year (or two semesters) each of calculus, physics, and chemistry, and one biology course.

Availability of funding and willingness of a member of the graduate faculty to serve as an advisor are important criteria for admission to
the program.

**Special Application Requirements:**
Applicants must submit three letters of recommendation via the University of Minnesota's ApplyYourself website. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE General Test. Students may be admitted any semester but are strongly encouraged to submit their application by December 15 for fall semester admission. More specific application instructions can be found on the program website: wrs.umn.edu/admissions/admissions-info.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 22 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is defined by the faculty advisor. The Plan B option is well suited to students who have little undergraduate course work in water resources science and thus need more coursework to gain the combination of depth and breadth needed in this field. Plan B projects involve field, laboratory, or computer work and the analysis, synthesis, or interpretation of data.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

In addition to the required core coursework, students must complete at least 6 credits outside the major and at least 6 credits in their chosen emphasis or in the limnology and oceanology track.

Plan A students have the option to use their water quality elective twice, once to complete their water quality elective and once to partially complete their area of emphasis coursework, if the class overlaps in both areas and is approved by their advisor.

Students with WRS-equivalent core courses taken as undergraduates may substitute other classes to meet credit requirements.

**Water Resources Seminar**

Students must take WRS 8100 for 0.5 credits.

WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 - 3.0 cr)
Water Resources Ethics
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

Hydrology Core
Take at least 3 credits from the following:
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- ESCI 4702 - General Hydrogeology (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)

Environmental/Water Chemistry Core
Take at least 3 credits from the following:
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)

Limnology Core
- EEB 5601 - Limnology (3.0 cr)

Water Resources Policy Core
WRS 5101 - Water Policy (3.0 cr)

Water Quality Core Elective
Take 3 or more credit(s) from the following:
- BBE 4523 - Ecological Engineering Design (3.0 cr)
- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 5523 - Ecological Engineering Design (3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
- CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
- CEGE 4562 - Environmental Remediation Technology (3.0 cr)
- CEGE 5551 - Environmental Microbiology (3.0 cr)
- CEGE 8505 - Biological Processes (3.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 5713 - Tracers and Karst Hydrogeology (3.0 cr)
- ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)
- ESPM 5601 - Principles of Waste Management (3.0 cr)
- ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)

Outside Major Electives
Take at least 6 credits outside your major, in consultation with your advisor.

Plan A Option:
Take 10 or more credit(s) from the following:
- WRS 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B Option
Select additional courses in consultation with your advisor to complete the Plan B option.

Areas of Emphasis
Complete at least 6 credits from the one of the following emphases:

Aquatic Biology Emphasis
Take 6 or more credit(s) from the following:
- BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
• CEGE 5551 - Environmental Microbiology (3.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
• ENT 5361 - Aquatic Insects (4.0 cr)
• ESPM 5575 - Wetlands (3.0 cr)
• FW 4136 - Ichthyology (4.0 cr)
• FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
• FW 8459 - Stream and River Ecology (3.0 cr)
• FW 8465 - Fish Habitats and Restoration (3.0 cr)
• HORT 5071 - Ecological Restoration (4.0 cr)

-OR-

Environmental Chemistry Emphasis
Take 6 or more credit(s) from the following:
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
• CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
• ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
• ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
• ESPM 4216 - Contaminant Hydrology (3.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)

-OR-

Hydrology (Climatology) Emphasis
Take 6 or more credit(s) from the following:
• ESPM 5402 - Biometeorology (3.0 cr)
• GEOG 5426 - Climatic Variations (3.0 cr)

-OR-

Hydrology (Groundwater) Emphasis
Take 6 or more credit(s) from the following:
• CEGE 4351 - Groundwater Mechanics (3.0 cr)
• CEGE 4352 - Groundwater Modeling (3.0 cr)
• ESCI 4702 - General Hydrogeology (3.0 cr)
• ESCI 5971 - Field Hydrogeology (2.0 cr)

-OR-

Hydrology (Surface Water) Emphasis
Take 6 or more credit(s) from the following:
• BBE 5513 - Watershed Engineering (3.0 cr)
• BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
• CEGE 4501 - Hydrologic Design (4.0 cr)
• CEGE 8506 - Stochastic Hydrology (4.0 cr)
• CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
• CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
• ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
• CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
• EEB 8601 - Introduction to Stream Restoration (3.0 cr)
• ESCI 8602 - Stream Restoration Practice (2.0 cr)
• CEGE 8602 - Stream Restoration Practice (2.0 cr)
• EEB 8602 - Stream Restoration Practice (2.0 cr)
• ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
• ESPM 5555 - Wetland Soils (3.0 cr)
• SOIL 5555 - Wetland Soils (3.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• SOIL 5232 - Vadose Zone Hydrology (3.0 cr)

-OR-

Limnology Emphasis
Take 6 or more credit(s) from the following:
• EEB 4611 - Biogeochemical Processes (3.0 cr)
• EEB 5601 - Limnology (3.0 cr)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCI 4402</td>
<td>Biogeochemical Cycles in the Ocean</td>
<td>3.0</td>
</tr>
<tr>
<td>ESCI 5705</td>
<td>Limnogeology and Paleoenvironment</td>
<td>3.0</td>
</tr>
<tr>
<td>FW 5604W</td>
<td>Fisheries Ecology and Management [WI]</td>
<td>3.0</td>
</tr>
<tr>
<td>FW 8459</td>
<td>Stream and River Ecology</td>
<td>3.0</td>
</tr>
<tr>
<td>FW 8465</td>
<td>Fish Habitats and Restoration</td>
<td>3.0</td>
</tr>
<tr>
<td>PUBH 6190</td>
<td>Environmental Chemistry</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**OR**

### Water Management Technology Emphasis
Take 6 or more credit(s) from the following:
- BBE 4523 - Ecological Engineering Design (3.0 cr)
- CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
- CEGE 4511 - Hydraulic Structures (3.0 cr)
- CEGE 4512 - Open Channel Hydraulics (4.0 cr)
- CEGE 4562 - Environmental Remediation Technology (3.0 cr)
- CEGE 8504 - Theory of Unit Operations (4.0 cr)
- CEGE 8505 - Biological Processes (3.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)

**OR**

### Water Policy Emphasis
Take 6 or more credit(s) from the following:
- APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
- CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
- ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)

**OR**

### Water Quality Emphasis
Take 6 or more credit(s) from the following:
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
- CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)

**OR**

### Watershed Science and Management Emphasis
Take 6 or more credit(s) from the following:
- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- CEGE 4501 - Hydrologic Design (4.0 cr)
- ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
- CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
- EEB 8601 - Introduction to Stream Restoration (3.0 cr)
- ESCI 8602 - Stream Restoration Practice (2.0 cr)
- CEGE 8602 - Stream Restoration Practice (2.0 cr)
- EEB 8602 - Stream Restoration Practice (2.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)
- ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
- ESPM 5555 - Wetland Soils (3.0 cr)
- SOIL 5555 - Wetland Soils (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
- FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
- HORT 5071 - Ecological Restoration (4.0 cr)
- WRS 5050 - Special Topics in Water Resources Science (1.0 - 3.0 cr)

### Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.
**Limnology and Oceanography**

The science of inland waters, or "limnology," includes the study of streams, lakes, ponds, and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes the study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology.

A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical and chemical sciences. Such interdisciplinary fields in the modern research university require mechanisms to insure cross-fertilization of ideas, approaches, methods, techniques, and knowledge. The limnology and oceanography track in WRS provides just such a much-needed mechanism. The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography.

In addition to the required core coursework, students must complete at least 6 credits outside the major, and at least 6 credits in the limnology and oceanology track.

Students with WRS-equivalent coursework taken as undergraduates may substitute other classes to meet minimum credit requirements.

The faculty advisor must be a member of the limnology and oceanography track faculty.

**Water Resources Seminar**
- Students must take WRS 8100 for 0.5 credits.

**WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 - 3.0 cr)**

**Water Resources Ethics**
- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Hydrology Core**
- Take 3 or more credit(s) from the following:
  - BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
  - FNRM 5114 - Hydrology and Watershed Management (3.0 cr)

**Water Quality Core Elective**
- Take 3 or more credit(s) from the following:
  - BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
  - BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
  - CEGE 8505 - Biological Processes (3.0 cr)
  - CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
  - EEB 5605 - Limnology Laboratory (2.0 cr)
  - ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
  - ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
  - ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
  - ESPM 5575 - Wetlands (3.0 cr)
  - ESPM 5601 - Principles of Waste Management (3.0 cr)
  - FW 8459 - Stream and River Ecology (3.0 cr)
  - FW 8465 - Fish Habitats and Restoration (3.0 cr)

**Limnology/Oceanology Emphasis**
- Take 6 or more credit(s) from the following:
  - EEB 4611 - Biogeochemical Processes (3.0 cr)
  - EEB 5601 - Limnology (3.0 cr)
  - EEB 5605 - Limnology Laboratory (2.0 cr)
  - ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
  - ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
  - FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
  - FW 8459 - Stream and River Ecology (3.0 cr)
  - FW 8465 - Fish Habitats and Restoration (3.0 cr)
  - PUBH 6190 - Environmental Chemistry (3.0 cr)

**Outside Major Electives**
- Take at least 6 credits outside your major, in consultation with your advisor.
Twin Cities Campus
Water Resources Science Minor
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 193 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- University of Minnesota Duluth

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the M.S. and PhD levels: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Plant Biology; and Soil, Water, and Climate. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; and Physics; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Course
WRS 5101 - Water Policy (3.0 cr)

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Information current as of December 20, 2016
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Master's
Core Courses
Take 6 or more credit(s) from the following:

Hydrology Core Courses
• BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
• CEGE 4501 - Hydrologic Design (4.0 cr)
• ESCI 4702 - General Hydrogeology (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)

•Environmental/Water Chemistry Core Courses
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)

•Limnology Core Courses
• EEB 5601 - Limnology (3.0 cr)
• BBE 4523 - Ecological Engineering Design (3.0 cr)
• BBE 5523 - Ecological Engineering Design (3.0 cr)
• BBE 5513 - Watershed Engineering (3.0 cr)
• BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)

Doctoral
Core Courses
Take 3 or more credit(s) from the following:

Hydrology Core Courses
• BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
• CEGE 4501 - Hydrologic Design (4.0 cr)
• ESCI 4702 - General Hydrogeology (3.0 cr)
• FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
• FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)

•Environmental/Water Chemistry Core Courses
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)

•Limnology Core Courses
• EEB 5601 - Limnology (3.0 cr)
• BBE 4523 - Ecological Engineering Design (3.0 cr)
• BBE 5523 - Ecological Engineering Design (3.0 cr)
• BBE 5513 - Watershed Engineering (3.0 cr)
• BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)

Emphasis Courses
Take 6 or more credit(s) from the following:

Aquatic Biology Emphasis
• BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
• CEGE 5551 - Environmental Microbiology (3.0 cr)
• EEB 5601 - Limnology (3.0 cr)
• ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
• ENT 5361 - Aquatic Insects (4.0 cr)
• ESPM 5575 - Wetlands (3.0 cr)
• FW 4136 - Ichthyology (4.0 cr)
• FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
• FW 8459 - Stream and River Ecology (3.0 cr)
• FW 8465 - Fish Habitats and Restoration (3.0 cr)
• HORT 5071 - Ecological Restoration (4.0 cr)

Environmental Emphasis
• CEGE 5541 - Environmental Water Chemistry (3.0 cr)
• CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
or CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
or ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
or ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
or ESPM 4216 - Contaminant Hydrology (3.0 cr)
or LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

• Hydrology Emphasis (Climate)
  • ESPM 5402 - Biometeorology (3.0 cr)
or GEOG 5426 - Climatic Variations (3.0 cr)

• Hydrology Emphasis (Groundwater)
  • CEGE 4351 - Groundwater Mechanics (3.0 cr)
or CEGE 4352 - Groundwater Modeling (3.0 cr)
or ESCI 4702 - General Hydrogeology (3.0 cr)
or ESCI 5971 - Field Hydrogeology (2.0 cr)

• Hydrology Emphasis (Surface Water)
  • BBE 5513 - Watershed Engineering (3.0 cr)
or BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
or CEGE 4501 - Hydrologic Design (4.0 cr)
or CEGE 8506 - Stochastic Hydrology (4.0 cr)
or CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
or CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
or ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
or CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
or EEB 8601 - Introduction to Stream Restoration (3.0 cr)
or ESI 8602 - Stream Restoration Practice (2.0 cr)
or CEGE 8602 - Stream Restoration Practice (2.0 cr)
or EEB 8602 - Stream Restoration Practice (2.0 cr)
or ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
or ESPM 5555 - Wetland Soils (3.0 cr)
or SOIL 5555 - Wetland Soils (3.0 cr)
or FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
or FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
or SOIL 5232 - Vadose Zone Hydrology (3.0 cr)

• Limnology Emphasis
  • EEB 4611 - Biogeochemical Processes (3.0 cr)
or EEB 5601 - Limnology (3.0 cr)
or ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
or ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
or FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
or FW 8459 - Stream and River Ecology (3.0 cr)
or FW 8465 - Fish Habitats and Restoration (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

• Limnology/Oceanography Emphasis
  • EEB 4611 - Biogeochemical Processes (3.0 cr)
or EEB 5601 - Limnology (3.0 cr)
or EEB 5605 - Limnology Laboratory (2.0 cr)
or ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
or ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
or FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
or FW 8459 - Stream and River Ecology (3.0 cr)
or FW 8465 - Fish Habitats and Restoration (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

• Water Management Technology Emphasis
  • BBE 4523 - Ecological Engineering Design (3.0 cr)
or CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
or CEGE 4511 - Hydraulic Structures (3.0 cr)
or CEGE 4512 - Open Channel Hydraulics (4.0 cr)
or CEGE 4562 - Environmental Remediation Technology (3.0 cr)
or CEGE 8504 - Theory of Unit Operations (4.0 cr)
or CEGE 8505 - Biological Processes (3.0 cr)
or CEGE 8611 - Mechanics of Sediment Transport (3.0 cr)
or ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)

• Water Policy Emphasis
  • APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
or CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
or ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)

• Water Quality Emphasis
  • BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
  • CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
  • CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
  • ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
  • ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
  • ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
  • ESPM 5575 - Wetlands (3.0 cr)

• Watershed Science and Management Emphasis
  • BBE 5513 - Watershed Engineering (3.0 cr)
  • BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
  • CEGE 4501 - Hydrologic Design (4.0 cr)
  • ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
  • CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
  • EEB 8601 - Introduction to Stream Restoration (3.0 cr)
  • ESCI 8602 - Stream Restoration Practice (2.0 cr)
  • CEGE 8602 - Stream Restoration Practice (2.0 cr)
  • EEB 8602 - Stream Restoration Practice (2.0 cr)
  • ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
  • ESPM 5575 - Wetlands (3.0 cr)
  • ESPM 5555 - Wetland Soils (3.0 cr)
  • SOIL 5555 - Wetland Soils (3.0 cr)
  • FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
  • FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
  • HORT 5071 - Ecological Restoration (4.0 cr)
  • WRS 5050 - Special Topics in Water Resources Science (1.0 - 3.0 cr)
Twin Cities Campus
Water Resources Science PhD
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 193 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- The Water Resources Science PhD is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Water Resources Science PhD program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the PhD level: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. A Limnology and Oceanography track is also available. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Plant Biology; and Soil, Water, and Climate. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering Geography; Geological Sciences; Physics; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a master's degree in physical, biological, or environmental science or engineering.

Other requirements to be completed before admission:
Recommended academic preparation includes one year (or two semesters) each of calculus, physics, and chemistry, and one biology course at the undergraduate level.

Availability of funding and willingness of a member of the graduate faculty to serve as an adviser are important criteria for admission to
the PhD program.

**Special Application Requirements:**
Applicants must submit three letters of recommendation via the University of Minnesota's ApplyYourself website. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE. Students may be admitted any semester but are strongly encouraged to submit their application by December 15 for fall semester admission. More specific application instruction can be found on the program website: wrs.umn.edu/admissions/admissions-info.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
22 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Water Resources Seminar**
Students must take WRS 8100 for 0.5 credits.
- WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 - 3.0 cr)

**Water Resources Ethics**
- WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)

**Hydrology Core**
Take at least 3 credits from the following:
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
or CEGE 4501 - Hydrologic Design (4.0 cr)
or ESCI 4702 - General Hydrogeology (3.0 cr)
or FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
or FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)

**Environmental/Water Chemistry Core**
Take at least 3 credits from the following:
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
or ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
or LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

**Limnology Core**

EEB 5601 - Limnology (3.0 cr)

**Water Resources Policy Core**

WRS 5101 - Water Policy (3.0 cr)

**Water Quality Core Elective**

Take 3 or more credit(s) from the following:
- BBE 4523 - Ecological Engineering Design (3.0 cr)
- BBE 5513 - Watershed Engineering (3.0 cr)
- BBE 5523 - Ecological Engineering Design (3.0 cr)
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
- CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
- CEGE 4562 - Environmental Remediation Technology (3.0 cr)
- CEGE 5511 - Environmental Microbiology (3.0 cr)
- CEGE 5551 - Environmental Microbiology (3.0 cr)
- CEGE 5556 - Water and Wastewater Treatment (3.0 cr)
- CEGE 5557 - Environmental Remediation Technology (3.0 cr)
- CEGE 5558 - Environmental Microbiology (3.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)
- ESPM 5601 - Principles of Waste Management (3.0 cr)
- ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)

**Outside Major Electives**

Take at least 12 credits outside your major, in consultation with your advisor.

**Thesis Requirement**

All doctoral students must take 24 doctoral thesis credits.

WRS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Area of Emphasis**

Complete a least 6 credits from the one of the following emphases:

**Aquatic Biology Emphasis**

Take at least 6 credits from the following:
- BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
or CEGE 5551 - Environmental Microbiology (3.0 cr)
or EEB 5601 - Limnology (3.0 cr)
or ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
or ENT 5361 - Aquatic Insects (4.0 cr)
or ESPM 5575 - Wetlands (3.0 cr)
or FW 4136 - Ichthyology (4.0 cr)
or FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
or FW 8459 - Stream and River Ecology (3.0 cr)
or FW 8465 - Fish Habitats and Restoration (3.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)

-OR-

**Environmental Chemistry Emphasis**

Take at least 6 credits from the following:
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
or CEGE 5542 - Experimental Methods in Environmental Engineering (3.0 cr)
or CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
or ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
or ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
or ESPM 4216 - Contaminant Hydrology (3.0 cr)
or LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

-OR-

Hydrology (Climatology) Emphasis
Take at least 6 credits from the following:
ESPM 5402 - Biometeorology (3.0 cr)
or GEOG 5426 - Climatic Variations (3.0 cr)

-OR-

Hydrology (Groundwater) Emphasis
Take at least 6 credits from the following:
CEGE 4351 - Groundwater Mechanics (3.0 cr)
or CEGE 4352 - Groundwater Modeling (3.0 cr)
or ESCI 4702 - General Hydrogeology (3.0 cr)
or ESCI 5971 - Field Hydrogeology (2.0 cr)

-OR-

Hydrology (Surface Water) Emphasis
Take at least 6 credits from the following:
BBE 5513 - Watershed Engineering (3.0 cr)
or BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
or CEGE 4501 - Hydrologic Design (4.0 cr)
or CEGE 8506 - Stochastic Hydrology (4.0 cr)
or CEGE 8507 - Advanced Methods in Hydrology (4.0 cr)
or CEGE 8572 - Computational Environmental Fluid Dynamics (4.0 cr)
or ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
or CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
or EEB 8601 - Introduction to Stream Restoration (3.0 cr)
or ESCI 8602 - Stream Restoration Practice (2.0 cr)
or CEGE 8602 - Stream Restoration Practice (2.0 cr)
or EEB 8602 - Stream Restoration Practice (2.0 cr)
or ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
or ESPM 5555 - Wetland Soils (3.0 cr)
or SOIL 5555 - Wetland Soils (3.0 cr)
or FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
or FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
or SOIL 5232 - Vadose Zone Hydrology (3.0 cr)

-OR-

Limnology Emphasis
Take at least 6 credits from the following:
EEB 4611 - Biogeochemical Processes (3.0 cr)
or EEB 5601 - Limnology (3.0 cr)
or ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
or ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
or FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
or FW 8459 - Stream and River Ecology (3.0 cr)
or FW 8465 - Fish Habitats and Restoration (3.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)

-OR-

Water Policy Emphasis
Take at least 6 credits from the following:
APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
or CONS 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
or ESPM 5256 - Natural Resource Law and the Management of Public Lands and Waters (3.0 cr)

-OR-

Water Quality Emphasis
Take at least 6 credits from the following:
BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
or CEGE 4502 - Water and Wastewater Treatment (3.0 cr)
or CEGE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
or ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
or ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
or ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
or ESPM 5575 - Wetlands (3.0 cr)

-OR-

Watershed Science and Management Emphasis
Take at least 6 credits from the following:
BBE 5513 - Watershed Engineering (3.0 cr)
or BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
or CEGE 4501 - Hydrologic Design (4.0 cr)
or ESCI 8601 - Introduction to Stream Restoration (3.0 cr)
or CEGE 8601 - Introduction to Stream Restoration (3.0 cr)
or EEB 8601 - Introduction to Stream Restoration (3.0 cr)
or ESCI 8602 - Stream Restoration Practice (2.0 cr)
or CEGE 8602 - Stream Restoration Practice (2.0 cr)
or EEB 8602 - Stream Restoration Practice (2.0 cr)
or ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
or ESPM 5575 - Wetlands (3.0 cr)
or ESPM 5703 - Agroforestry in Watershed Management (3.0 cr)
or ESPM 5555 - Wetland Soils (3.0 cr)
or SOIL 5555 - Wetland Soils (3.0 cr)
or FNRM 5114 - Hydrology and Watershed Management (3.0 cr)
or FNRM 5153 - Forest Hydrology & Watershed Biogeochemistry (3.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
or WRS 5050 - Special Topics in Water Resources Science (1.0 - 3.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Limnology and Oceanography
The science of inland waters, or “limnology,” includes the study of streams, lakes, ponds and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology. A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical, and chemical sciences.

This track within the cross-campus interdisciplinary WRS program provides comprehensive training in limnology and oceanography. As is the case for the WRS graduate program as a whole, the L&O program includes a set of core courses plus electives in the subfield of limnology and oceanography.

The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography. Faculty on both Twin Cities and Duluth campuses participate in the limnology and oceanography track. WRS limnology and oceanography faculty list: http://wrs.umn.edu/faculty/landotracklist/index.htm.

Students must complete coursework equivalent to that of an M.S. in the water resources science limnology and oceanography track, with additional coursework in an area of limnology and oceanography.

PhD students pursuing the Limnology and Oceanography track must have at least two members of the limnology and oceanography faculty on their committee, including the adviser.

Water Resources Seminar
Students must take WRS 8100 for 0.5 credits.
WRS 8100 - Interdisciplinary Seminar in Water Resources (0.5 - 3.0 cr)

Water Resources Ethics
WRS 8581 - Research and Professional Ethics in Water Resources and Environmental Science (0.5 cr)
Hydrology Core
Take 3 or more credit(s) from the following:
- BBE 8513 - Hydrologic Modeling of Small Watersheds (3.0 cr)
- FNRM 5114 - Hydrology and Watershed Management (3.0 cr)

Environmental/Water Chemistry Core
Take 3 or more credit(s) from the following:
- CEGE 5541 - Environmental Water Chemistry (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)

Limnology Core
- EEB 5601 - Limnology (3.0 cr)

Water Resources Policy Core
- WRS 5101 - Water Policy (3.0 cr)

Water Quality Core Elective
Take 3 or more credit(s) from the following:
- BBE 5535 - Assessment and Diagnosis of Impaired Waters (3.0 cr)
- BIOL 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
- CEGE 8505 - Biological Processes (3.0 cr)
- CEGE 8511 - Mechanics of Sediment Transport (3.0 cr)
- EEB 5605 - Limnology Laboratory (2.0 cr)
- ENT 5081 - Insects, Aquatic Habitats, and Pollution (3.0 cr)
- ESCI 4401 - Aqueous Environmental Geochemistry (3.0 cr)
- ESCI 8511 - Mechanics of Sediment Transport (3.0 cr)
- ESPM 5575 - Wetlands (3.0 cr)
- ESPM 5601 - Principles of Waste Management (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)

Limnology/Oceanology Emphasis
Take 6 or more credit(s) from the following:
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- EEB 5605 - Limnology Laboratory (2.0 cr)
- ESCI 4402 - Biogeochemical Cycles in the Ocean (3.0 cr)
- ESCI 5705 - Limnogeology and Paleoenvironment (3.0 cr)
- FW 5604W - Fisheries Ecology and Management [WI] (3.0 cr)
- FW 8459 - Stream and River Ecology (3.0 cr)
- FW 8465 - Fish Habitats and Restoration (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)

Outside Major Electives
Take at least 12 credits outside your major, in consultation with your advisor.
Twin Cities Campus

Development Practice M.D.P.

HHH Administration

Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002).
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 50
• This program requires summer semesters for timely completion.
• Degree: Master of Development Practice

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of development practice (MDP) prepares students for careers in international development. The degree provides rigorous interdisciplinary training and equips students with the skills needed to address the problems of poverty and sustainable development in the developing world.

The MDP program is jointly administered by the Humphrey School of Public Affairs and the Interdisciplinary Center for the Study of Global Change (ICGC) and spans several academic units across the University of Minnesota. The degree provides training in policy analysis and management, health and education, natural sciences, social sciences, and interdisciplinary research methods. An international field experience and capstone workshop in development practice also are required.

The MDP degree is part of a global consortium of international development programs.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
While no specific experience or academic pathway is required, students with a strong liberal education background and sound quantitative and analytical skills will be best prepared for academic success at the Humphrey School of Public Affairs.

Previous coursework in mathematics, statistics, and economics is recommended. Past applicants needing to strengthen this part of their skill set have found courses in introductory microeconomics, college algebra, and introductory statistics to be helpful preparation. Prior to admission students may find such courses available online; many are also available at the University of Minnesota.

International professional experience and foreign language competency are strongly preferred.

Special Application Requirements:
A complete application will include a University of Minnesota graduate application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores, at least three letters of recommendation, and an optional diversity statement.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
- Internet Based - Total Score: 100
- Paper Based - Total Score: 600
- IELTS - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 50 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: The capstone project is an opportunity for MDP students in their second year to apply their knowledge through a client-based team project. Each student team and the workshop instructor will work with an NGO or public sector client engaged in some dimension of international development, preferably situated in a developing country, to identify a suitable project. While the specifics of each project will vary, all will include in-depth research, analysis, and the creation of a professional written report. Student teams will be expected to develop an appropriate presentation of this product to the relevant stakeholders. The projects will be done by small groups and can have multiple dimensions. Students will have the opportunity to integrate various aspects of development such as economic development, public health, environmental sustainability, education and skills development, and citizen participation.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Core Courses

AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
MDP 5001 - Ways of Knowing and Sustainable Livelihoods (2.0 cr)
MDP 5002 - Research Methods for Sustainable Livelihoods (4.0 cr)
MDP 5003 - Field Study Pre-Departure Seminar (1.0 cr)
MDP 5004 - International Field Experience (3.0 cr)
MDP 5100 - International Field Seminar (1.0 cr)
MDP 5200 - Capstone Workshop in Development Practice (3.0 cr)
PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
PA 5031 - Empirical Analysis I (4.0 cr)
PA 5501 - Theories and Policies of Development (3.0 cr)
PA 5503 - Economics of Development (3.0 cr)
PA 5521 - Development Planning and Policy Analysis (4.0 cr)

Education Policy

OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
or OLPD 5107 - Gender, Education, and International Development (3.0 cr)

Environmental Science

GEOG 5401 - Geography of Environmental Systems and Global Change (4.0 cr)
or GCO 5008 - Grand Challenge: Policy and Science of Global Environmental Change [ENV] (3.0 cr)

Leadership

PA 5151 - Organizational Perspectives on Global Development & Humanitarian Assistance (3.0 cr)
or PA 5405 - Public Policy Implementation (3.0 cr)

Public Health

PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6134 - Sustainable Development and Global Public Health (2.0 cr)

Electives

Electives to bring total degree credits to at least 50. See www.hhh.umn.edu/degrees/mpd/ for further information.

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Information current as of December 20, 2016
**Twin Cities Campus**

**Early Childhood Policy Postbaccalaureate Certificate**

*HHH Social Policy Academic Program*

**Hubert H. Humphrey School of Public Affairs**

Link to a list of faculty for this program.

**Contact Information:**
Humphrey School of Public Affairs, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Early Childhood Policy PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The early childhood policy post-baccalaureate certificate gives students expertise in applying research-based knowledge to public policies affecting young children and the adults who care for them. In addition to completing coursework, students in the certificate program complete a capstone workshop or independent study focused on early childhood policy. These certificate components provide a vehicle for students to gain fundamental early childhood policy skills and knowledge and to foster connection between the University of Minnesota and the early childhood policy community. Students will have opportunities to participate in the work of the University of Minnesota’s renowned Human Capital Research Collaborative.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Admission to the certificate will be allowed in fall and spring semesters. Admission decisions will be made by a subcommittee of the faculty advisory group. A complete application will include a Graduate School application, personal statement, resume or C.V., and transcripts.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

The 12-credit certificate consists of one cornerstone course: PA5413/CPSY 5413 - Early Childhood and Public Policy (3 cr), one policy elective (3 cr), one open elective (3 cr), and a capstone workshop, professional paper, or independent study focused on early childhood
policy (PA 8081, 8082, 8921 or 8991). The certificate can be completed in two to four semesters.
Twin Cities Campus

Election Administration Postbaccalaureate Certificate
HHH Politics and Governance Academic Program
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Humphrey School of Public Affairs, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)
Email: hhhh admit@umn.edu
Website: http://www.hhh.umn.edu

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2016
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• Degree: Election Administration PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Election Administration Post-baccalaureate certificate prepares students across the country for mid-career positions in election administration. Students will acquire and develop the skills and knowledge of election operations and procedures they need to serve as election staff or to further their existing careers in election administration. All courses are offered in an on-line format and include topics such as election law, election design, and voter participation.

Program Delivery
This program is available:
• completely online (all program coursework can be completed online)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the certificate will be allowed in fall and spring semesters. Admission decisions will be made by a subcommittee of the faculty advisory group. The application must include a personal statement, resume or C.V., and transcripts.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

Core
PA 5971 - Survey of Election Administration (3.0 cr)
PA 5972 - Elections and the Law (3.0 cr)
PA 5973 - Strategic Management of Election Administration (2.0 cr)
PA 5974 - Election Administration Capstone Project (2.0 cr)

Electives
Take 2 or more credit(s) from the following:

• PA 5975 - Election Design (2.0 cr)
• PA 5976 - Voter Participation (1.0 cr)
• PA 5977 - Public Budgeting for Election Administration (1.0 cr)
• PA 5978 - Management of Organizations for Election Admin (1.0 cr)
• PA 5979 - Communications for the Elections Administrator (1.0 cr)
Twin Cities Campus
Human Services Leadership Postbaccalaureate Certificate
HHH Leadership and Management Academic Program
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- N/A

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human service professionals face extraordinary challenges that require innovative thinking and an interdisciplinary approach. The certificate in human services leadership provides mid-career professionals knowledge and skills in leadership, public policy, and public service redesign for greater success plus increased potential for advancement to serve in mid- to senior-level leadership positions in county, state, and nonprofit agencies. Designed with input from industry leaders, the program is intended for working professionals involved in human service program development and delivery. The program allows students to complete a professional 12-credit graduate-level certificate that can serve as a stepping stone to the mid-career master of public affairs degree.

Accreditation
This program is accredited by N/A

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Special Application Requirements:
At least 8 years of post-baccalaureate professional work experience. Pre-baccalaureate experience may be considered for applicants with a significant gap between completion of high school and the bachelor's degree. Sufficient prior academic preparation as demonstrated in a four-year bachelor's degree. A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, TOEFL scores (if applicable), at least three letters of recommendation, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Listening Score: 25
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Internet Based - Speaking Score: 25
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MN Batt
Key to test abbreviations (TOEFL, IELTS, MN Batt).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework
Take PA 5xxx: Human-Centered Service Redesign (3 credits) and PA 5xxx Public Service Redesign Workshop (3 credits)

Elective Courses
Take 6 or more credit(s) from the following:
• PA 5011 - Management of Organizations (3.0 cr)
• PA 5105 - Integrative Leadership Seminar (3.0 cr)
• PA 5112 - Public Budgeting (3.0 cr)
• PA 5137 - Project Management in the Public Arena (3.0 cr)
• PA 5145 - Civic Participation in Public Affairs (3.0 cr)
• PA 5311 - Program Evaluation (3.0 cr)
• PA 5405 - Public Policy Implementation (3.0 cr)
• PA 5421 - Racial Inequality and Public Policy (3.0 cr)
Twin Cities Campus
Nonprofit Management Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002).
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 13
- This program does not require summer semesters for timely completion.
- Degree: Nonprofit Management PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The nonprofit management certificate program is designed for both current students and professionals who are employed in nonprofit organizations, especially persons who do not have a formal educational background in managing and leading a nonprofit organization. Students acquire knowledge and skills in effective leadership and management, organizational development, nonprofit governance, strategic planning, policy analysis, human resource development, finance, and fundraising. This program offers a wide array of elective courses appropriate to a broad range of nonprofit settings.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited institution.

Other requirements to be completed before admission:
2 or more years experience as paid or volunteer staff member with nonprofit organizations.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., and transcripts.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
13 credits of coursework are required, including 7.5 credits of required courses. Required courses must be taken for a letter grade.

In consultation with the faculty adviser, remaining elective credits are chosen to meet the student’s individual goals and interests.

**Required Core Courses (7.5 credits)**
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
Twin Cities Campus
Policy Issues on Work and Pay Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Ave S, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Policy Issues on Work and Pay PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Policy Issues in Work and Pay certificate provides an understanding of, and the ability to evaluate and develop, federal, state, and local policies that affect the employment relationship. Students learn about the role of government in the employment relationship, including statutes, and how employers, unions, and the government interpret and utilize policies. Core courses are drawn from the Humphrey School of Public Affairs as well as the Center for Human Resources and Labor Studies in the Carlson School of Management, with auxiliary courses in law, history, sociology, and applied economics.

The certificate consists of at least 15 credits. Students complete 10 elective credits that allow them to focus on the area of public policy that is most relevant to their professional and educational goals and needs. Some elective courses require prerequisites, which do not count toward the certificate.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Mathematics courses at least through algebra; a one-semester course in microeconomics.

Special Application Requirements:
A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

Required Core Courses (5 credits)
PA 5431 - Public Policies on Work and Pay (3.0 cr)
Note: Only the section of PA 5022 specifically titled Economics of Social Insurance Programs (3 cr) will count toward the certificate.
HRIR 5654 - Public Policies on Employee Benefits: Social Safety Nets (2.0 cr)
or PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)

Elective Courses (minimum of 10 credits)
Note: HRIR 5000: Topic of section must cover public policies.
Take 3 - 5 course(s) totaling 10 or more credit(s) from the following:
• HRIR 5000 - Topics in Human Resources and Industrial Relations (2.0 cr)
• HRIR 5222 - Managing Diversity (2.0 cr)
• HRIR 5252 - Employment and Labor Law for the HRIR Professional (2.0 cr)
• HRIR 6701 - Labor Relations and Collective Bargaining (4.0 cr)
• PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
• PA 8386 - Research Methods in Public Policy (2.0 cr)
• LAW 6203 - Labor Law (2.0 cr)
• LAW 6625 - Disability in the Workplace (3.0 cr)
• LAW 6631 - Employment Discrimination (3.0 cr)
• LAW 6632 - Employment Law (3.0 cr)
• LAW 6833 - Alternative Dispute Resolution (2.0 - 3.0 cr)
• APEC 5511 - Labor Economics (3.0 cr)
• SOC 8421 - Work and Occupations (3.0 cr)
Twin Cities Campus

Public Affairs Leadership Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Public Affairs Leadership PBac Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Certificate in Public Affairs Leadership offers mid-career professionals specific knowledge and skills in leadership, management, public policy, and analysis to succeed in today's challenging environment. Intended for working professionals, the program allows students to complete a professional certificate in an integrative cohort format in nine months. The certificate stands on its own or can be a stepping stone to the mid-career Master of Public Affairs degree. The Certificate in Public Affairs Leadership is offered in a unique combination of on campus and online sessions, making it convenient for students from outside of the Twin Cities area to participate. The program starts with an intensive, introductory week in August, followed by monthly Friday-Saturday meetings from September to May. This cohort approach combines the intensity and depth of in-person instruction paired with the convenience of online coursework.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment is required.

Other requirements to be completed before admission:
At least 10 years of post-baccalaureate professional work experience is preferred and highly recommended. Pre-baccalaureate experience may be considered for applicants with a significant gap between completion of high school and the bachelor's degree. Sufficient prior academic preparation as demonstrated in a four-year bachelor's degree.

A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, TOEFL scores (when applicable), at least three letters of recommendation, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Courses
PA 5051 - Cohort Leadership I (2.0 cr)
PA 5052 - Cohort Leadership II (2.0 cr)
PA 5053 - Cohort Policy & Program Analysis I (2.0 cr)
PA 5054 - Cohort Policy & Program Analysis II (2.0 cr)
PA 5055 - Cohort Analytics I (2.0 cr)
PA 5056 - Cohort Analytics II (2.0 cr)
Twin Cities Campus
Public Affairs M.P.A.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue S, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master’s
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Affairs

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of public affairs (MPA) is intended for mid-career professionals, and prepares them for public leadership and policy making. The program is typically completed in two to three years of part-time enrollment. The program can be completed in one calendar year (fall, spring, summer semesters) by attending full-time. Courses in a self-designed concentration provide a knowledge base and skills to achieve career goals. Concentration courses can be from Public Affairs and from the 150+ graduate programs across the University of Minnesota. Required courses in this degree are taken in a cohort format. The cohort meets on campus one full week in August, one Friday/Saturday each month (September-May), and online throughout the year.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.
A four-year bachelor’s degree from an accredited US university or foreign equivalent at time of enrollment.

Special Application Requirements:
At least 10 years of post-baccalaureate professional work experience is preferred and highly recommended. Pre-baccalaureate experience may be considered for applicants with a significant gap between completion of high school and the bachelor’s degree.
Sufficient prior academic preparation as demonstrated in a four-year bachelor’s degree. A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 major credits and up to null credits outside the major. The is no final exam. A capstone project is required.
**Capstone Project**: The capstone project is designed to provide a learning opportunity for students to apply their knowledge through a client-based team project. The workshop includes a written report for the client, an oral presentation to the client that summarizes the major findings of the report, and reflection paper on the workshop experience.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Core Courses (12 credits)**

- PA 5051 - Cohort Leadership I (2.0 cr)
- PA 5052 - Cohort Leadership II (2.0 cr)
- PA 5053 - Cohort Policy & Program Analysis I (2.0 cr)
- PA 5054 - Cohort Policy & Program Analysis II (2.0 cr)
- PA 5055 - Cohort Analytics I (2.0 cr)
- PA 5056 - Cohort Analytics II (2.0 cr)

**Capstone Project**

- PA 5080 - Capstone Preparation Workshop (1.0 cr)
- PA 8081 - Capstone Workshop (3.0 cr)

**Remaining Credits (14)**

MPA students self-design a concentration, choosing from a wide variety of classes, including skills courses in management, analysis, and planning; and courses in such areas as global policy; social policy; economic and community development; science, technology, and environmental policy; and urban and regional policy and planning.
Twin Cities Campus
Public Affairs, Ph.D.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue S, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhphd@umn.edu
Website: http://www.hhh.umn.edu/degrees/phd/

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The doctor of philosophy (PhD) in public affairs offers students opportunities for rigorous, advanced study in the areas of public affairs, policy analysis, and planning. The goal of the PhD program is to train researchers who will enter academia or join highly respected public or nonprofit institutions involved in cutting edge research in public affairs, policy, planning, and management. Successful applicants to the program will be clear about the research they wish to undertake and why they think the Humphrey School is the best place to do that research. Students are expected to make original theoretical, methodological, or substantive contributions in the area of their specialization (sub-plans). Sub-plans are offered in public policy; urban planning; management and government; and science, technology, and environmental policy. Students will be expected to complete the degree program within five years.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
The general requirement is the capability to pursue PhD-level work. Typically, an applicant should have an academic record from a recognized college that includes undergraduate coursework in microeconomics and mathematics (either calculus, statistics, or algebra).

Special Application Requirements:
A complete application will include a U of MN graduate application, a personal statement that includes motivation for pursuing doctoral studies, a resume or C.V., transcripts, GRE scores, a writing sample, TOEFL scores (if applicable), and at least three letters of recommendation.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
39 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Practical teaching experience: Each candidate must complete training in pedagogy, and a teaching experience as a course instructor or teaching assistant (TA) with instructional responsibilities. The pedagogical training may take place prior to or concurrent with the teaching experience. Evidence of English-speaking proficiency is required prior to the teaching experience.

Dissertation requirement: Each candidate must complete original academic research and fulfill a dissertation requirement by completing either an academic thesis or three related academic papers that are judged by the student's committee to be of publishable quality.

Integrative Seminars
- PA 8003 - Integrative Doctoral Seminar in Public Affairs I (3.0 cr)
- PA 8004 - Integrative Doctoral Seminar in Public Affairs II (3.0 cr)

Research Seminar
- PA 8005 - Doctoral Research Seminar in Public Affairs (3.0 cr)

Research Methods
Minimum of 12 credits in research methods, including at least one course each in: research design, quantitative methods, and qualitative methods. Courses are chosen in consultation with advisor based on student's background and research interests.

Academic Sub-plan
Students are required to complete one of four sub-plans consisting of a minimum of 18 credits, as described below. Sub-plans offer students the opportunity for advanced, rigorous study in the theory, methods, and practice in their field.

Doctoral thesis credits
- Students must register for at least 24 doctoral thesis credits.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Management and Governance
Required Courses
- PA 8106 - Research Seminar in Management, Leadership & Governance (3.0 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)

Electives
- 12 credits in the area of public and nonprofit leadership and management. Courses are chosen in consultation with advisor based on student's background and research interests.

Public Policy
The public policy sub-plan is a self-designed set of topic-based courses (minimum 18 credits) determined by the student and advisor with the consent of the other faculty in the sub-plan area.

Science, Technology, and Environmental Policy
- PA 8706 or PA 5711
- PA 8706 - Interdisciplinary Research Seminar on Science, Technology, and Environmental Policy (3.0 cr)
or PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 8707 or PA 5752
PA 8707 - Interdisciplinary Sustainability Systems Research Seminar (3.0 cr)
or PA 5752 - Material-Energy Flows for a Sustainable Society (3.0 cr)

Focus Area
One focus area course (at least 3 credits) covering topics such as:
- Energy and environmental policy
- Urban infrastructure and sustainable cities
- Water policy
- Emerging technologies and society
Courses offered in U of M departments that are related to focus area

Environmental and Sustainability Systems
One course (at least 3 credits) providing depth in environmental and sustainability systems, such as:
- Health & well-being, environmental phycology
- Climate, environment and eco-system studies
- Environmental economics, applied economics
- Industrial ecology
- Models, scenarios, risk, uncertainty, decision analysis
Courses offered in U of M departments related to environment/sustainability systems
Examples are available from faculty advisors.

Policy Process and Implementation
One course (at least 3 credits) providing depth in policy process and implementation, covering topics such as:
- Law, regulations, science and innovation policy
- Politics of public affairs
- Urban environmental planning
- Leadership and management
- Global policy
- Public finance, budgeting
- Policy implementation and evaluation
Courses offered in U of M departments related to policy process and implementation
Examples are available from faculty advisors.

Additional course (at least 3 credits) in consultation with faculty advisor

Professional training and seminars
Strongly recommended: Participation in seminars and professional trainings covering leadership, public communication, international and intercultural experiences, effective teaching, such as those offered at the Institute on the Environment and to include PA 8931, PA 8932, and PA 8933 (professional skills courses for PhD/public affairs students).
PA 8931 - PhD Public Affairs Professional Skills I (1.0 cr)
PA 8932 - PhD Public Affairs Professional Skills II (1.0 cr)
PA 8933 - PhD Public Affairs Professional Skills III (1.0 cr)

Urban Planning

Required Courses
PA 8206 - Planning Theory (3.0 cr)
PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)

Urban Planning Electives
Four additional courses, for at least 12 credits, to be determined by student and advisor. Students must demonstrate proficiency in GIS.
Twin Cities Campus
Public Policy M.P.P.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Policy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of public policy (MPP) curriculum is built upon a core of required theoretical and methodological courses. In remaining courses, students choose either to emphasize more advanced study of analysis or management, or to focus on a particular substantive area of public policy. Structured concentrations include advanced policy analysis methods; economic and community development; gender and public policy; global public policy; human rights; politics and governance; public and nonprofit leadership and management; science, technology, and environmental policy; and social policy. Students have multiple opportunities to apply the concepts learned in their coursework to real-life policy problems, including cases presented in courses, their internships, and workshops. Dual degrees include MPP/master of business administration; MPP/juris doctor; MPP/master of public health; and MPP/master of social work.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
While no specific experience or academic pathway is required, students with a strong liberal education background and sound quantitative and analytical skills will be best prepared for academic success at the Humphrey School of Public Affairs.

Previous coursework in mathematics, statistics, and economics is recommended. Past applicants needing to strengthen this part of their skill set have found courses in introductory microeconomics, college algebra, and introductory statistics to be helpful preparation.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements

Plan C: Plan C requires 45 major credits and 0 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Core

- PA 5011 - Management of Organizations (3.0 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)

Economics

Take 3 or more credit(s) from the following:
- PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
- PA 5431 - Public Policies on Work and Pay (3.0 cr)
- PA 5503 - Economics of Development (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 5805 - Global Economics (3.0 cr)

Methods

- PA 5032 - Regression Analysis (2.0 cr)
  or PA 5044 - Regression Analysis, Accelerated (2.0 cr)
- PA 5033 - Multivariate Techniques (2.0 cr)
  or PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)

Concentration: 9-12 credits

Global policy concentration requires 12 credits. All other concentrations require 9 credits.

Professional Paper

Professional paper through a capstone workshop, working group, or master's; professional paper (individual option).
- PA 8081 - Capstone Workshop (3.0 cr)
  or PA 8082 - Working Group (3.0 cr)
  or PA 8921 - Master's: Professional Paper (Individual Option) (1.0 - 3.0 cr)

Electives

Electives to bring total credits to 45.

Joint- or Dual-degree Coursework: This program offers options for four dual degrees. Each dual degree option within the MPP allows for a different number of credits in common between the two programs: MPP/MBA: 24 credits in common allowed; MPP/JD: 29 credits in common allowed; MPP/MPH - Public Health Practice: 26 credits in common allowed; MPP/MSW: 21 credits in common allowed for full program, 15 for advanced standing, 11 for direct practice. In addition, an accelerated bachelor's/master's (BA/MPP in Political Engagement) is available to University of Minnesota Political Science undergraduate students.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Political Engagement

This sub-plan is limited to students completing the program under Plan C.
The College of Liberal Arts and the Humphrey School of Public Affairs offer an early-admission opportunity for eligible University of Minnesota Political Science BA students also interested in completing the master's in public policy (MPP). The MPP's political engagement sub-plan enables political science majors to take 13 MPP credits during their senior (fourth) year, and to complete the MPP after a fifth year of full-time graduate study plus one summer.

Interested political science undergraduates should contact the Department of Political Science advisor for more information. The MPP/political engagement sub-plan application deadline is December 15 of the student's junior year, and admission to the MPP/political engagement sub-plan is contingent on a formal admissions process.

Students admitted to the MPP/political engagement sub-plan must maintain timely degree progress to ensure all undergraduate degree requirements are completed by the end of their fourth year.

The MPP's political engagement sub-plan is open to political science undergraduates only. Double majors may apply, but only if they choose to complete the senior project requirement in political science.

In addition to master's of public policy degree requirements*, students in the political engagement sub-plan will take:

- Political Engagement (POL 5005, 4 credits)
- Methods: at least 3 credits beyond PA 5031: Empirical Analysis; chosen from a slate of PA and POL methods courses.
- Electives: 15 credits relevant to Political Engagement sub-plan. May be chosen from PA or POL. At least 8 credits must be 8xxx POL. Satisfies MPP concentration requirement.
- Outside electives: 3 credits from outside POL or PA. Number of outside electives may be increased or reduced, in consultation with director of graduate studies.
- Research for Mentorship Placement: 1 credit directed reading with advisor
  Mentorship placement: PA 8991 (3 credits)
  Professional paper: PA 8081, PA 8082, or PA 8921 (3 credits)

(*)Political Engagement students are not required to take PA 5012 and PA 5022. They are required to take only 3 credits of methods courses beyond PA 5031.)
Twin Cities Campus
Public Policy Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public policy curriculum is built upon a core of required theoretical and methodological courses. In coursework, students study policy analysis or management or focus on a substantive area of public policy. Substantive areas include advanced policy analysis methods; economic and community development; global public policy; human rights; politics and governance; public and nonprofit leadership and management; public finance and budgeting; science, technology, and environmental policy; social policy; and gender and public policy. Students have multiple opportunities to apply the concepts learned to real-life policy problems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Specific coursework for the minor is chosen in consultation with the student's minor advisor or the public policy director of graduate studies. Students are required to take a minimum of three credits from the public policy MPP curriculum. Up to 3 credits may be taken on an S/N grade basis. All other courses must be completed with grades of B or better.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Coursework
Students pursuing the master’s-level minor must complete 9 credits from the following:
PA 5xxx
PA 8xxx

Doctoral
Required Coursework
Students pursuing the doctoral-level minor must complete at least 12 credits from the following:
PA 5xxx

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Information current as of December 20, 2016
Twin Cities Campus
Science, Technology, and Environmental Policy M.S.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The MS in science, technology, and environmental policy (STEP) provides students with an understanding of the role of science and technology in society, including food and agriculture, the economy, energy and the environment, security, health, and education; the impact of science and technology on the political and economic relationships within and among nations; and the analysis and design of policies for appropriate promotion and regulation of science and technology regionally, nationally, and internationally. The program educates students with natural and social science backgrounds to assume roles in public policy development.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited US university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
While no specific experience or academic pathway is required, students with a strong liberal education background and sound quantitative and analytical skills will be best prepared for academic success at the Humphrey School of Public Affairs.

Previous coursework in mathematics, statistics, and economics is recommended. Past applicants needing to strengthen this part of their skill set have found courses in introductory microeconomics, college algebra, and introductory statistics to be helpful preparation.

Applicants applying to the MS-STEP program should have completed a degree or taken advanced level coursework in the natural or engineering sciences prior to the date of their planned enrollment.

Special Application Requirements:
A complete application will include a University of Minnesota application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 26 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 36 major credits and up to null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students should take 6 credits to complement their previous training: appropriate courses in natural or engineering science or its history or philosophy for those with social science backgrounds; appropriate courses in the social sciences for those with natural or engineering science backgrounds.

Elective credits are chosen in consultation with the student’s advisor.

Students who have not taken prior coursework in statistics must demonstrate to their advisors that they have adequate preparation in statistics or must take Empirical Analysis I (PA 5031). PA 5031 does not count toward fulfilling the 36-credit minimum requirement.

Required Core Courses

PA 5002 - Introduction to Policy Analysis (1.5 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
PA 5711 - Science, Technology & Environmental Policy (3.0 cr)
PA 5715 - Survey of Current Issues in Science, Technology, and Environmental Policy (1.5 cr)
PA 5741 - Risk, Resilience and Decision Making (1.5 cr)
PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
or
PA 5752 - Material-Energy Flows for a Sustainable Society (3.0 cr)
or
APEC 5721 - Economics of Science and Technology Policy (3.0 cr)
PA 5712 - Science to Action: All Paths (1.5 cr)
or
PA 5742 - Interdisciplinary Environmental Study: Practice and Design (1.5 cr)

Additional Required Course

Take one of the following courses:

PA 5723 - Water Policy (3.0 cr)
or
PA 5721 - Energy and Environmental Policy (3.0 cr)
or
PA 5731 - Emerging Technologies and Society (3.0 cr)
or
PA 5751 - Urban Infrastructure Systems for Sustainable and Healthy Cities (3.0 cr)

Methods Courses

Take two of the following courses:

PA 5032 - Regression Analysis (2.0 cr)
or
PA 5044 - Regression Analysis, Accelerated (2.0 cr)
PA 5033 - Multivariate Techniques (2.0 cr)
or
PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)

Electives

Electives to bring total credits to at least 36, in consultation with the advisor.

Plan Options

Plan A Requirements
Take 10 master's thesis credits.

**PA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)**

-OR-

**Plan C Requirements**

Take one of the following courses:

**PA 8081 - Capstone Workshop (3.0 cr)**

**PA 8082 - Working Group (3.0 cr)**

**PA 8921 - Master's: Professional Paper (Individual Option) (1.0 - 3.0 cr)**

**Joint- or Dual-degree Coursework:** MS-STEP/JD (Joint Degree Program in Law, Health, and the Life Sciences) Student may take a total of 24 credits in common among the academic programs.
Twin Cities Campus
Science, Technology, and Environmental Policy Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in science, technology, and environmental policy provides students with an understanding of the role of science and technology in society, including food and agriculture, the economy, energy and the environment, security, health, and education; the impact of science and technology on the political and economic relationships within and among nations; and the analysis and design of policies for appropriate promotion and regulation of science and technology regionally, nationally, and internationally.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor in science, technology, and environmental policy consists of graduate-level public affairs (PA) courses. Up to 3 credits may be taken on an S/N grade basis. All other courses must be completed with grades of B or better. Specific coursework is chosen in consultation with the student's minor adviser or director of graduate studies. Students are required to take a minimum of three credits from those required in the M.S.-STEP degree program.
Twin Cities Campus
Urban and Regional Planning M.U.R.P.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Urban and Regional Planning

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of urban and regional planning (MURP) degree is an interdisciplinary program that prepares students to analyze, forecast, design, and implement plans for regions, communities, and neighborhoods. Students develop a comprehensive understanding of the built environment (land use, transportation, housing, regional economies) and the ability to mediate among competing interests. They are prepared for jobs in public, nonprofit, and private sectors. Students can generally complete the MURP degree in two years of full-time study.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment.

Other requirements to be completed before admission:
While no specific experience or academic pathway is required, students with a strong liberal education background and sound quantitative and analytical skills will be best prepared for academic success at the Humphrey School of Public Affairs.

Previous coursework in mathematics, statistics, and economics is recommended. Past applicants needing to strengthen this part of their skill set have found courses in introductory microeconomics, college algebra, and introductory statistics to be helpful preparation.

Special Application Requirements:
A complete application will include a University of Minnesota graduate application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and an optional diversity statement.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 38 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 48 major credits and up to null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A 400-hour professional internship is required. MURP students must demonstrate competence with GIS through coursework or work experience. (Students not competent in GIS must take a graduate-level GIS course as part of their 48 credits.)

Required Core Courses
- PA 5004 - Introduction to Planning (3.0 cr)
- PA 5013 - Law and Urban Land Use (1.5 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5042 - Urban and Regional Economics (2.0 cr)
- PA 5043 - Economic and Demographic Data Analysis (2.0 cr)
- PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)
- PA 5211 - Land Use Planning (3.0 cr)
- PA 5253 - Designing Planning and Participation Processes (3.0 cr)
- PA 8081 - Capstone Workshop (3.0 cr)

Plan Options

Plan A Requirements
Plan A students must complete at least 38 course credits, which will include the core courses, at least 6 credits from one of four concentration areas, and electives. Plan A students also must take at least 10 master's thesis credits.

Concentration Requirement
Take at least 6 credits from one of the following concentration areas: Environmental Planning; Housing and Community Development; Land Use and Urban Design; or Transportation Planning.

Electives
Take elective courses as needed to meet the 38-credit requirement for coursework.

Thesis Credits
Take 10 master's thesis credits.
- PA 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan C Requirements
Plan C students must complete at least 48 course credits, which will include the core courses, at least 12 credits from one of four concentration areas, and electives.

Concentration Requirement
Take at least 12 credits from one of the following concentration areas: environmental planning; housing and community development; land use and urban design; or transportation planning.

Electives
Take elective courses as needed to meet the 48-credit requirement.

Joint- or Dual-degree Coursework: MURP/JD: 29 credits in common allowed. MURP/MLA: 37 credits in common allowed. MURP/MPH: 26 credits in common allowed. MURP/MSCE: 18 credits in common allowed. MURP/MSW: 21 credits in common allowed for the full program; 15 for the advanced standing program; and 11 for MSW Direct Practice.
Twin Cities Campus
Urban and Regional Planning Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002) Email: hhhadmit@umn.edu Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Planners bring together knowledge and expertise from many diverse disciplines to shape neighborhoods, cities, and regions. The urban and regional planning minor helps students to think across those fields of expertise and act upon links among environmental systems, infrastructure development, and housing and community development. The program teaches technical and analytical skills needed to think strategically about developing and implementing plans at the neighborhood, city, and regional level.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework is chosen in consultation with the urban and regional planning advisor or director of graduate studies. At least 3 credits must be from the master's of urban and regional planning (MURP) curriculum. No more that 3 credits may be taken S/N. All other courses must be completed with grades of B or higher.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Coursework
Take at least 9 credits from the following, in consultation with the urban and regional planning minor advisor or director of Graduate Studies:
PA 5xxx
PA 8xxx

Doctoral
Required Coursework
Take at least 12 credits from the following, in consultation with the urban and regional planning advisor or director of Graduate Studies:
Twin Cities Campus
Juridical Science S.J.D.
Law School
Law School

Link to a list of faculty for this program.

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Juridical Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The SJD program at the University of Minnesota Law School is intended for those who wish to carry on advanced legal study and original research under faculty supervision. SJD students must present research which makes a significant, original contribution of long-term value to legal scholarship. The dissertation must be of publishable quality and provide lawyers, scholars, or governmental officials with a useful understanding, not previously available, of a particular area of the law.

Accreditation
This program is accredited by acquiescence of the American Bar Association.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have completed the first degree in law AND must have completed (or are in the process of completing) a US LLM degree at the University of Minnesota or another institution.

Special Application Requirements:
1) Submission of a preliminary dissertation proposal demonstrating that the dissertation will constitute an original and substantial contribution, of publishable quality, to legal scholarship, in a research field in which the Law School has experienced faculty available for advising, and 2) Submission of an extensive, high quality writing sample written in English to demonstrate the ability to engage in advanced research and writing.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Coursework Requirements
LAW 6851 - Practice-Ready Legal Research (2.0 cr)
The remaining 22 credits are determined through consultation with their faculty adviser and the director of graduate studies.

Thesis Credit Requirement
24 Thesis Credits
Twin Cities Campus
Law Minor
Law School

Link to a list of faculty for this program.

Contact Information:
Law School, Walter F. Mondale Hall, 229 19th Avenue South, Minneapolis, MN 55406 (612-625-1000; fax: 612-625-2011)
Email: lawreg@umn.edu
Website: http://www.law.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

A law minor is available to both master's and doctoral students and is individually tailored to their academic interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Admission to the law graduate minor is contingent upon prior admission to a University of Minnesota master's or doctoral degree-granting program. Enrollment in Law School courses is on a space-available basis, with preference given to law-degree-seeking candidates. Some Law School courses are open for graduate student registration without need for permission. Other courses require that students request admission by completing a declaration form and the non-Law student petition form (found at https://www.law.umn.edu/academics/non-degree-programs/graduate-and-undergraduate-courses), and submitting them to the Law School Registrar's office.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A masters minor requires at least 6 graduate credits; a doctoral minor requires at least 12 graduate credits.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Masters
Required Courses
Masters students must complete 6 credits of LAW coursework.

Doctoral
Required Courses
Doctoral students must complete 12 credits of LAW coursework.
Twin Cities Campus
Master of Science Patent Law
Law School
Law School

Link to a list of faculty for this program.

Contact Information:
612-625-4819

Chris Frank, J.D., Program Director of Master of Science in Patent Law Program
411 Walter F. Mondale Hall
229 19th Avenue South
Minneapolis, MN 55455
Email: patlaw@umn.edu
Website: https://www.law.umn.edu/academics/degree-programs/mspl-program

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Science Patent Law

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Science in Patent Law is a professional master's degree for scientists and engineers interested in pursuing a career in the growing field of patent law. The program requirements may be completed in one year of full-time study or in two years (with an optional third year) on a part-time basis. This program is offered through the University of Minnesota Law School. Students in this program will learn practical patent drafting, patent research, patent portfolio management and innovation skills. Many courses in this program will be taken jointly with J.D. students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants with a degree in Science or Engineering are preferred.

Other requirements to be completed before admission:
GRE and LSAT scores are accepted but not required.

Special Application Requirements:
Personal statement, resume, letters of recommendation, interview, patent bar eligibility assessment.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 to 36 major credits and 0 credits outside the major. The is no final exam. A capstone project is required.
Capstone Project: Patent Law CAPSTONE: Innovation (3 credits): In this course students will select a technology of interest with the cooperation of their adviser. Using their knowledge of innovation, patent law, patent prosecution, patent research and strategy they will identify, articulate and present opportunities for innovation in their chosen technology.
This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Patent Law: Core Curriculum**

Students are required to take 23 credits of core coursework, plus 7 additional elective credits as approved by the program director.

- LAW 5001 - Introduction to the American Legal System (2.0 cr)
- LAW 5224 - Patents (3.0 cr)
- LAW 5231 - Patent Prosecution Practice I (2.0 cr)
- LAW 5250 - Patent Portfolio Management (2.0 cr)
- LAW 5003 - Writing, Analysis & Persuasion (3.0 cr)
- LAW 5025 - Patent Law Proseminar (1.0 cr)
- LAW 5232 - Patent Prosecution Practice II (3.0 cr)
- LAW 5707 - Intellectual Property Transactions (2.0 cr)
- LAW 5290 - Patent Law Capstone: Innovation (3.0 cr)
- LAW 5075 - Ethics for Patent Agents (1.0 cr)
- LAW 5026 - Intellectual Property and Technology Proseminar (1.0 cr)

**Electives**

Students may choose from the following list of electives. Other courses may be approved in consultation with the program director.

Take 7 or more credit(s) from the following:

- LAW 6608 - Trademarks (3.0 cr)
- LAW 6613 - Copyright (3.0 cr)
- LAW 6248 - Advanced Patents (2.0 cr)
- LAW 6225 - Winning Patent Litigation (2.0 cr)
- LAW 6949 - Biotechnology & Patent Law (2.0 cr)
- LAW 6402 - Food and Drug Law (3.0 cr)
Twin Cities Campus
Integrative Biology and Physiology M.S.

Integrative Biology and Physiology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5902; fax: 612-625-5149)
Email: ibpdept@umn.edu
Website: http://physiology.med.umn.edu/graduate-program/

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students enter the Twin Cities M.S. program in integrative biology and physiology only for exceptional reasons. Most Twin Cities graduate work is performed at the Ph.D. level. See the Integrative Biology and Physiology Ph.D. program for more information.

The graduate programs in the Twin Cities have a cardiovascular emphasis, although other areas of specialization are represented.

On the Duluth campus, students can enroll in coursework and participate in research in several basic areas.

The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.
Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project focuses on some aspect of Physiology. Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Duluth campus: All course requirements for the M.S. degree can be completed on the Duluth campus. Students are expected to fulfill all degree requirements over a period of two to three calendar years. The program includes at least 20 credits in physiology and 6 credits in a minor or related field of study. Incoming students are encouraged to undertake at least two laboratory rotations in faculty research laboratories of their choice. Fulfillment of degree requirements also includes the presentation and defense of a thesis (Plan A). The final written examination and oral defense of the thesis takes place with participation of faculty from both campuses.

Twin Cities campus: Plan A or B degrees are awarded only in exceptional circumstances. A Plan A M.S. degree requires 14 credits in physiology and 6 credits outside of physiology. The degree is based on laboratory research off or on campus, and requires a written thesis or written project and an oral presentation of the work for the final exam. The M.S. degree is Plan A, unless there are special circumstances requiring a Plan B. For Plan B, the final exam is oral.
**Twin Cities Campus**

**Integrative Biology and Physiology Minor**

**Medical School**

Link to a list of faculty for this program.

**Contact Information:**
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5902; fax: 612-301-1543)
Email: ibpdept@umn.edu
Website: http://physiology.med.umn.edu/graduate-program/

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a “hybrid” field in which expertise from many other disciplines is ordinarily required and combined. The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals.

The graduate program in the Twin Cities has a cardiovascular emphasis, although many other areas of specialization are represented.

The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
Other requirements to be completed before admission:
For the minor, a background in mathematics, physics, chemistry, and biology acceptable to the graduate faculty is required.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of 6 graduate credits in physiology is required (with approval by the director of graduate studies) for the master's minor. Ph.D. students seeking a doctoral minor are expected to take PHSL 5101 or the equivalent, plus additional courses for a total of 12 credits. Approval is required by the director of graduate studies.

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Masters**
Doctoral
Twin Cities Campus
Integrative Biology and Physiology Ph.D.

Contact Information:
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street SE, Minneapolis, MN 55455 (612-625-5902; fax: 612-301-1543)
Email: ibpdept@umn.edu
Website: http://z.umn.edu/ibpgradprog

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a “hybrid” field in which expertise from many other disciplines is ordinarily required and combined.

The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals. PhD students take a core concentration that provides a broad background in the physiology of membranes, cells, transport, and organ systems. Individualized programs are structured to build on the student's strengths and to fill in gaps that would otherwise be an impediment to specific problem solving. Teaching experience is also available to all students.

The graduate program in the Twin Cities has a cardiovascular emphasis, although many other areas of specialization are represented.

Students can enter the PhD program from the Twin Cities or Duluth campus. Highly qualified individuals with solid quantitative backgrounds are encouraged to apply. In the Twin Cities, prospective students also include people with previous medical training who are already at the University of Minnesota or are considering the University of Minnesota Medical School for residency or fellowship training.

Entering PhD students are expected to take a series of laboratory rotations to familiarize themselves with active areas of research within the degree program. The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Other requirements to be completed before admission:
An undergraduate degree with at least one year (three quarters or two semesters) of calculus, one year of physics, one year of biology, and two years of chemistry is required. For the minor, a background in mathematics, physics, chemistry and biology acceptable to the graduate faculty is required.

Special Application Requirements:
For the Ph.D., applicants must take either the General Test of the GRE or the Medical College Admission Test. In addition, all applicants need three letters of recommendation. Admission to the program begins in the Fall semester.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The PhD program requires courses in cellular physiology and medical physiology. Coursework is tailored to the student's interests with input from the director of graduate studies and the student's advisor. During the first year, students rotate through three laboratories, attend weekly seminars, choose an advisor, and begin a research project. A preliminary written exam in physiology is given after the first year and examines the ability of the student to apply concepts learned in core courses. By the end of the second year, students have completed their coursework including a grant-writing class, and selected a laboratory for their thesis research. A preliminary oral exam is given at the end of the second year and tests the student's ability to apply principles of both physiology and the minor or supporting program to a proposed research-based thesis. A minimum of 12 credits must be completed in the minor field or supporting program.

Required Coursework
Take all of the coursework from the following list. Take 2 to 8 credits of PHSL 8294 (Lab Rotation), and 2 to 8 credits of PHSL 5096 (Seminar). Take PHSL 8232 (Journal Club) in conjunction with PHSL 5101.
ANSC 5700 - Cell Physiology (4.0 cr)
PHSL 8294 - Research in Physiology (1.0 - 18.0 cr)
PHSL 5096 - Integrative Biology and Physiology Research Advances (1.0 cr)
PHSL 5101 - Human Physiology (5.0 cr)
PHSL 8232 - Critical Reading of Journal Articles in Physiology (2.0 cr)
BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
PHSL 8242 - Professional Skills Development For Biomedical Scientists (1.0 cr)
PHSL 5701 - Physiology Laboratory (1.0 - 2.0 cr)

Molecular Biology/Genetics Options
Take at least 3 credits of molecular biology/genetics coursework, chosen in consultation with the advisor.
BIOL 4003 - Genetics (3.0 cr)
or BIOL 4004 - Cell Biology (3.0 cr)
or BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
or BIOC 4332 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
or BIOC 6021 - Biochemistry (3.0 cr)

Biostatistics Options
Take at least 3 credits of biostatistics coursework, chosen in consultation with the advisor.
STAT 5021 - Statistical Analysis (4.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)

Outside Coursework
Take at least 12 credits of coursework outside the major, in consultation with the advisor.

BMEN 5001 - Advanced Biomaterials (3.0 cr)

or BMEN 5041 - Tissue Engineering (3.0 cr)

or BMEN 5101 - Advanced Bioelectricity and Instrumentation (3.0 cr)

or BMEN 5351 - Cell Engineering (3.0 cr)

or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)

or GCD 4134 - Endocrinology (3.0 cr)

or NSC 5540 - Survey of Biomedical Neuroscience (2.0 cr)

or PHSL 4021 - Advanced Physiology and Bioengineering: Bionic Human (3.0 cr)

or PHSL 5095 - Problems in Physiology (1.0 - 5.0 cr)

or PHSL 5197 - Stress Physiology (1.0 cr)

or PHSL 5444 - Muscle (3.0 cr)

or PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)

or PHSL 5525 - Anatomy and Physiology of the Pelvis and Urinary System (1.0 - 2.0 cr)

or PHSL 8222 - Central Regulation of Autonomic Function (3.0 cr)

**Thesis Credits**

Take 24 credits of doctoral thesis credits.

PHSL 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Medical Physics M.S.
Radiation Oncology Administration, Radiology
Medical School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota Medical School, Department of Radiation Oncology, Mayo Mail Code 494, 420 Delaware Street S.E., Minneapolis, MN 55455 (phone: 612-626-6154; fax: 612-626-7060)
Email: gerbi001@umn.edu
Website: http://www.med.umn.edu/trad/GraduateProgram/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- no
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program is made up of faculty members with primary appointments in departments that include radiation oncology, radiology, physics, engineering, computer science, physiology, dentistry, and biochemistry. In addition to providing clinical experience in areas such as radiation oncology, radiation safety and quality assurance, the program is active in research and provides graduate level training in medical physics. The goal of the program is to prepare students (1) for further education, teaching, and research in medical physics, (2) to qualify to enter a medical physics residency program in radiation oncology or diagnostic radiology, and (3) to provide the mathematical and technical knowledge needed to succeed in the increasingly complex field of medical physics.

Accreditation
This program is accredited by Commission on Accreditation of Medical Physics Education Programs, Inc. (CAMPEP)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A degree in physics or engineering or other physical science. Equivalent of an undergraduate physics minor-at least 2 semesters of calculus based physics and at least 3 upper level physics courses.

Other requirements to be completed before admission:
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation are required. The General Test of the GRE is required. The computer based GRE exam is provided year-round by the Educational Testing Service. A list of test sites can be found at: http://www.ets.org/gre. Our institution code is R6874 with no department code. If the GRE was taken more than two years prior to application, the applicant will need to retake the examination. We have no absolute GRE cutoff score, but the score is taken into consideration among many individual factors in the evaluation of each application. Applicants are considered for admission in both semesters.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS - Total Score: 6.5
- MELAB - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The M.S. is offered under one plan. Plan B students complete a project under the direction of a faculty member/advisor, submit a written document to their oral exam committee, and defend their work in front of the committee.

Required Courses M.S.
- MPH 5170 - Basic Radiological Physics (3.0 cr)
- PHYS 5401 - Physiological Physics (4.0 cr)
- MPH 5138 - Research Seminar (1.0 - 5.0 cr)
- MPH 5173 - Medical and Health Physics of Radiation Therapy (3.0 cr)
- PHYS 5402 - Radiological Physics (4.0 cr)
- PHAR 5201 - Applied Health Sciences Terminology (2.0 cr)
- MPH 5171 - Medical and Health Physics of Imaging I (3.0 cr)
- MPH 5172 - Radiation Biology (3.0 cr)
- MPH 5174 - Medical and Health Physics of Imaging II (3.0 cr)
- MPH 5139 - Seminar and Journal Club (1.0 cr)

Medical Physics Electives
Other electives as advised.
- MPH 5177 - Radiation Therapy Physics Lab: Radiation Physics Basics (3.0 cr)
or MPH 8149 - Advanced Topics in Radiation Therapy Physics (2.0 cr)
or MPH 8148 - Advanced Digital Imaging Science (3.0 cr)
or MPH 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)

ADDITIONAL REQUIREMENTS (NOT FOR CREDIT)
In the fall semester of their first year, students must take the University ethics training: Responsible Conduct of Research (RCR), Parts 1 (a 3-hour session offered about 4 times/year) and 2.
Twin Cities Campus
Medical Physics Ph.D.
Radiation Oncology Administration, Radiology
Medical School

Link to a list of faculty for this program.

Contact Information:
Therapeutic Radiology, Dept of MMC 494 Mayo 8494A 420 Delaware St SE Minneapolis, MN 55455
Email: gerbi001@umn.edu
Website: http://www.med.umn.edu/grad/GraduateProgram/home.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- no
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program is made up of faculty members with primary appointments in departments that include radiation oncology, radiology, physics, engineering, computer science, physiology, dentistry, and biochemistry. In addition to providing clinical experience in areas such as radiation oncology, radiation oncology, radiation safety and quality assurance, the program is active in research and provides graduate level training in medical physics. The goal of the program is to prepare students (1) for further education, teaching, and research in medical physics, (2) to qualify to enter a medical physics residency program in radiation oncology or diagnostic radiology, and (3) to provide the mathematical and technical knowledge needed to succeed in the increasingly complex field of medical physics.

Accreditation
This program is accredited by Commission on Accreditation of Medical Physics Education Programs, Inc. (CAMPEP)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A degree in physics or engineering or other physical science. Equivalent of an undergraduate physics minor-at least 2 semesters of calculus based physics and at least 3 upper level physics courses.

Other requirements to be completed before admission:
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation are required. The General Test of the GRE is required. The computer based GRE exam is provided year-round by the Educational Testing Service. A list of test sites can be found at: http://www.ets.org/gre. Our institution code is R6874 with no department code. If the GRE was taken more than two years prior to application, the applicant will need to retake the examination. We have no absolute GRE cutoff score, but the score is taken into consideration among many individual factors in the evaluation of each application. Applicants are considered for admission in both semesters.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
IELTS
- Total Score: 6.5
MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
48 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Ph.D. students take preliminary written exams at the end of the first year of study or as soon as possible after completing the core course sequence in topics in physics for medicine and biology. An oral preliminary exam focuses on the plan for thesis research and the student's grasp of related information and is taken by the fall of the third year of full-time registration or its equivalent. Additionally, 24 thesis credits are required.

Required Courses
- MPH 5170 - Basic Radiological Physics (3.0 cr)
- PHYS 5401 - Physiological Physics (4.0 cr)
- MPH 5138 - Research Seminar (1.0 - 5.0 cr)
- MPH 5173 - Medical and Health Physics of Radiation Therapy (3.0 cr)
- PHYS 5402 - Radiological Physics (4.0 cr)
- PHAR 5201 - Applied Health Sciences Terminology (2.0 cr)
- MPH 5171 - Medical and Health Physics of Imaging I (3.0 cr)
- MPH 5172 - Radiation Biology (3.0 cr)
- MPH 5174 - Medical and Health Physics of Imaging II (3.0 cr)
- MPH 5177 - Radiation Therapy Physics Lab: Radiation Physics Basics (3.0 cr)
- MPH 8149 - Advanced Topics in Radiation Therapy Physics (2.0 cr)
- MPH 5139 - Seminar and Journal Club (1.0 cr)

Medical Physics Electives
Electives will be based on focus of program objectives with advisor.
- MPH 8148 - Advanced Digital Imaging Science (3.0 cr)
- or MPH 8147 - Advanced Physics of Magnetic Resonance Imaging (MRI) (3.0 cr)
- or Other electives as advised.

ADDITIONAL REQUIREMENTS (NOT FOR CREDIT)
In the fall semester of their first year, students must take the University ethics training:
Responsible Conduct of Research (RCR), Parts 1 (a 3-hour session offered about 4 times/year) and 2.
**Twin Cities Campus**

**Microbiology, Immunology, and Cancer Biology M.S.**

*Medical School - Adm*

**Medical School**

Link to a list of faculty for this program.

**Contact Information:**
Department of Microbiology and Immunology, 689 23rd Avenue SE, Minneapolis, MN  55455, 612-624-5947
Email: micab@umn.edu
Website: [http://micab.umn.edu](http://micab.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly into the master's program; it is available only by special arrangement with the program.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a bachelor's degree (B.S. preferred).

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 85

Key to [test abbreviations](#) (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 12 to 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may not be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students are not admitted directly into the master's program; it is available only by special arrangement with the program. Students complete 14 MICA course credits, 6 credits in the minor or related field, and 10 thesis credits. Students must write and defend a thesis based on original research.
Microbiology, Immunology, and Cancer Biology Minor

Contact Information:
Department of Microbiology and Immunology, 690 23rd Avenue SE, Minneapolis, MN 55455, 612-624-5947
Email: micab@umn.edu
Website: http://micab.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- No

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a bachelor's degree (B.S. preferred).

Other requirements to be completed before admission:
Required courses include calculus, general chemistry, organic chemistry, and physics. A minimum of two upper-level biology courses, which may include biochemistry, genetics, cell biology, molecular biology, microbiology, or immunology, etc. are also required.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 96

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students enrolled in a University master's or doctoral program are eligible for the MICaB minor. Requirements for the master's- and doctoral-level MICaB minor include: completion of 8 MICaB credits from 2 of the following 4-credit courses: MICA 8002, MICA 8003, MICA 8004; and the approval of the MICaB director of graduate studies. Doctoral students must also complete at least 4, but no more
than 10, additional MICaB credits in consultation with the MICaB director of graduate studies.

**MICaB minor requirements**  
Minimum requirement of 12-18 credits to include: two or three of the following MICa 8002, 8003 or 8004; and other MICa 8000-level 2, 3 or 4 credit courses to total 12-18 credits (excluding MICa 8012).

**Program Sub-plans**  
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

- Masters
- **Course Group 0**

- Doctoral
Twin Cities Campus
Microbiology, Immunology, and Cancer Biology Ph.D.
Medical School - Adm
Medical School

Link to a list of faculty for this program.

Contact Information:
Microbiology, Immunology and Cancer Biology PhD Program, 689 23rd Avenue SE, Room 1-109, University of Minnesota, Minneapolis, MN 55455
612-624-5947
Email: micab@umn.edu
Website: http://micab.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 48
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Accreditation
This program is accredited by NA

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a bachelor's degree (BS preferred).

Other requirements to be completed before admission:
Required courses include calculus, general chemistry, organic chemistry, and physics. A minimum of two upper-level biology courses, which may include biochemistry, genetics, cell biology, molecular biology, microbiology, or immunology, etc., are also required.

Research experience is required. Relevant undergraduate experience includes honors thesis work, paid or volunteer work in a research laboratory and summer internships. It does not include laboratory courses that accompany science courses such as biology. Postbaccalaureate research experience is preferred but not required.

Special Application Requirements:
The program evaluates applications based on four equally weighted criteria: academics (GPA and GRE scores), letters (3) of recommendation, a personal statement, and research experience. The average GPA and GRE scores of accepted applicants are typically 3.50 and 80th percentile, respectively (no GRE Subject Test is required). Letters of recommendation from research advisers or mentors are preferred as these individuals can comment knowlegably on the student's potential in biomedical research. Applicants’ personal statements should describe their research in general and their specific contribution to it, their rationale for seeking a doctoral degree, and any information they wish to share regarding their backgrounds and interest in the MICaB Program. Finally, applicants should provide specific details of their research experiences (project titles, mentors, dates, locations, etc.), along with a list of relevant abstracts, publications, etc.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
11 to 12 credits are required in the major.
12 to 13 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Beginning study in the fall, students spend their first year on major coursework, identifying an advisor by doing laboratory rotations, selecting a focus area, and initiating their thesis research project. In the fall semester of their second year, all students take MICA 8012, which highlights the integrated nature of the three foci and helps prepare the students for their written and oral qualifying examinations (taken in the spring semester of the second year). Students also take courses that support studies in their focus area during their first two years.

In addition to coursework and research, students have opportunities to participate in laboratory meetings, journal clubs, and student research seminars, and to assist in laboratory courses. Most students complete the PhD in five years.

Required Coursework
Take 8 credits from the following list. Take MICA 8094 during the fall and spring semesters of the first year for a total of 2 credits. While students are required to take only one of the three core courses (MICA 8002, 8003, and 8004), they are encouraged to take all three.
MICA 5000 - Practicum: Teaching (0.0 cr)
MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
MICA 8003 - Immunity and Immunopathology (4.0 cr)
MICA 8004 - Cellular and Cancer Biology (4.0 cr)
MICA 8012 - Writing and Reviewing a Research Proposal (2.0 cr)
MICA 8094 - Research in Microbiology, Immunology, and Cancer Biology (1.0 cr)
MICA 8910 - Seminar: Faculty Research Topics (0.0 cr)
MICA 8920 - Seminar: Student Research Topics (0.0 cr)

Focus Area and Elective Coursework
Take one 3-credit, 5xxx-level or higher focus area science course in the first and second years. Select a focus area course from the following list, or another course related to the area of interest. MICA 8002, 8003 or 8004 can be used as a focus area course, if not taken as a required course. Elective courses also can be chosen from this list or selected in consultation with the advisor. No more than one 4xxx-level course can be applied towards credit requirements.
Take 16 or more credit(s) from the following:
• BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
• BIOC 5552 - Biotechnology and Bioengineering for Biochemists (3.0 cr)
• BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
• BIOC 5960 - Special Topics in Biochemistry (3.0 cr)
• BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
• BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
• BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
• BTHX 5610 - Research & Publication Seminar (1.0 cr)
• CHEM 8412 - Chemical Biology of Enzymes (4.0 cr)
• CHEN 8754 - Systems Analysis of Biological Processes (3.0 cr)
• CHEN 8995 - Special Topics (1.0 - 4.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• CSCI 5980 - Special Topics in Computer Science (1.0 - 3.0 cr)
• ESCI 4801 - Geomicrobiology (3.0 cr)
• GCD 5005 - Computer Programming for Cell Biology (3.0 cr)
• GCD 6103 - Human Histology (3.0 - 8.0 cr)
• GCD 8006 - Mammalian Gene Transfer and Expression (2.0 cr)
• GCD 8073 - Advanced Human Genetics (3.0 cr)
• GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
• GCD 8151 - Cell Structure and Function (3.0 cr)
• GCD 8161 - Advanced Developmental Biology (3.0 cr)
• GCD 8920 - Special Topics (2.0 cr)
• GEOG 8260 - Seminar: Physical Geography (2.0 cr)
• GRAD 5102 - Preparation for University Teaching for Nonnative English Speakers (2.0 cr)
• GRAD 8101 - Teaching in Higher Education (3.0 cr)
• GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)
• HINF 5502 - Programming Essentials Python 3 (1.0 cr)
• LAAS 5311 - Soil Chemistry and Mineralogy (3.0 cr)
• MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
• MICA 8010 - Microbial Pathogenesis (3.0 cr)
• MICA 8011 - Current Topics in Immunology (3.0 cr)
• MICA 8013 - Translational Cancer Research (2.0 cr)
• MICA 8014 - Small RNA Biology (2.0 cr)
• MICA 8371 - Mucosal Immunobiology (3.0 cr)
• PHCL 5111 - Pharmacogenomics (3.0 cr)
• PHSL 8242 - Professional Skills Development For Biomedical Scientists (1.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6341 - Epidemiologic Methods I (3.0 cr)
• PUBH 6450 - Biostatistics I (4.0 cr)
• PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
• SCB 8181 - Stem Cell Biology (3.0 cr)
• VMED 5180 - Ecology of Infectious Disease (3.0 cr)

**Thesis Credits**

Take at least 24 doctoral thesis credits.

MICA 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Neuroscience M.S.
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 26 major credits, 12 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The course requirements for a master's degree are the same as those for a Ph.D. degree. See the Program Requirements of the Neuroscience Ph.D.
Twin Cities Campus

Neuroscience Minor

Medical School

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Doctorate): 16
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A doctoral minor program is developed in consultation with the director of graduate studies for neuroscience. Students are required to take one of the following core courses.

Function/Structure: NSC 5561 - Systems Neuroscience (4 cr) or
Cellular/Molecular: NSC 5461 - Cellular and Molecular Neuroscience (4 cr)

In addition, students are required to take elective neuroscience courses for a total minimum of 12 credits (including the core courses).
Twin Cities Campus
Neuroscience Ph.D.
Neuroscience
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street SE, Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 51
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Applicants are required to take the GRE General Test. Students whose native language is not English are required to take the TOEFL and obtain a minimum score of 625 (paper) or 107 (Internet); or obtain 6.5 on the IELTS examination. There are no minimum GPA or GRE score requirements to apply.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 107
  - Paper Based - Total Score: 625
• IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
21 credits are required in the major.
6 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The neuroscience PhD curriculum begins in the summer session with the intensive laboratory course in cellular and molecular neurobiology (NSC 5551), held at the Itasca Biological Station and Laboratories.

The core curriculum continues on the Twin Cities campus with NSC 5461, 5561, 5661, and 8211. While taking these courses, students explore research opportunities in the faculty's laboratories and thereby select a thesis advisor.

Students will also participate in journal clubs (NSC 8320) to discuss work in the field of Neuroscience. Elective courses totaling 6 credits are required and selected in consultation with the advisor.

Students with sufficient background and previous course experience may apply for a waiver of specific requirements. A student, if they so choose, must take at least 12 elective credits to receive a minor (typical minors include cell biology, physiology, statistics, and psychology). Students are also expected to participate in teaching neuroscience and to attend the weekly colloquiums, as well as neuroscience seminars and sessions devoted to professional development. Students are strongly encouraged to attend seminars in other areas and departments that may interest them.

**Summer - First Year**
- NSC 5551: Cell & Molecular Neurobiology Lab at Itasca (4 cr)

**Fall - First Year**
- NSC 5461: Cellular & Molecular Neuroscience (4 cr)
- NSC 5561: Systems Neuroscience (4 cr)
- NSC 8321: Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)

**Spring - First Year**
- NSC 5661: Behavioral Neuroscience (3 cr)
- NSC 8211: Developmental Neurobiology (3 cr)
- NSC 8320: Neuroscience Seminar Series Journal Club (Section 2) (1 cr)
- NSC 8321: Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)

**Fall - Second Year**
- NSC 8321: Career Skills and Understanding Responsibilities as a Neuroscientist (0.5 cr)

**Spring - Second Year**
- NSC 8320: Neuroscience Seminar Series Journal Club (Section 2) (1 cr)

**Electives**
During the course of PhD studies, take at least 6 credits of electives. Electives are chosen in consultation with the advisor.
Twin Cities Campus
Orthoptics Post-baccalaureate Certificate
Ophthalmology
Medical School

Link to a list of faculty for this program.

Contact Information:
Minnesota Lions Children's Eye Clinic
(University of Minnesota Physicians and University of Minnesota Amplatz Children's Hospital)
701 25th Ave S. Ste 300
Minneapolis, MN 55454
612-365-8365
612-365-8351 (Fax)
Email: kmerrill@umphysicians.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 14
- This program requires summer semesters for timely completion.
- Degree: Orthoptics PostBaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Orthoptic Certificate program is a vital part of the ophthalmic health care profession. This is a specialized profession, the focus of which is the evaluation and treatment of disorders of vision, eye movements, and eye alignment in children and adults. The study of orthoptics follows a logical sequence of studies vital to the understanding of the visual system. The didactic education is integrated with practical clinical experience. Orthoptists work with ophthalmologists, eye physicians and surgeons, as part of the medical team. They are employed in a variety of settings, including university and teaching hospitals, children's hospitals, and solo or multi-specialty group medical practices. An orthoptist sees a variety of patients of all ages, although due to the nature of their visual disorders, the majority of the patients are young children; some individuals with multiple health concerns are also evaluated as they commonly have ocular/binocular problems. After completing an Orthoptic Certificate, a student earns national certification as an orthoptist through written and practical examinations administered by the American Orthoptic Council.

This program requires two semesters and a summer term of coursework.

Accreditation
This program is accredited by American Association of Certified Orthoptists

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.00.

Required prerequisites
Course Group 0

Other requirements to be completed before admission:
Requirements for entry into the Orthoptics Certificate Program include the following:
1. Completion of baccalaureate degree with GPA at least 2.0.
2. Successful completion of one year in a hospital/clinic-based ophthalmic technician training program (e.g., Regions Hospital)

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

The 2.8 GPA requirement complies with University of Minnesota policy.

Orthoptics Required Courses
- OPH 5501 - Orthoptics I (4.0 cr)
- OPH 5601 - Orthoptics II (5.0 cr)
- OPH 5701 - Orthoptics III (5.0 cr)

Required Core

Orthoptic Certificate
Twin Cities Campus
Otolaryngology Ph.D. Otol.
Otolaryngology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Otolaryngology, MMC 396, 420 Delaware Street SE, Minneapolis, MN 55455 (612-625-3200; fax: 612-625-2101)
Website: http://www.ent.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 55
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy in Otolaryngology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students in both clinical and experimental aspects of otolaryngology. The Ph.D.Otol. degree requires a publishable thesis. Rotations at University of Minnesota Medical Center-Fairview, Minneapolis Veterans Administration Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Hennepin County Medical Center provide a wide range of opportunity for clinical education and surgical experience.

Opportunities for independent research are provided in the laboratories of audiology, auditory electrophysiology, auditory neurophysiology, biochemistry, cancer biology, cell biology and genetics, electron microscopy, electrophysiology, histochemistry, morphometry, psychoacoustics, temporal bone pathology, tumor immunology, skin-flap physiology, laryngeal physiology, mandibular bone physiology, microvascular tissue transfer, and vestibular physiology. Graduates of the program have careers in teaching, research, and professional practice.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Other requirements to be completed before admission:
Requires a bachelor's or master's degree, preferably in an area related to otolaryngology or, for those pursuing the degree in conjunction with a residency in otolaryngology, an MD degree.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
19 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The number of credits varies depending on preparation and the research undertaken. Most students take a total of about 55 credits. A minimum of 12 credits in the minor or supporting program, plus 24 doctoral thesis credits, are required. An advisory committee, including the student, the advisor, and the director of graduate studies, determines coursework in the major. At least one seminar is
selected from seminars such as OTOL 8247, 8248, 8249, and 8250. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies.

All students are expected to publish a research paper in a peer-reviewed journal. Students concurrently in an otolaryngology residency usually take five to six years to complete research, course, and dissertation requirements.
Twin Cities Campus
Pharmacology M.S.
Pharmacology
Medical School

Contact Information:
Department of Pharmacology, 6-120 Jackson Hall, 321 Church Street S.E., Minneapolis MN 55455 (612-625-9997; fax: 612-625-8408)
Email: phclgrad@umn.edu
Website: http://www.pharmacology.med.umn.edu/graduate.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 36
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A four-year B.A. or B.S. degree (or its equivalent) in a basic science program is generally required.

Other requirements to be completed before admission:
Candidates for admission are evaluated on the basis of undergraduate record, GRE score, previous research experience, and letters of recommendation.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 30 major credits and 0 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** A research project approved by the advisor and Director of Graduate Studies.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students are required to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the Director of Graduate Studies for permission to remain in the program.
**Twin Cities Campus**

**Pharmacology Minor**

**Pharmacology Medical School**

Link to a list of faculty for this program.

**Contact Information:**
Department of Pharmacology, 6-120 Jackson Hall, 321 Church Street S.E., Minneapolis MN 55455 (612-625-9997; fax: 612-625-8408)
Email: phclgrad@umn.edu
Website: [http://www.pharmacology.med.umn.edu/graduate.html](http://www.pharmacology.med.umn.edu/graduate.html)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires a minimum of 9 credits in pharmacology approved by the director of graduate studies. A doctoral minor requires a minimum of 12 credits in pharmacology approved by the director of graduate studies. There are no special requirements (e.g., specific courses, written examination).
Twin Cities Campus
Pharmacology Ph.D.
Pharmacology Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Pharmacology, 6-120 Jackson Hall, 321 Church Street S.E., Minneapolis MN 55455 (612-625-9997; fax: 612-625-8408)
Email: phclgrad@umn.edu
Website: http://www.pharmacology.med.umn.edu/graduate.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A four-year B.A. or B.S. degree (or its equivalent) in a basic science program is generally required.

Other requirements to be completed before admission:
Candidates for admission are evaluated on the basis of undergraduate record, GRE score, previous research experience, and letters of recommendation.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives.

Applicants must submit scores from the General Test of the GRE, with scores above the 80th percentile in all categories preferred.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students are required to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the Director of Graduate Studies for permission to remain in the program.

For more detailed information, contact the Director of Graduate Studies in Pharmacology.

Joint- or Dual-degree Coursework: Joint Degree Program in Law, Health and the Life Sciences. Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Physical Therapy D.P.T.
Rehabilitation Medicine Administration
Medical School

Link to a list of faculty for this program.

Contact Information:
Program in Physical Therapy, MMC 388, 420 Delaware Street SE, Minneapolis, MN 55455, (612-624-2662; fax: 612-625-4274)
Email: goebe005@umn.edu
Website: http://physther.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 141
- This program requires summer semesters for timely completion.
- Courses in this Program are taught on campus for the first 7 semesters, with numerous off-site clinic visits scheduled throughout semester 2-7. The remaining 2 semesters of the Program consist of 4 full-time clinical internships. These internships occur off-campus in physical therapy clinics.
- Degree: Doctor of Physical Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The physical therapy program, a division within the Department of Physical Medicine and Rehabilitation, offers a professional doctoral degree in physical therapy (D.P.T.). Physical therapy is a healthcare discipline involved with the study and rehabilitation of movement impairments such as muscular weakness, impaired coordination, joint stiffness, and pain, which can lead to functional problems affecting self care, employment, ambulation, etc. Graduates are prepared to promote proper health care and quality of living by maximizing human movement following disease or injury or by preventing its loss. The program requires three years of year-round, full-time graduate study. Academic coursework and research activity are completed during the first seven semesters. The final two semesters are devoted to clinical internships.

Accreditation
This program is accredited by Commission on Accreditation in Physical Therapy Education (CAPTE) (APTA).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The University of Minnesota program in physical therapy has no required or preferred undergraduate major. Any baccalaureate degree or equivalent from an accredited institution is accepted.

Other requirements to be completed before admission:
To be eligible for admission, the student must complete a baccalaureate degree, or its foreign equivalent, from an accredited institution by June 1st of the year of admission, including the required prerequisite courses or their equivalents.

Applicant must complete at least 100 hours of volunteer or work experience in a physical therapy setting. Exposure to multiple and varied areas of practice in physical therapy and additional health care exposure are considered an important preparation. The GRE General exam only is required. TOEFL is required for international students. Two letters of recommendation.

Special Application Requirements:
Below is a list of required prerequisite coursework to be taken before entering the program. Courses must be taken A-F, unless receiving Advanced Placement (AP) credit. A minimum grade of C is required in all prerequisite coursework. It is recommended that these courses be taken within the previous five years. Courses may be taken at any accredited college. Students are expected to be skillful with computer applications for word processing and creating spreadsheets.
- General biology, with on-site lab
- A second biology course of the student's choice, with on-site lab
- Human anatomy (lab strongly recommended)
- Human physiology
- General chemistry or inorganic chemistry - minimum two courses, with on-site lab
- General physics, which includes mechanics and electricity - minimum two courses, with on-site lab
- General psychology
- Abnormal psychology
- Statistics - ANOVA and regression analysis content strongly recommended
- Introductory calculus (pre-calculus not acceptable; Intro to Calculus or Short Calculus acceptable)
- Medical terminology

For all AP courses on the transcript, a score must be entered. This will be the score issued by the College Board. Students must also forward an unofficial copy of the College Board Report to the admissions coordinator to keep on file.

If distance learning courses are taken from an accredited college or university for college credit, there is no limit to the number that may be taken through distance education. Labs must be taken on-site.

All prerequisite courses and an undergraduate degree must be completed before the student enrolls in the professional program. Students may apply with two remaining prerequisites in progress. Past students have found that biochemistry, and human/animal biology classes have been helpful preparation for the D.P.T. curriculum.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

141 credits are required in the major.
This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 6 semesters must be completed before filing a Degree Program Form.

The program requires 141 major field credits, of which 101 are core academic credits and 40 are clinical internship credits. Nine credits of research are included in the core academic credits and a scientific poster presentation and written exam based on this research culminates the project. No minor or related field is required. Students must maintain a cumulative GPA of 2.80 while in the program.

Year 1 summer
PT 6058 - Anatomy for Physical Therapy (6.0 cr)

Year 1 Fall
PT 6002 - Ethics in Public Health: Research and Policy (1.0 cr)
PT 6231 - Clinical Biomechanics (5.0 cr)
PT 6280 - Clinical Assessment (4.0 cr)
PT 6213 - Clerkship I (2.0 cr)
PT 6281 - Scientific Foundations I: Theory of Therapeutic Exercise (3.0 cr)
PT 6340 - Human Growth and Development (3.0 cr)
PT 8131 - Research Seminar I (1.0 cr)

**Year 1 Spring**
- NSCI 6112 - Medical Neuroscience for Professional Students (5.0 cr)
- PT 8132 - Research Seminar II (1.0 cr)
- PT 6310 - Physiology for Physical Rehabilitation (5.0 cr)
- PT 6214 - Clerkship II (2.0 cr)
- PT 6221 - Therapeutic Procedures (4.0 cr)

**Year 2 Summer**
- PT 6813 - Cardiopulmonary Physical Therapy (3.0 cr)
- PT 6250 - Acute Care in Physical Therapy (2.0 cr)
- PT 6251 - Integument (2.0 cr)
- PT 6252 - Pathophysiology (3.0 cr)
- PHAR 6800 - Rehabilitation Pharmacotherapy (2.0 cr)
- PT 8193: Research Problems in Physical Therapy 2 crs.

**Year 2 Fall**
- PT 6283 - Musculoskeletal I (7.0 cr)
- PT 6293 - Essentials of Rehabilitation Research (4.0 cr)
- PT 6215 - Clerkship III (1.0 cr)
- PT 8193: Research Problems in Physical Therapy 2 crs.

**Year 2 Spring**
- PT 6282 - Scientific Foundations II: Neuromotor Control (3.0 cr)
- PT 6287 - Neuromotor Control (8.0 cr)
- PT 6284 - Musculoskeletal Rehabilitation II (4.0 cr)
- PT 6216 - Clerkship IV (1.0 cr)
- PT 8193: Research Problems in Physical Therapy 2 crs.

**Year 3 Summer**
- PT 6288 - Pediatric Rehabilitation (8.0 cr)
- PT 6290 - Administration (4.0 cr)
- PT 8193: Research Problems in Physical Therapy 1 crs.

**Year 3 Fall**
- PT 6295 - Clinical Internship I (10.0 cr)
- PT 6296 - Clinical Internship II (10.0 cr)

**Year 3 Spring**
- PT 6297 - Clinical Internship III (10.0 cr)
- PT 6298 - Clinical Internship IV (10.0 cr)
Twin Cities Campus
Rehabilitation Science M.S.
Rehabilitation Medicine Administration
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Physical Medicine and Rehabilitation, MMC 388, 420 Delaware Street SE, Minneapolis, MN, 55455 (612-625-3966; fax: 612-625-4274)
Email: adamc002@umn.edu
Website: http://www.rehabscience.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30 to 33
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The rehabilitation science program prefers PhD applicants over MS applicants. The MS often applies to students who are in need of a trial program to determine whether or not the PhD is a good fit. In addition, the MS is used for students who initially begin the PhD, but find that the PhD is not the best fit and subsequently switch to the MS.

The graduate program in rehabilitation science is a post-professional program designed to train rehabilitation scientists and academicians. The program includes occupational and physical therapists and students with other backgrounds interested in rehabilitation research. The program's philosophy provides students with 1) a strong foundation in research methodology, 2) a concentrated educational experience specifically tailored toward a student's specific research question in rehabilitation science, and 3) a working knowledge of the importance of a collaborative, interdisciplinary approach to the scientific process.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum US equivalent bachelor's degree.

Other requirements to be completed before admission:
Applicants must hold a US-equivalent bachelor's degree or graduate degree in a discipline related to rehabilitation such as biomedical engineering, medicine, occupational therapy, physical therapy, or speech/audiology. International students must hold a comparable foreign degree from an accredited program. Depending on the educational background of the applicant, admission may be contingent upon completion of selected prerequisite coursework.

Special Application Requirements:
In addition to the University's application (including personal statement and fee), applicants must submit the following materials: GRE General Test scores (scores in the 60th percentile or higher are preferred); official transcripts; three letters of reference; and TOEFL score for international students. Student must also have an agreed-upon faculty adviser at the time of applying. Compatibility of research interests is a major determinant in the student/adviser relationship.

GRE score is mandatory. Scores in the 50th percentile or higher are preferred.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 154
  - General Test - Quantitative Reasoning: 155
  - General Test - Analytical Writing: 4
International applicants must submit score(s) from one of the following tests:

**TOEFL**
- Internet Based - Total Score: 88
- Internet Based - Listening Score: 21
- Internet Based - Writing Score: 23
- Internet Based - Reading Score: 21
- Internet Based - Speaking Score: 23

**IELTS**
- Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 9 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 14 major credits and 16 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B project is determined in consultation with the advisor.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Plan A Requirements**

Take at least 14 RSC credits to meet the major field requirement; 3 statistics credits and 6 credits of electives for the outside credit requirement; and 10 master's thesis credits.

Take 14 or more credit(s) from the following:

- **RSC 5058** - Anatomy for Rehabilitation Science (6.0 cr)
- **RSC 5101** - Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences (1.0 cr)
- **RSC 5106** - Rehab Science: Past, Present, and Future (1.0 cr)
- **RSC 5103** - Seminal Milestones in the Biology of Aging (0.0 - 1.0 cr)
- **RSC 5135** - Advanced Biomechanics I: Kinematics (3.0 cr)
- **RSC 5200** - Introduction to Transcranial Magnetic Stimulation (3.0 cr)
- **RSC 5206** - Academic Ethos (1.0 cr)
- **RSC 5231** - Clinical Biomechanics (2.0 - 5.0 cr)
- **RSC 5235** - Advanced Biomechanics II: Kinetics (3.0 cr)
- **RSC 5281** - Scientific Foundations: Exercise Theory (3.0 cr)
- **RSC 5294** - Independent Study in Rehabilitation Science (1.0 - 3.0 cr)
- **RSC 5306** - Scientific and Professional Presentation (1.0 cr)
- **RSC 5310** - Physiology for Physical Rehabilitation (1.0 - 5.0 cr)
- **RSC 5814** - Age, Exercise, and Rehabilitation (2.0 cr)
- **RSC 5841** - Applied Data Acquisition and Processing (4.0 cr)
- **RSC 5901** - Scholarly Inquiry in Health Sciences (4.0 cr)
- **RSC 8021** - Application of Proteomics to Aging (0.0 - 1.0 cr)
- **RSC 8022** - Fostering a Career in Aging Research (1.0 cr)
- **RSC 8106** - Critical Analysis of Scientific Literature (1.0 - 2.0 cr)
- **RSC 8130** - Current Literature Seminar (1.0 - 3.0 cr)
- **RSC 8135** - Advanced Kinesiology (3.0 cr)
- **RSC 8170** - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- **RSC 8185** - Problems in Rehabilitation Science (1.0 - 3.0 cr)
- **RSC 8188** - Teaching Practicum (1.0 - 5.0 cr)
- **RSC 8192** - Research Design in Rehabilitation Science (4.0 cr)
- **RSC 8206** - Grant Writing (2.0 cr)
• RSC 8235 - Human Kinetics (3.0 cr)
• RSC 8282 - Problems in Human Movement (4.0 cr)
• RSC 8306 - Peer Review and Publication (2.0 cr)

**Statistics Requirement**
Take at least 3 credits of statistics from the following list, or chosen in consultation with the adviser.
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Electives**
Take 6 elective RSC and/or non-RSC credits, selected in consultation with the advisor.
- RSC 5xxx
- RSC 8xxx

**Thesis Credits**
Take at least 10 master's thesis credits.
- RSC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

**Plan B Requirements**
Take at least 14 RSC credits to meet the major field requirement; and 3 statistics credits and 13 credits of electives for the outside credit requirement
Take 14 or more credit(s) from the following:
- RSC 5058 - Anatomy for Rehabilitation Science (6.0 cr)
- RSC 5101 - Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences (1.0 cr)
- RSC 5106 - Rehab Science: Past, Present, and Future (1.0 cr)
- RSC 5103 - Seminal Milestones in the Biology of Aging (0.0 - 1.0 cr)
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- RSC 5200 - Introduction to Transcranial Magnetic Stimulation (3.0 cr)
- RSC 5206 - Academic Ethos (1.0 cr)
- RSC 5231 - Clinical Biomechanics (2.0 - 5.0 cr)
- RSC 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
- RSC 5281 - Scientific Foundations: Exercise Theory (3.0 cr)
- RSC 5294 - Independent Study in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 5306 - Scientific and Professional Presentation (1.0 cr)
- RSC 5310 - Physiology for Physical Rehabilitation (1.0 - 5.0 cr)
- RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
- RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
- RSC 5901 - Scholarly Inquiry in Health Sciences (4.0 cr)
- RSC 8021 - Application of Proteomics to Aging (0.0 - 1.0 cr)
- RSC 8022 - Fostering a Career in Aging Research (1.0 cr)
- RSC 8106 - Critical Analysis of Scientific Literature (1.0 - 2.0 cr)
- RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
- RSC 8135 - Advanced Kinesiology (3.0 cr)
- RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8185 - Problems in Rehabilitation Science (1.0 - 3.0 cr)
- RSC 8188 - Teaching Practicum (1.0 - 5.0 cr)
- RSC 8192 - Research Design in Rehabilitation Science (4.0 cr)
- RSC 8206 - Grant Writing (2.0 cr)
- RSC 8235 - Human Kinetics (3.0 cr)
- RSC 8282 - Problems in Human Movement (4.0 cr)
- RSC 8306 - Peer Review and Publication (2.0 cr)

**Statistics Requirement**
Take at least 3 credits of statistics from the following list, or chosen in consultation with the adviser.
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- EPSY 8251 - Statistical Methods in Education I (3.0 cr)
- EPSY 8252 - Statistical Methods in Education II (3.0 cr)

**Electives**
Take 13 elective RSC and/or non-RSC credits, selected in consultation with the advisor.
- RSC 5xxx
- RSC 8xxx
Twin Cities Campus
Rehabilitation Science Minor
Rehabilitation Medicine Administration
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Physical Medicine and Rehabilitation, MMC 388, 420 Delaware Street SE, Minneapolis, MN, 55455 (612-625-3966; fax: 612-625-4274)
Email: adamc002@umn.edu
Website: http://www.rehabscience.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2016
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in rehabilitation science is a post-professional program designed to train rehabilitation scientists and academicians. The program includes occupational and physical therapists and students with other backgrounds interested in rehabilitation research. The program's philosophy provides students with 1) a strong foundation in research methodology, 2) a concentrated educational experience specifically tailored toward a student's specific research question in rehabilitation science, and 3) a working knowledge of the importance of a collaborative, interdisciplinary approach to the scientific process.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum US equivalent bachelor's degree.

Other requirements to be completed before admission:
Applicants must hold a bachelor's degree or graduate degree in a discipline related to rehabilitation such as biomedical engineering, medicine, occupational therapy, physical therapy, or speech/audiology. International students must hold a comparable foreign degree from an accredited program. Depending on the educational background of the applicant, admission may be contingent upon completion of selected prerequisite coursework.

Special Application Requirements:
The student must inform the director of graduate studies (DGS) in writing of his or her intent to pursue the minor. A rehabilitation science faculty admissions committee determines student admission for the minor. To be admitted, a student must be an active graduate student pursuing an equivalent graduate degree in another field. The student must be in good academic standing within his or her major program. The student must have a mutually agreed-upon graduate faculty member in rehabilitation science serve as a reviewer on the student's dissertation committee and serve as the minor field examiner on the final exam committee.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Doctoral**
**Ph.D. Minor**
Take at least 12 credits, selected in consultation with the Rehabilitation Sciences director of graduate studies. RSC courses must be taken on the A-F grading basis.

- Take 12 or more credits from the following:
  - RSC 5106 - Rehab Science: Past, Present, and Future (1.0 cr)
  - RSC 5206 - Academic Ethos (1.0 cr)
  - RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
  - RSC 5294 - Independent Study in Rehabilitation Science (1.0 - 3.0 cr)
  - RSC 5306 - Scientific and Professional Presentation (1.0 cr)
  - RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
  - RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
  - RSC 8106 - Critical Analysis of Scientific Literature (1.0 - 2.0 cr)
  - RSC 8206 - Grant Writing (2.0 cr)
  - RSC 8306 - Peer Review and Publication (2.0 cr)
  - RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
  - RSC 8135 - Advanced Kinesiology (3.0 cr)
  - RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
  - RSC 8185 - Problems in Rehabilitation Science (1.0 - 3.0 cr)
  - RSC 8192 - Research Design in Rehabilitation Science (4.0 cr)
  - RSC 8282 - Problems in Human Movement (4.0 cr)

**Masters**
**Master’s Minor**
Take at least 6 credits, selected in consultation with the Rehabilitation Sciences director of graduate studies. RSC courses must be taken on the A-F grading basis.

- Take 6 or more credits from the following:
  - RSC 5106 - Rehab Science: Past, Present, and Future (1.0 cr)
  - RSC 5206 - Academic Ethos (1.0 cr)
  - RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
  - RSC 5294 - Independent Study in Rehabilitation Science (1.0 - 3.0 cr)
  - RSC 5306 - Scientific and Professional Presentation (1.0 cr)
  - RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
  - RSC 5841 - Applied Data Acquisition and Processing (4.0 cr)
  - RSC 8106 - Critical Analysis of Scientific Literature (1.0 - 2.0 cr)
  - RSC 8206 - Grant Writing (2.0 cr)
  - RSC 8306 - Peer Review and Publication (2.0 cr)
  - RSC 8130 - Current Literature Seminar (1.0 - 3.0 cr)
  - RSC 8135 - Advanced Kinesiology (3.0 cr)
  - RSC 8170 - Special Topics in Rehabilitation Science (1.0 - 3.0 cr)
  - RSC 8185 - Problems in Rehabilitation Science (1.0 - 3.0 cr)
  - RSC 8192 - Research Design in Rehabilitation Science (4.0 cr)
  - RSC 8282 - Problems in Human Movement (4.0 cr)
Twin Cities Campus
Rehabilitation Science Ph.D.
Rehabilitation Medicine Administration
Medical School

Link to a list of faculty for this program.

Contact Information:
Rehabilitation Science Program, 420 Delaware Street SE - MMC 388, Minneapolis, MN, 55455 (phone: 612-625-3966; fax: 612-625-4274)
Email: adaml0002@umn.edu
Website: http://www.physicalrehab.umn.edu/rehabilitation-science

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in rehabilitation science is a post-professional program designed to train rehabilitation scientists and academicians to meet the growing demand for experts in physical and occupational therapy and related fields. The program includes occupational and physical therapists and students with other backgrounds interested in rehabilitation research. The program’s philosophy provides students with 1) a strong foundation in research methodology, 2) a concentrated educational experience tailored toward a student's specific research question in rehabilitation science, and 3) a working knowledge of the importance of a collaborative, interdisciplinary approach to the scientific process.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Bachelor's degree or US equivalent in a related discipline is minimal requirement.

Professional, graduate, or master's degree preferred but not required.

Other requirements to be completed before admission:
Applicants must hold a bachelor's or graduate degree, or accredited US equivalent, in a discipline related to rehabilitation; for example, biomedical engineering, kinesiology, medicine, occupational therapy, physical therapy, public health, or speech/audiology. Depending on the educational background of the applicant, admission may be contingent upon completion of selected prerequisite coursework.

Special Application Requirements:
In addition to completing and submitting the University's online application (which includes submission of a personal statement, diversity statement, and upload of CV/resume), applicants must submit the following materials: report of GRE General Test scores (scores in the 50th percentile or higher are preferred); transcripts from all institutions attended; three letters of recommendation; and TOEFL and/or iELTS scores for international students. Student must also have an agreed-upon faculty adviser at the time of application. Compatibility of research interest is a major determinant in the student/adviser relationship. For further information regarding these requirements, contact Program Administrator, Rich Adamczak, via email at adamc002@umn.edu.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 155
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 88
- Internet Based - Listening Score: 21
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 21
- Internet Based - Speaking Score: 23

• IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 credits are required in the major.
20 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Core Courses
All students must complete the core courses.
Take 6 or more credit(s) from the following:
• RSC 5106 - Rehab Science: Past, Present, and Future (1.0 cr)
• RSC 5206 - Academic Ethos (1.0 cr)
• RSC 5306 - Scientific and Professional Presentation (1.0 cr)
• RSC 8106 - Critical Analysis of Scientific Literature (1.0 - 2.0 cr)
• RSC 8206 - Grant Writing (2.0 cr)
• RSC 8306 - Peer Review and Publication (2.0 cr)

Additional RSC Courses
Take at least 10 credits from the following courses, upon consultation with advisor:
RSC 5xxx
RSC 8xxx

Statistics Requirement
Take at least 8 credits of statistics from the following options, or choose 8 statistics credits in consultation with advisor:
Public Health Statistics Series
  PUBH 6450 - Biostatistics I (4.0 cr)
  PUBH 6451 - Biostatistics II (4.0 cr)

or Educational Psychology Statistics Series
  EPSY 8261 - Statistical Methods in Education I (3.0 cr)
  EPSY 8262 - Statistical Methods in Education II (3.0 cr)

Elective Courses
Take at least 12 credits in consultation with advisor. Electives can include a combination of RSC coursework and courses from other disciplines.

Joint- or Dual-degree Coursework: DPT/PhD
Student may take a total of 18 credits in common among the academic programs.
Twin Cities Campus
Stem Cell Biology M.S.
Stem Cell Institute
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Stem Cell Biology Institute, 2001 6th Street S.E., Mail Code 2873, Minneapolis, MN 55455-3007 (612-625-0602; fax: 612-624-2436)
Email: ander607@umn.edu
Website: http://www.stemcell.umn.edu/graduate_programs/master_of_science/home.htm

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Stem Cell Biology master's program is a multidisciplinary program that prepares graduates for a career in research, teaching, or industry within the field of stem cell biology. It offers training in stem cell biology, a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture, lab, and seminar courses in these various disciplines, in addition to stem cell biology. They will interact with members of the Stem Cell Institute through participation in research seminars and journal clubs.

Students who elect Plan A will spend a full calendar year, including summer, conducting research in the laboratory of a stem cell graduate program faculty member. This research will form the basis of the master's thesis.

Students who elect Plan B will conduct research of primary literature that will result in a written paper and seminar on a topic in Stem Cell Biology agreed upon in advance by the student and faculty adviser. Part-time students choosing Plan B are expected to take one to two courses per semester and to finish the master's degree within 3 years. Students will not be expected to take courses in the summer.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A bachelor's degree or foreign equivalent in biological science or a related field.

Special Application Requirements:
Applicants must upload to the Apply Yourself on-line application website: 1) a personal statement (500 words or less) outlining research interests and long- and short-term goals (NOTE: students applying to Plan A should include information about previous research experience); 2) a curriculum vitae or resume; 3) the names of three individuals whom the student has asked to write letters of recommendation; and 4) unofficial transcripts.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 94
  - Internet Based - Listening Score: 22
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Internet Based - Speaking Score: 26

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Information current as of December 20, 2016
Program Requirements

Plan A: Plan A requires 14 to 16 major credits, 4 to 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 to 16 major credits and 14 to 16 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must demonstrate familiarity with the tools of research and scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively.

In addition to taking courses in two or three semesters, students can choose two paths for completing the degree. Students in Plan A will complete a master's thesis and take an oral exam. Students in Plan B will complete a course which will involve a major written paper and presentation.

Required Courses

All students are required to take these courses.

Required Courses
- SCB 5051 - Stem Cell Biology Practical Training Module (1.0 cr)
- SCB 5054 - Stem Cell Institute Research Seminar and Journal Club (2.0 cr)
- SCB 8181 - Stem Cell Biology (3.0 cr)

Required molecular biology course
- At least one of these courses is required.
  - BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
  - or GCD 4034 - Molecular Genetics (3.0 cr)

Required courses - at least one of these three is required.
- At least one of these courses is required.
  - GCD 8161 - Advanced Developmental Biology (3.0 cr)
  - or GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
  - or Either 5xxx or 8xxx level Bioethics course, must be approved by SCB program before registration.

Additional Courses for Plan A and Plan B

Plan A
- Students must take 10 thesis credits - 5 in spring of year 1 and 5 in fall of year 2 is recommended.
  - SCB 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
- Students may choose elective credits from the following list or other courses in consultation with the program advisor.
  - Take 4 or more credit(s) from the following:
    - BIOC 5213 - Selected Topics in Molecular Biology (3.0 cr)
    - BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
    - BIOL 4004 - Cell Biology (3.0 cr)
    - BMEN 5041 - Tissue Engineering (3.0 cr)
• BMEN 5351 - Cell Engineering (3.0 cr)
• BMEN 5444 (Inactive) (3.0 cr)
• BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
• BTHX 5400 - Intro Ethics in Hlth Policy (3.0 cr)
• GCD 5036 - Molecular Cell Biology (3.0 cr)
• GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
• GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
• GCD 8151 - Cell Structure and Function (3.0 cr)
• GCD 8161 - Advanced Developmental Biology (3.0 cr)
• MICA 8003 - Immunity and Immunopathology (4.0 cr)
• MICA 8004 - Cellular and Cancer Biology (4.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
• MILI 6990 - The Health Care Marketplace (2.0 cr)
• MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
• NSC 8211 - Developmental Neurobiology (3.0 cr)
• PHCL 5110 - Introduction to Pharmacology (3.0 cr)
• PHCL 5112 - A Graduate Toolkit I: An Introduction to the Scientific Research Lab (1.0 cr)
• PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
• PHSL 8242 - Professional Skills Development For Biomedical Scientists (1.0 cr)
• PSY 5063 - Introduction to Functional MRI (3.0 cr)

-OR-

Plan B
SCB 5900 is a required course for Plan B.

SCB 5900 - Master's Plan B Research Paper and Presentation (2.0 cr)

Students may choose elective credits from the following list or other courses in consultation with their advisor.

Take 14 or more credit(s) from the following:
• BIOC 5213 - Selected Topics in Molecular Biology (3.0 cr)
• BIOC 8401 - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
• BIOL 4004 - Cell Biology (3.0 cr)
• BMEN 5041 - Tissue Engineering (3.0 cr)
• BMEN 5351 - Cell Engineering (3.0 cr)
• BMEN 5444 (Inactive) (3.0 cr)
• BTHX 5210 - Ethics of Human Subjects Research (3.0 cr)
• BTHX 5400 - Intro Ethics in Hlth Policy (3.0 cr)
• GCD 5036 - Molecular Cell Biology (3.0 cr)
• GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
• GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
• GCD 8151 - Cell Structure and Function (3.0 cr)
• GCD 8161 - Advanced Developmental Biology (3.0 cr)
• MICA 8003 - Immunity and Immunopathology (4.0 cr)
• MICA 8004 - Cellular and Cancer Biology (4.0 cr)
• MILI 6235 - Pharmaceutical Industry: Business and Policy (2.0 cr)
• MILI 6726 - Medical Device Industry: Business and Public Policy (2.0 cr)
• MILI 6990 - The Health Care Marketplace (2.0 cr)
• MILI 6995 - Medical Industry Valuation Laboratory (2.0 cr)
• NSC 8211 - Developmental Neurobiology (3.0 cr)
• PHCL 5110 - Introduction to Pharmacology (3.0 cr)
• PHCL 5112 - A Graduate Toolkit I: An Introduction to the Scientific Research Lab (1.0 cr)
• PHSL 5510 - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
• PHSL 8242 - Professional Skills Development For Biomedical Scientists (1.0 cr)
• PSY 5063 - Introduction to Functional MRI (3.0 cr)
Twin Cities Campus

Stem Cell Biology PhD Minor

Stem Cell Institute

Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Stem Cell Biology Institute, 2001 6th Street SE, Mail Code 2873, Minneapolis, MN 55455-3007 (612-625-0602; fax: 612-624-2436)
Email: ander607@umn.edu
Website: http://www.stemcell.umn.edu/graduate-programs/phd-level-minor

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This degree program offers training in stem cell biology, a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture, lab, and seminar courses in these various disciplines, in addition to Stem Cell Biology. They will interact with members of the Stem Cell Institute through participation in research seminars and journal clubs, and will spend a full calendar year conducting stem cell research in the laboratory of a stem cell biology graduate program faculty member.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Applicants must be admitted to a Ph.D. program and obtain approval from the director of graduate studies in stem cell biology to enroll in the minor program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

In addition to the major requirement appropriate to the student's specific program, the stem cell biology PhD minor will require 12 credits from designated courses with a minimum GPA 3.00.

The main research project must be done in the lab of a member of the stem cell biology graduate faculty.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
The PhD minor is available to students with an interest in stem cell biology who are in relevant PhD programs such as MCDB&G, MCoB, pharmacology, microbiology, bio-engineering, or in a medical or veterinary medicine school program. It offers training in stem cell biology, which is a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture and seminar courses. They will interact with members of the Stem Cell Institute through participation in research seminar and journal clubs and conduct stem cell research in the laboratory of a stem cell biology...
graduate program faculty member.

Requirements include 12 credits from designated courses—9 core credits and 3 credits from elective courses—and a research project in the lab of a Stem Cell Institute faculty member. Students may not use credits offered in their major field to satisfy minor requirements.

**Required Courses**

All students are required to take these courses.

- **BIOC 8002** - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- **GCD 8161** - Advanced Developmental Biology (3.0 cr)
- **SCB 8181** - Stem Cell Biology (3.0 cr)

**PhD Minor Electives**

Students may choose from following list of courses. If any are required as part of major requirements, they may not be used to fulfill minor requirements.

Take 3 or more credit(s) from the following:

- **BIOC 8401** - Ethics, Public Policy, and Careers in Molecular and Cellular Biology (1.0 cr)
- **BMEN 5041** - Tissue Engineering (3.0 cr)
- **BMEN 5351** - Cell Engineering (3.0 cr)
- **BTHX 5400** - Intro Ethics in Hlth Policy (3.0 cr)
- **BTHX 8000** - Advanced Topics in Bioethics (1.0 - 4.0 cr)
- **GCD 8008** - Mammalian Gene Transfer and Expression (2.0 cr)
- **GCD 8131** - Advanced Molecular Genetics and Genomics (3.0 cr)
- **GCD 8151** - Cell Structure and Function (3.0 cr)
- **MICA 8003** - Immunity and Immunopathology (4.0 cr)
- **MICA 8004** - Cellular and Cancer Biology (4.0 cr)
- **NSC 8211** - Developmental Neurobiology (3.0 cr)
- **PHCL 5110** - Introduction to Pharmacology (3.0 cr)
- **PHSL 5510** - Advanced Cardiac Physiology and Anatomy (2.0 - 3.0 cr)
- **PHSL 8242** - Professional Skills Development For Biomedical Scientists (1.0 cr)
- **PSY 5063** - Introduction to Functional MRI (3.0 cr)
Twin Cities Campus
Adult Health/Gerontological Clinical Nurse Specialist Postgraduate Certificate
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Adlt Hlth/Geron Clincial Nurse Spec Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space-available basis until March 1.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
• MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate.

Courses may include:
- NURS 6405 - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- NURS 6406 - Advanced Practice CNS Roles Across the Lifespan: Practicum (1.0 cr)
- NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
- NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- NURS 7706 - Implementing the Role of the Clinical Nurse Specialist in Acute Care (1.0 cr)
- NURS 7406 - Advanced Nursing Practicum in Adult-Gerontology Health (2.0 cr)
- NURS 7705 - The Adult and Gerontological Clinical Nurse Specialist in Acute Care (2.0 cr)
Twin Cities Campus
Adult Health/Gerontological Nurse Practitioner Postgraduate Certificate
School of Nursing

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Adult Hlth/Geron Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate.

Courses may include:

NURS 6307 - Women's Health Care Practicum (1.0 cr)
NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
Twin Cities Campus
Doctor of Nursing Practice D.N.P.
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Office of Student Career & Advancement Services, 5-160 Weaver Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 34 to 102
- This program requires summer semesters for timely completion.
- Degree: Doctor of Nursing Practice

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Doctor of Nursing Practice (DNP) Program is offered as the post-baccalaureate with specialty (13 specialties). The School of Nursing also offers a reduced-credit, post-master's DNP program for students who have completed a master's degree in a nursing practice specialty.

The DNP program is an innovative, practice-focused program that prepares students to be leaders in health care, develop quality improvement, and systems problem solving. It prepares nurses to create and lead new models of care delivery for communities locally, across the nation, and around the world. Students work with faculty who are leaders in their fields and on the cutting edge of nursing research and practice. These experts become mentors and guide students through the program. The unique, interdisciplinary core curriculum is divided into the following four areas.

1. DNP core - Includes science of nursing intervention, moral and ethical positions, research, statistics, program evaluation, evidence-based practice, epidemiology, informatics, leadership, health economics, health policy, and teaching and learning.
2. DNP specialty core - Prepares students for advanced clinical practice; includes physiology, pharmacology, pharmacotherapeutics, and advanced health assessment.
3. DNP specialization - Prepares graduates for certification in their chosen specialty by a national certifying body and includes:
   a. Advanced clinical practice with specialty-specific courses for each of the areas of clinical specialization
   b. Other specialty coursework in public health, organizational leadership, informatics, and integrative health and healing
4. Scholarly leadership project - Completed by all students in a three-semester sequence during which the project is planned, implemented, evaluated, and disseminated

The School of Nursing and the School of Public Health offer a DNP/MPH-Public Health Practice dual degree program. This dual degree option provides students with a unique opportunity to provide advanced nursing care as leaders of inter-professional health care teams, emphasizing population-focused practice, and quality improvement to impact patient outcomes.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The post-baccalaureate DNP and post-master's DNP programs require an entry-level nursing degree (e.g. BSN, BAN, post-baccalaureate certificate in nursing, or entry-level master of nursing).

A graduate degree is not required for admission to the post-baccalaureate DNP program.
Applicants for the post-master's DNP must hold a master's degree in a nursing practice specialty.

Other requirements to be completed before admission:

The required application process is available on the School of Nursing website at www.nursing.umn.edu. Interviews are by invitation only and are not granted to all applicants. Application deadlines for the DNP program: September 1 for the nurse anesthesia specialty. All other specialties have November 1 for priority consideration, with applications accepted on a space available basis until March 1.

Applicants must submit their test score(s) from the following:

- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586

- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations(GRE, TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

34 to 102 credits are required in the major.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

DNP/MPH-Public Health Practice students must complete the core course requirements for both the DNP and MPH.

Core Coursework

Take the following required courses for at least 34 credits:

- NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
- NURS 6200 - Science of Nursing Intervention (3.0 cr)
- NURS 7000 - DNP Proseminar (1.0 cr)
- NURS 7101 - DNP Seminar II (3.0 cr)
- NURS 7102 - DNP Seminar III (2.0 cr)
- NURS 7110 - NURS 7110 DNP Project Practicum (1.0 - 3.0 cr)
- NURS 7200 - Economics of Health Care (3.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7300 - Program Evaluation (3.0 cr)
- NURS 7300 - Health Policy Leadership (3.0 cr)
- NURS 7600 - System Leadership and Innovation (3.0 cr)
- NURS 7900 - System Leadership and Innovation in Nursing (3.0 cr)
- NURS 6110 - Epidemiology in Nursing (2.0 cr)

or PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

Joint- or Dual-degree Coursework: Doctor of Nursing Practice/Master of Public Health - Public Health Practice (D.N.P./M.P.H.-Public Health Practice) Student may take a total of 14 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans.

Students may complete the program with more than one sub-plan.

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Adult Health/Gerontological Clinical Nurse Specialist

The DNP program with a specialty in adult health and gerontological nursing as a clinical nurse specialist prepares nurses for leadership as advanced practice nurses and clinical experts to provide advanced nursing care to adults and elders in a variety of settings. The DNP program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and practicum experiences as well as a final internship where the student has the opportunity focus on a sub-specialty area (e.g. oncology, cardiology, palliative care), if desired. Graduates work as expert clinicians and consultants in acute care settings, nursing homes, transitional care, and specialty practices. The adult health and gerontological specialty offers leadership preparation for nurses desiring expertise in the management of complex health conditions, working with nurses and interdisciplinary teams and organizations to provide care and services for adults and older adults. Students ground their studies in the science of nursing interventions, moral/ethical issues, and nursing research. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

**Required Specialty Coursework**

Take the following courses for at least 30 credits:

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6405 - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- NURS 6406 - Advanced Practice CNS Roles Across the Lifespan: Practicum (1.0 cr)
- NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
- NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- NURS 7406 - Advanced Nursing Practicum in Adult-Gerontology Health (2.0 cr)
- NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- NURS 7705 - The Adult and Gerontological Clinical Nurse Specialist in Acute Care (2.0 cr)
- NURS 7706 - Implementing the Role of the Clinical Nurse Specialist in Acute Care (1.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)

Statistics: As approved by D.N.P. specialty

Adult/Gerontological Nurse Practitioner

The DNP program with a specialty in adult health and gerontological nursing as a nurse practitioner prepares nurses for leadership as advanced practice nurses and clinical experts to provide advanced nursing care to adults and elders in a variety of settings. This DNP program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and practicum experiences, as well as a final internship where the student has the opportunity focus on a sub-specialty area (e.g. oncology, cardiology, palliative care), if desired. Graduates work in primary care/ambulatory care settings, hospitals, group practices of advanced practice gerontological nurses that manage care of adults and older adults in nursing homes, transitional care settings, assisted living, and specialty practices.

The adult health and gerontological specialty offers leadership preparation for nurses desiring expertise in advanced nursing assessment and management for health promotion and disease prevention, management of complex health conditions, and working with interdisciplinary teams to provide care and services for persons ranging from adolescents, adults, and older adults. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

**Required Specialty Coursework**

Take the following courses for at least 28 credits:

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6305 - Women's Reproductive Health Care (2.0 - 3.0 cr)
- NURS 6307 - Women's Health Care Practicum (1.0 cr)
- NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
- NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 - 2.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
Women's Healthcare Nurse Practitioner or (NP)
The DNP program with a specialty in women's health prepares nurses for leadership as advanced practice nurses. This DNP program is for students who hold a baccalaureate degree in nursing, and involves both coursework and clinical practicum experience with an internship in the final semester.

Clinical experience is offered in primary care, women's health, and specialty practice areas, such as oncology and reproductive endocrinology. Students ground their studies in the science of nursing intervention, moral/ethical issues, and nursing research. They then focus on courses that examine the basis of assessment and intervention for adolescent and adult populations with an emphasis on adolescent and adult women. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. A final project that is a systematic investigation of a practice problem is planned, implemented, and completed during the curriculum.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework
Take the following courses for at least 33 credits:

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6213 - Reproductive Healthcare for Women at Risk (2.0 cr)
- NURS 6214 - Reproductive Healthcare for Women at Risk Practicum (2.0 cr)
- NURS 6305 - Women's Reproductive Health Care (2.0 - 3.0 cr)
- NURS 6306 - Women's Reproductive Health Practicum (1.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- NURS 6925 - Advanced Concepts in Women's Health Care I (1.0 - 3.0 cr)
- NURS 6926 - Advanced Concepts in Women's Health for WHNP Practicum I (1.0 cr)
- NURS 6927 - Advanced Concepts in Women's Health II (2.0 cr)
- NURS 6928 - Adv Concepts in Women's Health II WHNP Prac (1.0 cr)
- NURS 7310 - WHNP Clinical and Professional Integration (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)

Statistics: As approved by D.N.P. specialty

Nurse Anesthesia
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The nurse anesthesia area of study prepares registered nurses to become Certified Registered Nurse Anesthetists (CRNAs) who are prepared for nurse anesthesia practice at the highest level. Graduates will possess expertise in general and regional anesthesia techniques and will be prepared to provide leadership in the practice setting. The nurse anesthesia area of study is fully accredited by the Council on Accreditation of Nurse Anesthesia Education Programs. In January of 2009, the University of Minnesota Nurse Anesthesia Area of Study received the maximum 10-year accreditation approval from the Council on Accreditation of Nurse Anesthesia Educational Programs. The program was the first nurse anesthesia program in the US to be accredited to offer the entry-level DNP.

With the Minneapolis VA Medical Center serving as the primary clinical site for the program, the University of Minnesota nurse anesthesia students rotate to several urban and rural clinical sites, which offer a broad spectrum of practice experiences. Some of the clinical sites are required, and some are optional. All required clinical sites are within daily driving distance of the campus.

Nurse anesthesia students complete the requirements for the DNP degree, as well as the requirements to take the National Certification Exam for nurse anesthetists.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework
Take the following courses for at least 59 credits:
Family Nurse Practitioner

The DNP program with a specialty in the family nurse practitioner (FNP) area of study prepares nurses for leadership as advanced practice nurses. The three-year DNP program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and clinical practicums.

The FNP area of study offers leadership preparation for nurses desiring expertise in the scope of practice and in the role of the family nurse practitioner. Students ground their studies in the science of nursing intervention, moral/ethical issues, and nursing research. They then focus on courses that examine the basis of assessment and intervention for families and individuals of all ages. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. A final project that is a systematic investigation of a practice problem is planned, implemented, and completed during the curriculum.

Where applicable, completion of required FNP coursework and practice hours provides eligibility to sit for the FNP Certification through the American Nurses Credentialing Center.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework

Take the following courses for at least 35 credits:

**CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)**
**NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)**
**NURS 5222 - Advanced Human Physiology (2.0 cr)**
**NURS 5226 - Advanced Human Pathophysiology (2.0 cr)**
**NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)**
**NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)**
**NURS 6102 - Family Health Theory (2.0 cr)**
**NURS 6305 - Women's Reproductive Health Care (2.0 - 3.0 cr)**
**NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)**
**NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)**
**NURS 7501 - Health Care of Children for the Family Nurse Practitioner Practicum (1.0 cr)**
**NURS 7503 - Reproductive Health Care of Women Practicum for Family Nurse Practitioners (1.0 cr)**
**NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)**
**NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)**
**NURS 7506 - Family Practice Practicum III: Assessment and Management of Health for the Family Nurse Practitioner (1.0 cr)**
**NURS 7507 - Assessment Management of Health Practicum IV:Community Health Leadership for Family Nurse Pract (1.0 cr)**
**NURS 7508 - Health Care of the Elderly for the Family Nurse Practitioner Practicum (1.0 cr)**
**NURS 7509 - Assessment and Management of Health Practicum VI: Primary Care for the Family Nurse Practitioner (1.0 cr)**
**NURS 7515 - Health Care of Children for the Family Nurse Practitioner: Well Child Care (1.0 cr)**
**NURS 7516 - Health Care of Children for the Family Nurse Practitioner: Acute and Chronic Management (2.0 cr)**
**NURS 7518 - Health Care of the Elder Patient for the Family Nurse Practitioner (1.0 cr)**

Statistics: As approved by D.N.P. specialty
Health Innovation and Leadership

Health care is delivered today in diverse settings, by an expanding workforce and with extraordinary opportunities for nurses to lead, whether through formal leadership positions or through personal advocacy, in traditional settings or in emerging sites. This requires an individual who can think broadly and embrace a global perspective; who embraces diversity in all its forms, including diversity of thought; who is curious and never satisfied with the status quo; who stimulates new ways of thinking and solutions which open up possibilities for action; who bases action on informed practice gained from multiple ways of knowing; who engages in critical thinking, and learns from other thought leaders; who inspires and creates needed change within a particular environment; who can work effectively with a variety of individuals and within disparate groups; and who can create healing environments within which others can do their best work.

The DNP with a focus on health innovation and leadership prepares nurses to function effectively as leaders in traditional and contemporary settings. The goal is to prepare a leader who can work well in the current environment while promoting change and improvement. Students in the program utilize a combination of learning strategies, readings, reflections, and independent learning experiences. Seminars will enable students and faculty to discuss relevant issues and share expertise.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Coursework
Take the following courses, including 5 credits of electives, for at least 35 credits:

- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- NURS 6600 - Health Systems and Care Models (3.0 cr)
- NURS 6702 - Nursing Leadership Seminar: Introduction to Innovation and Leadership (3.0 cr)
- NURS 6703 - Nursing Leadership Seminar: Organizational Culture and Leadership (2.0 cr)
- NURS 6704 - Nursing Leadership Practicum: Organizational Culture and Leadership (1.0 - 2.0 cr)
- NURS 6705 - Nursing Leadership Seminar: Quality and Change Management (2.0 cr)
- NURS 6706 - Nursing Leadership Practicum: Quality and Change Management (1.0 - 2.0 cr)
- NURS 6707 - Health Care Design and Innovation Practicum (2.0 cr)
- NURS 7604 - Executive Leadership Seminar: Boundary Spanning Leadership (2.0 cr)
- NURS 7605 - Executive Leadership Practicum: Boundary Spanning Leadership (1.0 - 2.0 cr)
- NURS 7606 - Relationship-Based Leadership and Management (3.0 cr)
- NURS 7608 - Health Care Finance and Resource Management (3.0 cr)
- HUMF 5874 - Service Design: Designing complex systems to improve service delivery (4.0 cr)

Take at least 5 elective credits, in consultation with the specialty faculty.

Statistics: As approved by D.N.P. specialty

Nursing Informatics

The nursing informatics (NI) specialty area prepares graduates with knowledge and skills necessary for leadership roles in health and nursing informatics to address the issues for consumers, clinical providers, and public health for processing and managing information through the use of various technologies. A wide array of courses throughout the University of Minnesota accompany nursing offerings, which offers students the opportunity to strengthen their disciplinary and interdisciplinary expertise.

With increasing demand for computerizing health information, graduates of the nursing informatics specialty are well positioned to assume leadership roles in nursing and health informatics field. The NI area of study provides knowledge and scholarship complemented by clinical experiences in the following areas:

- Systems analysis and design
- Knowledge representation and interoperability
- Clinical decision support and evidence-based practice
- Human factors and usability
- Leadership and health informatics
- Consumer, clinical provider, and population health informatics
- Health policy leadership
- Development and project management of health informatics projects
- Program evaluation
- Organization and administration of health services
- Ethical foundations of nursing
- Applied research

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework
Take the following courses, for at least 24 credits:

- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
Integrative Health and Healing
The integrative health and healing specialty area prepares graduates with skills necessary for working with individuals, families, communities and health systems in developing holistic approaches to health promotion, disease prevention, and chronic disease management, with a special emphasis on managing lifestyle changes and incorporating the use of complementary therapies. Graduates are prepared to work in diverse settings including hospitals, outpatient settings, health plans, corporate and community organizations, and in private practice. A wide array of courses are available which offer students the opportunity to strengthen their disciplinary and interdisciplinary expertise. Through a collaboration with the Center for Spirituality and Healing, students can opt to concurrently earn a graduate certificate in integrative therapies and healing practices, including a focus in health coaching.

The integrative health and healing area of study provides a foundation of knowledge and practical experiences in the following areas:
- Optimal healing environments
- Botanical medicine
- Clinical aromatherapy
- Mind/body healing
- Functional nutrition
- Energy healing
- Health coaching
- Self-care
- Advanced integrative health and healing skills and program planning
- Applied research

Students choosing to complete coursework part-time are well accommodated by the curriculum.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework
Take the following courses, including 2 credits of integrative therapies electives, for at least 40 credits:
CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
CSPH 5102 - Art of Healing: Self as Healer (1.0 cr)
CSPH 5226 - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
CSPH 5313 - Acupressure (1.0 cr)
CSPH 5423 - Botanical Medicines: Foundations and Practical Applications (1.0 cr)
CSPH 5431 - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
CSPH 5503 - Aromatherapy Fundamentals (1.0 cr)
CSPH 5631 - Healing Imagery I (2.0 cr)
CSPH 5701 - Fundamentals of Health Coaching I (4.0 cr)
CSPH 5711 - Optimal Healing Environments (3.0 cr)
NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
NURS 5222 - Advanced Human Physiology (2.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 7209 - Integrative Health and Healing (1.0 cr)
NURS 7210 - Integrative Health and Healing Practicum I (1.0 cr)
NURS 7211 - Integrative Health and Healing II (1.0 cr)
NURS 7212 - Integrative Health and Healing Practicum II (2.0 cr)
NURS 7214 - Integrative Health and Healing III (1.0 cr)
NURS 7215 - Integrative Health and Healing Practicum III (2.0 cr)
NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
CSPH 5535 - Reiki Healing (1.0 cr)
CSPH 5536 - Advanced Reiki Healing: Level II (1.0 cr)

Take two credits of Integrative Therapies electives, in consultation with the advisor.

Statistics: As approved by D.N.P. specialty
Nurse Midwifery
This program combines academic preparation with clinical skills for the independent management of health care of women and newborns. Further, students receive additional academic preparation in health care policy, economics, evidence-based practice, evaluation and informatics, and complete a systems change project while in the program. DNP midwifery graduates will be prepared to more quickly fulfill leadership roles in the health care setting.

Courses are offered in a web-based format, with multi-day, on-campus seminars approximately two to three times per semester, in Minneapolis. By taking the courses in a web-based or online format, students may complete the midwifery program without having to relocate. Trips to campus to interact with faculty and other students allow for development of a professional learning community and enhance professional socialization. Midwifery clinical sites are used in or near a student's home community if available. Travel may be necessary depending on available midwifery practice locations. The online program is primarily geared to students in the five-state Upper Midwest region of Minnesota, Iowa, South Dakota, North Dakota, and Wisconsin. For more information about online learning, please visit Online Learning Opportunities.

Nurse-midwives assist women and families to promote and maintain health, and to facilitate optimal individual and family integrity in the context of culture and community.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework
Take courses in the following list for at least 34 credits:

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6210 - Midwifery Care of the Childbearing Family (3.0 cr)
- NURS 6211 - Midwifery Care of the Childbearing Family Practicum (2.0 cr)
- NURS 6213 - Reproductive Healthcare for Women at Risk (2.0 cr)
- NURS 6214 - Reproductive Healthcare for Women at Risk Practicum (2.0 cr)
- NURS 6305 - Women's Reproductive Health Care (2.0 - 3.0 cr)
- NURS 6306 - Women's Reproductive Health Practicum (1.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 7213 - Midwifery Clinical and Professional Integration (3.0 cr)
- NURS 6308 - Women's Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6925 - Advanced Concepts in Women's Health Care I (1.0 - 3.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)

Statistics: As approved by D.N.P. specialty

Pediatric Clinical Nurse Specialist
Students who pursue the pediatric clinical nurse specialist (PCNS) specialty area take core courses in nursing theory, moral/ethical issues, and research. They acquire skills in health assessment, intervention, and evaluation. They examine the care of children and families with special health care needs. They focus on planning and implementing programs to improve quality of care for children with chronic and complex illnesses. As the population of children with special health care needs continues to increase, there is likely to be a greater demand for clinical experts and leaders in pediatric nursing. The PCNS area of study is supported by the Center for Children with Special Health Care Needs.

PCNS coursework includes supervised clinical experiences. Efforts are made to provide students with clinical settings within their geographical area. Clinical courses are directed by certified faculty and supervised by clinical nurse specialist preceptors. The PCNS area of study can be completed in a two-year (full-time) or three-year (part-time) sequence.

PCNSs work in collaboration with health care teams in a variety of settings to facilitate quality care for children across the continuum of care settings. They function as clinical experts in the planning, implementation, and evaluation of patient care standards. They provide direct care, oversee staff, patient and family education, participate in clinical research, and develop programs specific to the needs of children.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework
Take the following courses for at least 33 credits:

- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
Pediatric Nurse Practitioner

The pediatric nurse practitioner (PNP) area of study incorporates theory and clinical courses to prepare students to provide comprehensive care to children and their families. Most students elect to complete the children with special health care needs (CSHCN) leadership track by taking additional courses which are supported by the Center for Children with Special Health Care Needs.

Coursework includes nursing theory, moral/ethical issues, research, child assessment, management of childhood illnesses, and health policy. Courses are taught by faculty from the School of Nursing, School of Public Health, the Institute of Child Development, Family Social Science, the Medical School, and the Institute of Community Integration in the College of Education.

Supervised clinical experience is incorporated in the program. Efforts are made to meet students’ individual goals and to provide experiences in their geographic area. Clinical experiences are available in interdisciplinary settings such as primary care, home care, schools, specialty clinics, community agencies, the legislature, and the Minnesota Department of Health.

At the completion of the program, students are eligible to take the Pediatric Nurse Practitioner certification examinations offered by the American Nurses Credentialing Center or the National Certification Board of Pediatric Nurse Practitioners and Nurses. Students in the CSHCN track are eligible for certification from the Institute on Community Integration.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

Required Specialty Coursework

Take the following courses for at least 32 credits:

- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5299 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6102 - Family Health Theory (2.0 cr)
- NURS 6922 - Primary Care: Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6923 - Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children (2.0 cr)
- NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 7925 - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)
- Statistics: As approved by D.N.P. specialty
clinically precepted by certified psychiatric-mental health clinical nurse specialists. Clinical experiences are available in outpatient clinics, community mental health centers, hospitals, schools, and home care agencies. Full-time or part-time students may enroll in the area of study. Current psychiatric nursing experience is strongly encouraged.

Graduates will be academically prepared to take the American Nurses Credentialing Center (ANCC) certification examination for certified specialists in psychiatric-mental health nursing, after obtaining additional required post-master's clinical hours and supervision.

In addition to the required specialty core, students must complete a statistics requirement, as determined and approved by the specialty faculty.

**Required Specialty Coursework**

Take the following courses for at least 34 credits. Take at least one complimentary alternative medicine (CAM) elective course, in consultation with the DNP specialty faculty.

- **CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
- **NURS 5200** - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- **NURS 5222** - Advanced Human Physiology (2.0 cr)
- **NURS 5225** - Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing (3.0 cr)
- **NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
- **NURS 5229** - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- **NURS 6102** - Family Health Theory (2.0 cr)
- **NURS 6504** - Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing (2.0 cr)
- **NURS 6505** - PMH/APN Prac II:Assessing, Managing Psychiatric Disorders in Adv Prac Psychiatric-Mental Health Nurs (2.0 cr)
- **NURS 6602** - PMH Advanced Practice Nursing: Group as a Health Care Intervention (2.0 cr)
- **NURS 6603** - PMH APN Practicum IV: Group as a Health Care Intervention (2.0 cr)
- **NURS 6604** - Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing (2.0 cr)
- **NURS 6605** - Psychiatric/Mental Health Advanced Practice Nursing Practicum I (1.0 cr)
- **NURS 6802** - Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families (2.0 cr)
- **NURS 6803** - Psychiatric/Mental Health Adv Pract Nurs Practicum III: Psychotherapy With Individuals,Families (1.0 cr)
- **NURS 6930** - Foundations of Advanced Public Health Nursing Practice (3.0 cr)
- **NURS 6931** - Health Equity and Social Justice (1.0 cr)
- **NURS 6934** - Population-focused Assessment and Prioritization (1.0 cr)
- **NURS 6944** - Population-focused Assessment & Prioritization Practicum (1.0 cr)
- **NURS 7108** - Population Health Informatics (2.0 cr)
- **NURS 7399** - Public Health Nurse Leadership Role (1.0 cr)
- **NURS 7940** - Application of Behavior Change Theory to Population Health (1.0 cr)
- **NURS 7942** - Application of Behavior Change Theory to Population Health Practicum (2.0 cr)

Elective 1: Graduate credit (3 credits)
Elective 2: Graduate Credit (3 credits)

Take either **NURS 6942** or **NURS 7109**

- **NURS 6942** - Health Equity and Social Justice Practicum (2.0 cr)
or **NURS 7109 - Population Health Informatics Practicum (2.0 cr)**

**Public Health Nursing - Adolescent Nursing**

**Public Health Nursing - Adolescent Nursing**
Graduate study in adolescent nursing utilizes interdisciplinary courses taught by faculty from the Schools of Nursing, Medicine, and Public Health, and the Institute for Child Development. Its curriculum emphasizes the special health care needs of youth and teaches learners best practices in working with youth to promote health and health care.

Students should visit the center's website to gain a better idea of what the Center for Adolescent Nursing is about: http://www.nursing.umn.edu/CANL.

**NURS 5016 - Critical Reading of Scientific Literature in Adolescent Health (1.0 cr)**

**NURS 5604 - Advanced Health Assessment and Interventions with Adolescents (2.0 cr)**

**PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)**

**Post-Master's D.N.P.**
The post-master's option is for individuals who already hold a master's degree in a nursing practice specialty and who have nursing specialty preparation. The DNP program prepares nurses for leadership as advanced practice nurses, clinical experts, health care executives, policy experts, and informaticians.

Post-master's DNP students complete the core DNP requirements. Consult with the DNP program for more information.
**Twin Cities Campus**

Leadership in Health Information Technology for Health Professionals

Postbaccalaureate Certificate

School of Nursing

School of Nursing

Link to a list of faculty for this program.

**Contact Information:**

School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)

Email: nursecerts@umn.edu

Website: [http://www.nursing.umn.edu](http://www.nursing.umn.edu)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 16
- This program requires summer semesters for timely completion.
- Degree: Ldrshp in Hlth Info Tec for Hlth Pro PBacc Cert

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

By combining formal clinical or public health advanced preparation with course work in health information technology (HIT), individuals who earn the postbaccalaureate certificate in leadership in health information technology for health professionals will be able to lead the successful deployment and use of HIT to achieve transformational improvement in the quality, safety, outcomes, and thus in the value of health services.

**Program Delivery**

This program is available:

- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the program requires a baccalaureate degree from an accredited institution in a clinical or public health discipline. Example degrees would be a BS/BA in nursing or public health.

Preferred: Advanced degree in clinical or public health discipline from an accredited institution (nursing MS/DNP/PhD; public health MPH/MS/PhD; MS/PhD in other health-related field)

Other requirements to be completed before admission:

Applicants must have clinical or public health experience. A minimum of two years of management experience is required if the applicant does not hold an advanced degree.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 587
- **MELAB**
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students may qualify for tuition support for informatics courses through the University Partnership in Health Informatics (UPHI). If students receive UPHI funding, they are required to complete certificate requirements within one year of starting the program.

Required Coursework
Take the following courses to meet the 16-credit minimum:
- NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
- NURS 5116 - Consumer Health Informatics (1.0 cr)
- NURS 6105 - Systems Analysis and Design (3.0 cr)
- NURS 7105 - Knowledge Representation and Interoperability (2.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)
- NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
Twin Cities Campus
Master of Nursing M.N.
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Office of Student Career and Advancement Services, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 52
- This program requires summer semesters for timely completion.
- Degree: Master of Nursing

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of nursing degree (MN) is a full-time, 16-month, graduate-level program for students with a baccalaureate (or higher) degree in a non-nursing field. The program includes all the essentials of a bachelor of science in nursing (BSN) program, plus additional graduate work. Upon completion of the coursework, students are eligible to take the National Council Licensure Examination for Registered Nurses (NCLEX-RN) and are also eligible for Public Health Nursing (PHN) certification in Minnesota. Traditional classroom formats are complemented by interactive components and web-based resources.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Completion of a baccalaureate degree from an accredited institution in a non-nursing area of study completed no later than June 1 prior to start of fall semester for year admitted.

Other requirements to be completed before admission:
There are nine prerequisite courses to complete before the start of the master of nursing (MN) program: General Chemistry, Human Anatomy, Human Physiology, Microbiology, Pathology, Human Nutrition, Lifespan Growth and Development, Abnormal Psychology, Inferential Statistics.

Five courses must be complete, with final grades sent to the School of Nursing, by the application deadline. Students are recommended to make three of the five courses their science courses.

Special Application Requirements:
Prior to matriculation to the program, students must complete a Minnesota background check, immunizations, submit provider-level CPR verification, and meet the School of Nursing published technical standards. Application to the Master of Nursing program is available on the School of Nursing website. After a preliminary review of submitted materials, selected applicants are invited to participate in an interview with representatives of the admissions committee.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
- Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 52 major credits and up to null credits outside the major. The is no final exam. A capstone project is required. Capstone Project: The capstone project is an examination of a clinical problem in the setting where students complete their final clinical rotation. It may also be a type of research experience or practicum with a School of Nursing faculty member.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must maintain the compliance requirements (Minnesota background check, immunizations, provider-level CPR verification, and School of Nursing published technical standards) throughout the program.

Required Coursework
- NURS 5029 - Introduction to Nursing Interventions (4.0 cr)
- NURS 5030 - Foundational Concepts of Professional Nursing (3.0 cr)
- NURS 5031 - Human Response to Health and Illness: Adults and Elders (4.0 cr)
- NURS 5032 - Human Response to Health and Illness: Children and Childbearing Families (5.0 cr)
- NURS 5033 - Population-Focused Health in Public Health and Mental Health Nursing (5.0 cr)
- NURS 5034 - Transition to Professional Nursing Practice (3.0 cr)
- NURS 5035 - Practicum Nursing Care for Complex Health Conditions (4.0 cr)
- NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
- NURS 5190 - Essentials of Holistic Health Assessment (3.0 cr)
- NURS 5222 - Advanced Human Physiology (2.0 cr)
- NURS 5241 - Nursing Leadership for Effective Practice (2.0 cr)
- PHAR 5800 - Pharmacotherapy for the Health Professions (3.0 cr)
- NURS 6200 - Science of Nursing Intervention (3.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7600 - Nursing Research and Evidence Based Practice (2.0 - 4.0 cr)
- NURS 5226 - Advanced Human Pathophysiology (2.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

MN Bridge Program
This sub-plan is not currently accepting applicants.
Twin Cities Campus
Nurse Midwifery Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Nurse Midwifery Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nurse midwifery offers students with a doctor of nursing practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by American Midwifery Certification Board & Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A DNP or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where postsecondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
• MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous DNP degree and coursework. Final coursework decisions are made by the faculty advisor.

Courses may include:
- NURS 6305 - Women's Reproductive Health Care (2.0 - 3.0 cr)
- NURS 6306 - Women's Reproductive Health Practicum (1.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6308 - Women's Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6210 - Midwifery Care of the Childbearing Family (3.0 cr)
- NURS 6211 - Midwifery Care of the Childbearing Family Practicum (2.0 cr)
- NURS 6213 - Reproductive Healthcare for Women at Risk (2.0 cr)
- NURS 6214 - Reproductive Healthcare for Women at Risk Practicum (2.0 cr)
- NURS 7213 - Midwifery Clinical and Professional Integration (3.0 cr)
- NURS 6925 - Advanced Concepts in Women's Health Care I (1.0 - 3.0 cr)
- NURS 5505 - Assessment and Support of Women in Labor (2.0 cr)
**Twin Cities Campus**  
**Nursing Ph.D.**  
**School of Nursing**

Link to a list of faculty for this program.

**Contact Information:**  
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)

- Program Type: Doctorate  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 58 to 70  
- This program does not require summer semesters for timely completion.  
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. program in nursing prepares scholars as scientists, leaders, innovators, and educators in nursing and health care who:

* discover new knowledge for nursing science and health care practice through ethical, innovative, theory-based research;
* integrate knowledge to influence health care delivery and policy through collaborative, interprofessional initiatives at organizational, local, state, regional, national, and global levels;
* create and evaluate strategies to improve the health and well-being of individuals, families, communities, and populations; and
* disseminate knowledge to those in nursing, other health sciences, policy makers, and the public through scholarly publication, formal teaching, and other creative venues.

**Accreditation**  
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

**Program Delivery**  
This program is available:  
• via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:

- GRE  
  - General Test - Verbal Reasoning: 156  
  - General Test - Quantitative Reasoning: 146  
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:

- TOEFL  
  - Internet Based - Total Score: 95

- MELAB  
  - Final score: 85

Key to test abbreviations (GRE, TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
34 to 46 credits are required in the major. 
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Required Coursework
NURS 8180 - Doctoral Proseminar I: Scholarly Development (1.0 cr)
NURS 8175 - Quantitative Research Design and Methods (3.0 cr)
NURS 8172 - Theory and Theory Development for Research (3.0 cr)
NURS 8152 - Scholarship in Health Care Ethics (3.0 cr)
NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
NURS 8177 - Advanced Nursing Research Practicum (2.0 cr)
NURS 8190 - Critical Review in Health Research (2.0 cr)
NURS 8121 - Health Behaviors and Illness Responses (3.0 cr)
NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)
NURS 8134 - Interventions and Outcomes Research (3.0 cr)
Twin Cities Campus
Pediatric Clinical Nurse Specialist Postgraduate Certificate
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Pediatric Clinical Nurse Specialist Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework; final coursework decisions are made by the faculty adviser.

Courses may include:
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 6920 - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
- NURS 6921 - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 7925 - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
- NURS 7926 - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
- NURS 7927 - Adv Assessment, Intervention in Families of Children and Youth With Special Health Care Needs Prac (1.0 cr)
**Twin Cities Campus**

**Pediatric Nurse Practitioner Postgraduate Certificate**

*School of Nursing*

Link to a list of faculty for this program.

**Contact Information:**
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: [http://www.nursing.umn.edu](http://www.nursing.umn.edu)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Pediatric Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

**Accreditation**
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

**Program Delivery**
This program is available:
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

**Special Application Requirements:**
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework; final coursework decisions are made by the faculty adviser.

Courses may include:
NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
NURS 6920 - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
NURS 6921 - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
NURS 6922 - Primary Care: Assessment and Management of Common Conditions Affecting Children (3.0 cr)
NURS 6923 - Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children (2.0 cr)
NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
NURS 7925 - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
NURS 7926 - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
NURS 7927 - Adv Assessment, Intervention in Families of Children and Youth With Special Health Care Needs Prac (1.0 cr)
Twin Cities Campus
Psychiatric Mental Health Nurse Practitioner Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: http://www.nursing.umn.edu

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2016
• Length of program in credits: 20
• This program requires summer semesters for timely completion.
• Degree: Psych Mental Hlth Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
• MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The list below is only a sample of courses and may not be applicable for all applicants. Contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework; final coursework decisions are made by the faculty advisor.

Courses may include:

- NURS 6604 - Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing (2.0 cr)
- NURS 6605 - Psychiatric/Mental Health Advanced Nursing Practice Practicum I (1.0 cr)
- NURS 6504 - Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing (2.0 cr)
- NURS 5225 - Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing (3.0 cr)
- NURS 6505 - PMH/APN Prac II:Assessing, Managing Psychiatric Disorders in Adv Prac Psychiatric-Mental Health Nurs (2.0 cr)
- NURS 6602 - PMH Advanced Practice Nursing: Group as a Health Care Intervention (2.0 cr)
- NURS 6603 - PMH APN Practicum IV: Group as a Health Care Intervention (2.0 cr)
- NURS 7612 - Psychiatric/Mental Health Advanced Practice Nursing: Professional Seminar (1.0 cr)
- NURS 7613 - Psychiatric/Mental Health Advanced Practice Nursing: Practicum V (2.0 cr)
- NURS 6802 - Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families (2.0 cr)
- NURS 6903 - Nurse Anesthesia Care: Special Populations (2.0 cr)
**Twin Cities Campus**

**Women's Health Care Nurse Practitioner Postgraduate Certificate**

*School of Nursing*

*School of Nursing*

Link to a list of faculty for this program.

**Contact Information:**
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: nursecerts@umn.edu
Website: [http://www.nursing.umn.edu](http://www.nursing.umn.edu)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2016
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Ad Hlth/Wmn Hlth Care Nrs Pract Certificate

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (DNP) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

**Accreditation**
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

**Program Delivery**
This program is available:
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

Other requirements to be completed before admission:
All applicants must have a current registered nurse license.

**Special Application Requirements:**
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- **MELAB**
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](#)(TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate.

Courses may include:
- NURS 6305 - Women's Reproductive Health Care (2.0 - 3.0 cr)
- NURS 6306 - Women's Reproductive Health Practicum (1.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6925 - Advanced Concepts in Women's Health Care I (1.0 - 3.0 cr)
- NURS 6926 - Advanced Concepts in Women's Health for WHNP Practicum I (1.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (2.0 - 3.0 cr)
- NURS 6927 - Advanced Concepts in Women's Health II (2.0 cr)
- NURS 6928 - Adv Concepts in Women's Health II WHNP Pract (1.0 cr)
- NURS 6213 - Reproductive Healthcare for Women at Risk (2.0 cr)
- NURS 6214 - Reproductive Healthcare for Women at Risk Practicum (2.0 cr)
- NURS 7310 - WHNP Clinical and Professional Integration (2.0 cr)
Twin Cities Campus

Experimental and Clinical Pharmacology M.S.
Experimental and Clinical Pharmacology
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-153 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-626-8419)
Email: dicki002@umn.edu
Website: http://www.pharmacy.umn.edu/ecp/grad/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A U.S. bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

Other requirements to be completed before admission:
GRE scores are required from non-U.S. Pharm.D. applicants. Foreign students may be required to have a phone interview. All international students who are non-English speakers are required to submit TOEFL scores. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement.

Special Application Requirements:
Students are generally admitted to the ECP program for fall semester only. The application deadline is February 1. Applications received after February 1 will be considered on a space-available basis only.

Application to the ECP program at the University of Minnesota is done entirely online through ApplyYourself. A supplemental departmental application form is also required. Applicants should upload it directly to the ApplyYourself system.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus

Experimental and Clinical Pharmacology Minor
Experimental and Clinical Pharmacology
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-153 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-626-8419)
Email: dicki002@umn.edu
Website: http://www.pharmacy.umn.edu/ecp/grad/home.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Experimental and Clinical Pharmacology Ph.D.

Experimental and Clinical Pharmacology
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-153 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-626-8419)
Email: dicki002@umn.edu
Website: http://www.pharmacy.umn.edu/ecp/grad/home.html

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 72
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A U.S. bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had a professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

Other requirements to be completed before admission:
All international students who are non-English speakers are required to submit TOEFL scores. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement. ETS will download your TOEFL score directly into ApplyYourself. Non U.S.-Pharm.D. applicants are required to submit GRE scores. Foreign students may be required to have a phone interview.

Special Application Requirements:
Application to the ECP program at the University of Minnesota is done entirely online through ApplyYourself. A supplemental departmental application form is also required. Applicants should upload it to the ApplyYourself system.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must pass one written preliminary examination and one preliminary oral examination before writing the dissertation.

The final oral examination for the Ph.D. is a defense of the thesis.
Twin Cities Campus
Medicinal Chemistry M.S.
Graduate Studies in Medicinal Chemistry
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street SE, Minneapolis, MN 55455 (612-624-9919; fax: 612-626-3114)
Email: medchem@umn.edu
Website: http://www.pharmacy.umn.edu/medchem/home.html

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly to the MS program. See the Medicinal Chemistry PhD or contact the director of graduate studies for more information.

The medicinal chemistry program emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Students must complete a core curriculum of advanced courses in organic and medicinal chemistry, as well as credits in a minor or related field.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Students are not admitted directly to the M.S. program. See the Medicinal Chemistry Ph.D.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students complete a 14-credit core curriculum of advanced courses in organic chemistry and medicinal chemistry. In addition, students take 6 credits of coursework, chosen in consultation with the advisor, which supports the course of study.

Required Courses
MEDC 8001 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8002 - General Principles of Medicinal Chemistry (3.0 cr)
MEDC 8050 - Physical and Mechanistic Organic Chemistry (2.0 cr)
MEDC 8100 - Medicinal Chemistry Seminar (1.0 cr)
MEDC 8435 - BioAssay & Data Analysis (1.0 cr)
CHEM 8321 - Organic Synthesis (4.0 cr)

Additional Courses
Take at least 1 course from the following list. Choose remaining coursework to meet the 6-credit minimum in consultation with the advisor.
MEDC 5185 - Principles of Biomolecular Simulation (3.0 cr)
MEDC 5494 - Advanced Methods in Quantitative Drug Analysis (2.0 cr)
MEDC 8500 - Design of Chemotherapeutic Agents (2.0 cr)
MEDC 8753 - MOLECULAR TARGETS OF DRUG DISCOVERY (3.0 cr)
MEDC 8420 - Natural Products Chemistry (3.0 cr)
MEDC 8471 - High Throughput Drug Discovery (3.0 cr)
MEDC 8413 - Chemistry of Nucleic Acids (3.0 cr)
MEDC 8700 - Advanced Concepts in Drug Design (2.0 cr)

Thesis Credits
Take at least 10 masters thesis credits.
MEDC 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Medicinal Chemistry Minor
Graduate Studies in Medicinal Chemistry
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-624-0139)
Email: medchem@umn.edu
Website: http://www.pharmacy.umn.edu/medchem/home.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in medicinal chemistry emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of 12 credits in a focused area (which may include biochem or chem credits taken as required for the major program) is required for the doctoral minor, including introductory courses (MEDC 8001 and 8002), advanced medicinal chemistry courses, and other courses in the medicinal chemistry core curriculum.
Twin Cities Campus  
Medicinal Chemistry Ph.D.  
Graduate Studies in Medicinal Chemistry  
College of Pharmacy  

Link to a list of faculty for this program.  

Contact Information:  
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-624-0139)  
Email: medchem@umn.edu  
Website: http://www.pharmacy.umn.edu/medchem/home.html  

- Program Type: Doctorate  
- Requirements for this program are current for Fall 2016  
- Length of program in credits: 48  
- This program requires summer semesters for timely completion.  
- Degree: Doctor of Philosophy  

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.  

The program in medicinal chemistry emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.  

Program Delivery  
This program is available:  
- via classroom (the majority of instruction is face-to-face)  

Prerequisites for Admission  
The preferred undergraduate GPA for admittance to the program is 3.00.  

Other requirements to be completed before admission:  
Applicants should have a B.S. or M.S. degree in an appropriate related science field such as pharmacy, chemistry, or biology. Students majoring in other degree programs that encompass chemical, biochemical, or biological fields of study are also encouraged to apply. All applicants should have completed undergraduate chemistry through elementary organic chemistry. Undergraduate coursework in biochemistry and physical chemistry is also a prerequisite, but under certain circumstances such coursework may be taken during the first year. Students may apply for admission to the Ph.D. program only, and usually are admitted fall semester only.  

Special Application Requirements:  
Scores from the General (Aptitude) Test of the GRE, three letters of recommendation from college-level faculty, a complete set of official transcripts, and a statement of immediate and long range career objectives are required. All application materials should be submitted by the admissions deadline listed on the departmental website in order to be considered for fellowship, teaching, and research assistantships awarded in the next academic year.  

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
- IELTS  
  - Total Score: 6.5  
- MELAB  
  - Final score: 80  

Key to test abbreviations (TOEFL, IELTS, MELAB).  

For an online application or for more information about graduate education admissions, see the General Information section of the
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must also participate in the department seminar program, successfully complete a comprehensive exam requirement that serves as the preliminary written exam, and prepare and defend an original research proposal which serves as the preliminary oral exam.

All students must complete a core curriculum of advanced courses in organic chemistry and biochemistry (totaling 12 credits); and medicinal chemistry (12 cr).
Twin Cities Campus
Pharmaceutics M.S.
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics
Room 9-177 Weaver-Densford Hall
308 Harvard Street SE
Minneapolis, MN 55455
USA
Phone: 612-624-5151
Fax: 612-626-2125
Email: pceuts@umn.edu
Website: http://www.pharmacy.umn.edu/pharmaceutics

• Program Type: Master's
• Requirements for this program are current for Fall 2016
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Entry to the MS program is available on a very restricted basis. Please contact the director of graduate studies to obtain details about admission.

The Pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Other requirements to be completed before admission:
Undergraduate (and graduate, if applicable) scholastic records, recent GRE scores (with a preferred minimum 80% quantitative reasoning score and 3.5 analytical writing score), a statement of career goals and research interests, and three letters of recommendation.

International applicants must submit results from the TOEFL (with a preferred minimum 100 total score and 23 speaking score, and a required minimum 21 writing score and 19 reading score) or IELTS (with a required minimum 6.5 total score, 6.5 reading score, and 6.5 writing score). Prefer "First Class" or the equivalent on transcripts from foreign institutions.

All of the above are collectively used to determine each candidate's admissibility. Fall admission is preferred and the deadline to apply is November 30.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
• IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses

Pharmaceutics Modules
- Register for 2 credits of PHM 8295 in the fall and spring for a total of 4 credits.
- PHM 8295 - Research Problems in Pharmaceutics (1.0 - 12.0 cr)

Pharmaceutics Graduate Courses: 84xx
- Choose 1 of the following courses:
  - PHM 8421 - Advanced Pharmacokinetics (4.0 cr)
  - PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
  - PHM 8441 - Solubility and Solid-State Properties of Drugs (3.0 cr)
  - PHM 8481 - Advanced Neuropharmaceutics (4.0 cr)

Required Background
- Complete this requirement by taking one of the following courses. If PHAR 6726 or 6762 is chosen, or if the faculty accepts previous experience in lieu of background courses, additional elective coursework may be required to meet minimum credit requirements.
  - PHCL 5110 - Introduction to Pharmacology (3.0 cr)
  - PHAR 6726 - Principles of Pharmacology (2.3 cr)
  - PHAR 6762 - Medicinal Chemistry and Neuropharmacology (2.8 cr)

Electives
- Take at least 3 elective credits, in consultation with the advisor, to meet minimum credit requirements. Electives can be from inside or outside the major.

Outside Courses
- Take at least 6 credits outside the major, in consultation with the advisor.

Thesis Credits
- A total of 10 thesis credits is required.
  - PHM 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Twin Cities Campus
Pharmaceutics Minor
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics
Room 9-177 Weaver-Densford Hall
308 Harvard Street SE
Minneapolis, MN 55455
USA
Phone: 612-624-5151
Fax: 612-626-2125
Email: pceuts@umn.edu
Website: http://www.pharmacy.umn.edu/pharmaceutics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Doctoral
The doctoral minor requires a minimum of 12 credits in PHM 8xxx or PHAR 6xxx courses, approved by the pharmaceutics director of graduate studies.

Masters
The master's minor requires a minimum of 6 credits in PHM 8xxx or PHAR 6xxx courses, approved by the pharmaceutics director of graduate studies.
Twin Cities Campus
Pharmaceutics Ph.D.
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics
Room 9-177 Weaver-Densford Hall
308 Harvard Street SE
Minneapolis, MN 55455
USA
Phone: 612-624-5151
Fax: 612-626-2125
Email: pceuts@umn.edu
Website: http://www.pharmacy.umn.edu/pharmaceutics

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48 to 53
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics. Minor fields of particular value include biochemistry, biomedical engineering, biometry, chemistry, chemical engineering, mechanical engineering, molecular biology, pharmacology, and statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Other requirements to be completed before admission:
Undergraduate (and graduate, if applicable) scholastic records, recent GRE scores (with a preferred minimum 80% quantitative reasoning score and 3.5 analytical writing score), a statement of career goals and research interests, and three letters of recommendation.

International applicants must submit results from the TOEFL (with a preferred minimum 100 total score and 23 speaking score, and a required minimum 21 writing score and 19 reading score) or IELTS (with a required minimum 6.5 total score, 6.5 reading score, and 6.5 writing score). Prefer "First Class" or the equivalent on transcripts from foreign institutions.

All of the above are collectively used to determine each candidate's admissibility. Fall admission is preferred and the deadline to apply is November 30.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 to 21 credits are required in the major.
8 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Successful completion of program examinations and timely progress towards the degree are also required for students to remain in good standing.

Required Courses

Pharmaceutics Modules
- Register for 2 credits in fall and 2 credits in spring for a total of 4 credits.
  - PHM 8295 - Research Problems in Pharmaceutics (1.0 - 12.0 cr)

Pharmaceutics Seminar
- Register for 1 credit each semester in which presenting a seminar, for a total of 3 credits.
  - PHM 8100 - Seminar: Pharmaceutics (1.0 cr)

Pharmaceutics Graduate Courses: 81xx
- Take two courses for a total of 2 credits from the following list:
  - PHM 8110 - Readings in Pharmaceutics (1.0 cr)
  - or PHM 8120 - Readings in Central Nervous System (CNS) Drug Delivery (1.0 cr)
  - or PHM 8150 - Pharmacokinetics Research Seminar (1.0 cr)

Pharmaceutics Graduate Courses: 84xx
- Choose two courses from the following list for at least 7 credits:
  - PHM 8421 - Advanced Pharmacokinetics (4.0 cr)
  - or PHM 8431 - Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models (4.0 cr)
  - or PHM 8441 - Solubility and Solid-State Properties of Drugs (3.0 cr)
  - or PHM 8481 - Advanced Neuropharmaceutics (4.0 cr)

Required Background
- Equivalent coursework or previous experience, with approval of the program faculty, may be substituted for some or all of the following courses:
  - PHCL 5110 - Introduction to Pharmacology (3.0 cr)
  - or PHAR 6726 - Principles of Pharmacology (2.3 cr)
  - or PHAR 6762 - Medicinal Chemistry and Neuropharmacology (2.8 cr)
  - MATH 4512 - Differential Equations with Applications (3.0 cr)

Outside Coursework Requirement
- Take at least 8 credits of coursework outside the major, which can include non-PHAR- and non-PHM-designated courses taken to satisfy the background requirement. All courses must be selected in consultation with the advisor.

Thesis Credits
- Take at least 24 doctoral thesis credits.
  - PHM 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Social and Administrative Pharmacy M.S.
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax: 612-625-9931)
Email: cremi001@umn.edu
Website: http://www.pharmacy.umn.edu/pchs/saph/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30 to 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Study within the Social and Administrative Pharmacy Program is tailored carefully to the specific needs and objectives of the student. It is a flexible, interdisciplinary program which utilizes all resources of the University's many outstanding departments in an effort to provide the student with knowledge and experience in areas she/he feels are applicable to the resolution of pharmacy-oriented problems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Other requirements to be completed before admission:
Although the majority of students in the program are pharmacists, a pharmacy education is not required. A bachelor's degree or its foreign equivalent from a recognized college of pharmacy and a strong scholastic record are desirable. Individuals from other fields such as economics, engineering, computer science, medicine, psychology, sociology, or public health may be admitted if their undergraduate coursework satisfies the prerequisites for graduate coursework.

Special Application Requirements:
Applicants must complete a supplementary application form in addition to the University application. The supplementary form along with three letters of recommendation should be uploaded to the University Apply Yourself application. GRE scores are required and a performance level of 580 (158 for November 1, 2011-June 30, 2012) is preferred on the TOEFL for all international applicants whose native language is not English.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

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Information current as of December 20, 2016
Program Requirements

Plan A: Plan A requires 16 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 16 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The balance of coursework taken to meet the 30-credit minimum (8 credits in addition to the 16 major field credits and 6 minor or related field credits) is determined by agreement between the student and adviser.

Plan B also requires two papers of publishable quality; one paper must include a research component with an analysis of data.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.
Twin Cities Campus

Social and Administrative Pharmacy Minor
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax: 612-625-9931)
Email: cremi001@umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2016
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Social and Administrative Pharmacy Program are prepared for research and related activities investigating relationships between biological and physical factors in social settings that involve the drug use process. The flexible interdisciplinary program uses the resources of the many health and social science departments at the University, and may include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and mentored to become professional scientists. Those who complete the program will understand the process of conducting high quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

Social and administrative pharmacy (SAPH) is the application of behavior-oriented interdisciplinary theories to pharmacy problem solving and pharmacy system development. This includes the study of the social, psychosocial, political, legal, public policy, historic, and economic factors that impinge upon the use, non-use, and abuse of drugs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Social and Administrative Pharmacy Ph.D.
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax:612-625-9931)
Email: cremi001@umn.edu
Website: http://www.pharmacy.umn.edu/pchs/saph/home.html

• Program Type: Doctorate
• Requirements for this program are current for Fall 2016
• Length of program in credits: 71
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Social and administrative pharmacy (SAPH) is the application of behavior-oriented interdisciplinary theories to pharmacy problem solving and pharmacy system development. This includes the study of the social, psycho-social, political, legal, public policy, historic, and economic factors that impinge upon the use, non-use, and abuse of drugs.

Students in the Social and Administrative Pharmacy Program are prepared for research and related activities of investigating relationships between biological and physical factors in social settings that involve the drug use process. This flexible interdisciplinary program uses the resources of the many health and social science departments at the University, and may include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and mentored to become professional scientists. Those who complete the program will understand the process of conducting high-quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must complete a supplementary application form in addition to the University application. The supplementary form along with three letters of recommendation should be uploaded to the University Apply Yourself application. GRE scores are required and a performance level of 580 (158 for November 1, 2011-June 30, 2012) is preferred on the TOEFL for all international applicants whose native language is not English.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Two preliminary written exams are required: one concentrates on research design, methodological issues, and statistical analysis; the other on material specific to social and administrative pharmacy. Students must also pass a preliminary oral exam.
Twin Cities Campus

Comparative and Molecular Biosciences M.S.

College of Veterinary Medicine - Adm

College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/cmb

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Comparative and Molecular Biosciences (CMB) program is to train outstanding scientists in the basic mechanisms of animal and human health and disease.

The CMB program is transdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training. Areas of emphasis include genetic and infectious diseases, and comparative aspects of biology and pathology across animal species and humans. Students receive scientific training that prepares them for careers as independent investigators and educators in academia, industry, and government. The CMB program focuses on health that spans a wide range of species, from laboratory animal, companion animal, and livestock species to humans, and is unique within the University of Minnesota.

Note: The primary emphasis of the CMB program is the training of doctoral students; however, a small number of individuals complete a master's degree. The purpose of the master's degree is to provide technical training and scientific competence in the basic mechanisms of animal and human health and disease.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A bachelor's degree in a biological or basic science is required. Previous laboratory experience is strongly preferred.

Other requirements to be completed before admission:
Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for fall semester admission.
http://www.cvm.umn.edu/students/ms-phd/CMB/index.htm

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. requires a minimum of 20 course credits and 10 thesis credits. The 20 course credits include 11 credits from CMB courses. A statistics course is required. A minimum of 5 additional course credits from the biological sciences are also required. A minimum GPA of at least 3.0 is required to maintain satisfactory progress and to graduate.

CMB Program Courses
A minimum of 11 course credits are required. CMB 8550 must be taken twice.
- CMB 8134 - Ethical Conduct of Animal Research (3.0 cr)
- CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
- CMB 8303 - Comparative Models of Disease (2.0 cr)
- CMB 8550 - Comparative and Molecular Biosciences Seminar (1.0 cr)
- CMB 8560 - Research and Literature Reports (1.0 cr)

Statistics
One of the following statistics courses is required.
- CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
- or PUBH 6450 - Biostatistics I (4.0 cr)
- or PUBH 6451 - Biostatistics II (4.0 cr)
- or STAT 5021 - Statistical Analysis (4.0 cr)
- or STAT 5031 - Statistical Methods for Quality Improvement (4.0 cr)
- or STAT 5302 - Applied Regression Analysis (4.0 cr)
- or STAT 5303 - Designing Experiments (4.0 cr)
- or STAT 5421 - Analysis of Categorical Data (3.0 cr)

Additional courses
A minimum of 5 course credits required, primarily from the biological sciences. These courses can be selected from the following list or in consultation with the advisor.
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- or MICA 8003 - Immunity and Immunopathology (4.0 cr)
- or MICA 8004 - Cellular and Cancer Biology (4.0 cr)
- or MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
- or MICA 8010 - Microbial Pathogenesis (3.0 cr)
- or MICA 8371 - Mucosal Immunobiology (3.0 cr)
- or BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
- or BIOC 6021 - Biochemistry (3.0 cr)
- or BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
- or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
- or GOD 5036 - Molecular Cell Biology (3.0 cr)
- or GOD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
- or GOD 8073 - Advanced Human Genetics (3.0 cr)
- or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or **GCD 8151** - Cell Structure and Function (3.0 cr)
or **GCD 8161** - Advanced Developmental Biology (3.0 cr)
or **CMB 5200** - Statistical Genetics and Genomics (4.0 cr)
or **CMB 5594** - Directed Research in Comparative and Molecular Biosciences (1.0 - 4.0 cr)
or **CMB 5910** - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
or **CMB 8208** - Neuropsychopharmacology (3.0 cr)
or **CMB 8344** - Mechanisms of Hormone Action (2.0 cr)
or **CMB 8361** - Neuro-Immune Interactions (3.0 cr)
or **CMB 8371** - Mucosal Immunobiology (3.0 cr)
or **CMB 8481** - Advanced Neuropharmaceutics (4.0 cr)
Twin Cities Campus
Comparative and Molecular Biosciences Ph.D.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/cmb

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the comparative and molecular biosciences (CMB) program is to train outstanding scientists in the basic mechanisms of animal and human health and disease.

The CMB program is transdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training. Areas of emphasis include genetic and infectious diseases, and comparative aspects of biology and pathology across animal species and humans. Students receive scientific training that prepares them for careers as independent investigators and educators in academia, industry, and government. The CMB program focuses on health that spans a wide range of species, from laboratory animal, companion animal, and livestock species to humans, and is unique within the University of Minnesota.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A bachelor's degree in a biological or basic science is required. Previous research experience is expected but not required.

Other requirements to be completed before admission:
Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for admission, fellowships, and research assistantships awarded for the next academic year. http://www.cvm.umn.edu/students/ms-phd/CMB/index.htm

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
MELAB
- Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

Plan A: Plan A requires 20 major credits, 0 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The PhD requires a minimum of 24 course credits and 24 thesis credits. The 24 course credits include 13 credits of CMB program courses. A statistics course is required. A minimum of 7 additional course credits from the biological sciences are also required. In addition, all students are required to complete a teaching experience. A minimum GPA of at least 3.00 is required to maintain satisfactory progress and to graduate.

CMB program courses
A minimum of 13 course credits are required. CMB 8100 must be taken twice and CMB 8550 must be taken twice.

CMB 5910 - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
CMB 8100 - Research Rotation in Comparative and Molecular Biosciences (1.0 cr)
CMB 8134 - Ethical Conduct of Animal Research (3.0 cr)
CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
CMB 8303 - Comparative Models of Disease (2.0 cr)
CMB 8550 - Comparative and Molecular Biosciences Seminar (1.0 cr)
CMB 8560 - Research and Literature Reports (1.0 cr)

Statistics
One of the following statistics courses is required.

CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5031 - Statistical Methods for Quality Improvement (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5421 - Analysis of Categorical Data (3.0 cr)

Additional courses
A minimum of 7 course credits are required, selected from the following list or in consultation with the advisor. Students may take GRAD 8101 OR GRAD 8200 but not both.

MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
or MICA 8003 - Immunity and Immunopathology (4.0 cr)
or MICA 8004 - Cellular and Cancer Biology (4.0 cr)
or MICA 8009 - Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death (2.0 cr)
or MICA 8010 - Microbial Pathogenesis (3.0 cr)
or MICA 8371 - Mucosal Immunobiology (3.0 cr)
or BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
or BIOC 6021 - Biochemistry (3.0 cr)
or BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
or GCD 5036 - Molecular Cell Biology (3.0 cr)
or GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
or GCD 8073 - Advanced Human Genetics (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or GCD 8151 - Cell Structure and Function (3.0 cr)
or GCD 8161 - Advanced Developmental Biology (3.0 cr)
or CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
or CMB 5910 - Grantwriting: What Makes a Winning Proposal? (2.0 cr)
or CMB 8208 - Neuropsychopharmacology (3.0 cr)
or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
or CMB 8361 - Neuro-Immune Interactions (3.0 cr)
or CMB 8371 - Mucosal Immunobiology (3.0 cr)
or CMB 8394 - Research in Comparative Biomedical Sciences (1.0 - 6.0 cr)
or CMB 8481 - Advanced Neuropharmaceutics (4.0 cr)
or GRAD 8101 - Teaching in Higher Education (3.0 cr)
or GRAD 8200 - Teaching and Learning Topics in Higher Education (1.0 cr)

**Thesis Credits**

Take at least 24 doctoral thesis credits

CMB 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
Twin Cities Campus
Veterinary Medicine M.S.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/vmed

- Program Type: Master's
- Requirements for this program are current for Fall 2016
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the veterinary medicine graduate program is to promote science-based research and provide high-quality education to develop scientists who work to improve the health and well-being of animals and humans.

Program Goals:
- Prepare independent, basic, and applied scientists for successful careers in academia, industry, government, or veterinary practice
- Foster development of specific skills including leadership, communication, independent and critical thinking, teaching, interdisciplinary research in collaborative environments, scientific and grant writing, experimental and analytical methods
- Contribute to the body of knowledge in basic, translational, and applied sciences in animal health and well-being, and emerging and zoonotic threats

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

D.V.M. or equivalent; students with a B.A. or B.S. in biological sciences may be considered. Previous laboratory experience is preferred.

Other requirements to be completed before admission:
Applicants must submit a C.V. or résumé, three letters of recommendation from persons familiar with their scholarship and research potential, and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for admission, fellowships, and research assistantships awarded for the next academic year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
  - Reading Score: 6.5
  - Writing Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 20 major credits, up to null credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. requires a minimum of 20 course credits and 10 thesis credits. The 20 course credits include Ethics VMED8134, Student Seminar VMED8550, a Statistics course, and at least 1 additional 8000 level course in the biological sciences. Student Seminar VMED8550 must be taken twice. Additional course credits may be required to meet the 20-credit minimum.

Ethics
An animal ethics course is required.
VMED 8134 - Ethical Conduct of Animal Research (3.0 cr)

Seminar
The student seminar course is required to be taken two times.
VMED 8550 - Veterinary Medicine Seminar (1.0 cr)

Statistics
At least one statistics course is required, but two courses are recommended.
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5031 - Statistical Methods for Quality Improvement (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5421 - Analysis of Categorical Data (3.0 cr)

8000 level courses
At least one additional 8000 level course in the biological sciences. CMB 8202 is recommended. Consult your advisor to identify an appropriate 8000 level course. Suggestions are listed.
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
or GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
or GCD 8073 - Advanced Human Genetics (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or GCD 8151 - Cell Structure and Function (3.0 cr)
or GCD 8161 - Advanced Developmental Biology (3.0 cr)
or CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
or CMB 8303 - Comparative Models of Disease (2.0 cr)
or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
or VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)
or VMED 8193 - Welfare of Farmed Animals (1.0 cr)
or VMED 8394 - Research in Veterinary Medicine (1.0 - 3.0 cr)
or VMED 8492 - Seminar: Infectious Diseases and Swine Medicine (1.0 cr)
or VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)

Additional course credits in the biological sciences
Depending on the total number of course credits completed with the 1 - 8000 level course in the biological sciences, at least 9 additional course credits are required. Consult your advisor to identify appropriate courses. It is suggested that these courses be considered to fulfill these additional course credits.
VPM 4131 - Immunology (3.0 cr)
or CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
or VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
or VMED 5180 - Ecology of Infectious Disease (3.0 cr)
or VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
or VMED 5190 - Seminar and Presentation Development (2.0 cr)
or VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
or VMED 5442 - Quantitative Methods for Analysis of Food Animal Disease Data (4.0 cr)
or VMED 5594 - Research in Veterinary Medicine (1.0 - 4.0 cr)
or VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
or VMED 5920 - Food Defense: Prepare, Respond, Recover (3.0 cr)
or VMED 5921 - Seminar in Food Protection and Defense (1.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
or PUBH 6342 - Epidemiologic Methods II (3.0 cr)
or PUBH 6343 - Epidemiologic Methods III (4.0 cr)
or PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
or PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
or BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
or GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
or GCD 8073 - Advanced Human Genetics (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or GCD 8151 - Cell Structure and Function (3.0 cr)
or GCD 8161 - Advanced Developmental Biology (3.0 cr)
or CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
or CMB 8303 - Comparative Models of Disease (2.0 cr)
or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
or VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)
or VMED 8193 - Welfare of Farmed Animals (1.0 cr)
or VMED 8394 - Research in Veterinary Medicine (1.0 - 3.0 cr)
or VMED 8492 - Seminar: Infectious Diseases and Swine Medicine (1.0 cr)
or VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)
Twin Cities Campus
Veterinary Medicine Ph.D.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmsphd@umn.edu
Website: http://www.vetmed.umn.edu/education-training/ms-phd-programs

- Program Type: Doctorate
- Requirements for this program are current for Fall 2016
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The veterinary medicine graduate program focuses on the scientific study of the mechanisms of transmission and progression of diseases of importance to domestic animals, wildlife and humans with applications to diagnosis, prevention, and treatment. Includes training in infectious and noninfectious disease, epidemiology, environmental biology, ethology, anatomical, clinical and molecular pathobiology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

DVM or equivalent; students with a BA or BS in biological sciences may be considered. Previous laboratory experience is preferred.

Other requirements to be completed before admission:
Applicants must submit a CV or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for fellowships and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
0 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Ethics Course Requirement
Take the following animal ethics course:
VMED 8134 - Ethical Conduct of Animal Research (3.0 cr)

Seminar Requirement
Take VMED 8550 twice for a total of 2 credits.
VMED 8550 - Veterinary Medicine Seminar (1.0 cr)

Statistics Requirement
A minimum of one Statistics course is required. Two Statistics courses are preferred. Select coursework in consultation with the advisor.
PUBH 6414 - Biostatistical Literacy (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
or PUBH 6451 - Biostatistics II (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5031 - Statistical Methods for Quality Improvement (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)
or STAT 5421 - Analysis of Categorical Data (3.0 cr)

8xxx-Level Coursework Requirement
Take at least 3 8xxx-level biological sciences courses from the following list, or select others, in consultation with the advisor. CMB 8202 is recommended.
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)
or BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
or GCD 8008 - Mammalian Gene Transfer and Expression (2.0 cr)
or GCD 8073 - Advanced Human Genetics (3.0 cr)
or GCD 8131 - Advanced Molecular Genetics and Genomics (3.0 cr)
or GCD 8151 - Cell Structure and Function (3.0 cr)
or GCD 8161 - Advanced Developmental Biology (3.0 cr)
or CMB 8100 - Research Rotation in Comparative and Molecular Biosciences (1.0 cr)
or CMB 8202 - Mechanisms of Animal Health and Disease II (3.0 cr)
or CMB 8303 - Comparative Models of Disease (2.0 cr)
or CMB 8344 - Mechanisms of Hormone Action (2.0 cr)
or VMED 8192 - Dairy Health Management: Critical Thinking (1.0 cr)
or VMED 8193 - Welfare of Farmed Animals (1.0 cr)
or VMED 8394 - Research in Veterinary Medicine (1.0 - 3.0 cr)
or VMED 8492 - Seminar: Infectious Diseases and Swine Medicine (1.0 cr)
or VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)
or VMED 8190 - Cell Structure and Function (2.0 cr)
or VMED 8592 - Infectious Disease Journals: Critical Thinking (1.0 cr)

Additional Coursework
Take additional courses from the following list, or select others in consultation with the advisor, to complete the minimum course credit requirement.
VPM 4131 - Immunology (3.0 cr)
or CMB 5200 - Statistical Genetics and Genomics (4.0 cr)
or VMED 5165 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
or VMED 5180 - Ecology of Infectious Disease (3.0 cr)
or VMED 5181 - Spatial Analysis in Infectious Disease Epidemiology (3.0 cr)
or VMED 5190 - Seminar and Presentation Development (2.0 cr)
or VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
or VMED 5442 - Quantitative Methods for Analysis of Food Animal Disease Data (4.0 cr)
or VMED 5594 - Research in Veterinary Medicine (1.0 - 4.0 cr)
or VMED 5596 - Swine Diseases and Diagnostics (2.0 - 3.0 cr)
or VMED 5910 - Grant Writing: What Makes a Winning Proposal? (2.0 cr)
or VMED 5921 - Seminar in Food Protection and Defense (1.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
or PUBH 6342 - Epidemiologic Methods II (3.0 cr)
or PUBH 6343 - Epidemiologic Methods III (4.0 cr)
or PUBH 6350 - Epidemiologic Methods III: Lab (1.0 cr)
or PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)

**Thesis Credits**
Take at least 24 doctoral thesis credits.
VMED 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)